

Pragmatic Psychodynamic Psychotherapy for a Patient with Depression and Breast Cancer: Functional MRI Evaluation of Treatment Effects

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Time-limited psychodynamic psychotherapy is garnering empirical support as an intervention for clinical depression. However, research is needed to examine the efficacy of psychodynamic approaches among patients presenting with diverse psychiatric and medical problems. This case study examined the efficacy of eight sessions of pragmatic psychodynamic psychotherapy (PPP) in treating a woman with major depression and breast cancer. Pre- to post-treatment assessment indicated significant reductions in depression and weekly assessment indicated increased environmental reward was associated with reduced depression. Secondary aims involved piloting a functional magnetic resonance imaging (fMRI) task as a neurobiological indicator of depression attenuation as a function of PPP. This assessment was conducted to explore alternative means of evaluating treatment responsiveness and addressing the problem of arbitrary metrics in measuring change. Clinical and assessment implications are discussed, with a focus on innovative approaches to evaluate treatment outcome and behavioral and neurobiological mechanisms of change associated with PPP.

KEYWORDS: Psychodynamic Psychotherapy; depression; cancer; neuroimaging

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INTRODUCTION

Time limited psychodynamic psychotherapy is garnering support as an empirically supported treatment for depression (de Maat et al., 2008; Driessen et al., 2010; Gerber et al., 2011; Luyten & Blatt, 2012). However, the efficacy of psychodynamic interventions has never been evaluated in a medical care context as an adjunct to medical treatment for cancer. The median point prevalence rate of major depression in cancer patients ranges from 22%-29%, with depression prevalence in women with breast cancer estimated at approximately 30% (Hotopf, Chidgey, Addington-Hall, & Ly, 2002; Massie, 2004). Relative to nondepressed cancer patients, depressed cancer patients present with more severe psychosocial and psychiatric problems (Parker, Baile, de Moor, & Cohen, 2003) as well as deteriorated physical health and quality of life (Hopko al., 2008; Mystakidou et al., 2007; Spiegel & Giese-Davis, 2003; Stommel, Given, & Given, 2002; Weitzner, Meyers, Stuebing, & Saleeba, 1997). This case study examined the efficacy of pragmatic psychodynamic psychotherapy ([PPP] Summers & Barber, 2010) in treating a depressed breast cancer patient in the context of an oncology clinic.

Pragmatic psychodynamic psychotherapy is a semistructured approach and is derived from pre-existing case formulations and psychodynamic treatment techniques. This treatment approach is predicated on a developmental and conflict model of psychopathology, entails clearly defining goals at the onset of treatment, and is more focused than traditional psychoanalytic approaches. This time-limited approach is also explicit in promoting change in behaviors, thoughts, and affect, with treatment goals that are ideographically modified and consist of decreasing vulnerability to abandonment and decreasing harsh self-criticism (Summers & Barber, 2010). Therapy initially focuses on creating a supportive environment, depression education, psychosocial history assessment, and collaborative efforts to identify problems and develop treatment goals. This approach also involves identifying key relationship themes, with the intention of developing a collaborative understanding of the patient's Core Conflictual Relational Theme ([CCRT] Luborsky, 1977). This CCRT facilitates communication and a collaborative conceptualization of the patient's adaptive and maladaptive intra- and inter-personal style of relatedness. Change subsequently evolves through increased insight about maladaptive relational patterns and by working to become more flexible and open to novel styles of relatedness. The final treatment phase entails the patient and therapist working to consolidate insights gained about depressive affect,

practicing new relational patterns, and processing any encountered conflict(s).

In general, there is empirical evidence to support the efficacy of psychodynamic psychotherapy, with reported effect sizes being comparable to other treatments that have been labeled “empirically supported” (see Shedler, 2010 for review). The efficacy of psychodynamic therapy has been tested via randomized controlled trials and has garnered support for treating various psychological problems including depression, anxiety, panic, somatoform, and eating, substance-related, and personality disorders (Leichsenring, 2005; Milrod et al., 2007). Specific to depression, the few studies that have directly compared cognitive behavioral treatment (CBT) to short-term psychodynamic therapy for depression have not distinguished either treatment as being more efficacious than the another (Cuijpers, van Straten, van Oppen, & Andersson, 2008; Leichsenring, 2001). Additionally, studies comparing eight sessions of psychodynamic therapy to 16 sessions of CBT for depression have found comparable outcomes (Barkham et al., 1996; Shapiro et al., 1994). Continued investigation into psychodynamic treatments for depression is warranted.

This case study involved the treatment of an elderly woman named “Isabella” who developed depression secondary to her breast cancer diagnosis. Our objective was to evaluate whether PPP could be efficaciously administered in a specialized oncology clinic. Blood oxygenation level dependence (BOLD) was assessed with functional magnetic resonance imaging (fMRI) at pre- and post-treatment to examine brain activity prior to and following the intervention. This secondary aim was to pilot a recently developed scanner probe aimed at assessing brain activity thought to underscore benign response to pleasure and reward prior to and following PPP. Specifically, the question of interest was whether PPP would be associated with modified brain activity related to pleasure and reward. This probe was adapted from neuroimaging studies that listening to music elicits activity in brain regions thought to underscore pleasure (Menon & Levitin, 2005; Osuch et al., 2009).

In neuroimaging studies in which depressed individuals exhibited diminished response in brain regions involved in pleasure and reward processing (Bardo, 1998; Epstein et al., 2006; Keedwell, Andrew, Williams, Brammer, & Phillips, 2005; Pfaus, Damsma, Wenkstern, & Fibiger, 1995; Schaefer, Putnam, Benca, & Davidson, 2006; Schilström, Svensson, Svensson, & Nomikos, 1998; Carelli, Ijames, & Crumling, 2000, Osuch, et al., 2009), common behavioral features of depression, such as increased avoidance and diminished experience and anticipation for reward and

pleasure in daily activities (Dimidjian, Barrera, Martell, Munoz, & Lewinsohn, 2011; Jacobson, Martell, Dimidjian, 2001; Kasch, Rottenberg, Arnou & Gotlib, 2002) were also observed. Treatment outcome studies have begun to use functional neuroimaging to assess brain activity prior to and following treatment for depression (Brody et al., 2001; Fu et al., 2008; Goldapple et al., 2004; Kennedy et al., 2007; Martin, Martin, Rai, Richardson, & Royall, 2001). Recently, Buchheim and colleagues (2012) assessed pre- and post-treatment changes in brain activity after 15 months of long-term psychodynamic psychotherapy. Their research design used images from the Adult Attachment Projective Picture System ([APPS] George & West, 2001) during fMRI procedures to assess relational attachment patterns and observe functional brain changes that corresponded with treatment outcome. This study was highly innovative in that most prior clinical trials examining functional brain changes following psychotherapy have been criticized for not including functional tasks to probe brain activity (Frewen, Dozois, & Lanius, 2008). Incorporating functional tasks during scanning is thought to elicit brain activity that underscores phenomenological experiences associated with psychiatric disorders and may bear relevance to understanding whether psychological interventions affect theoretically relevant brain regions. Among individuals with depression, for example, it would be especially fruitful to investigate whether psychotherapy affects brain regions typically associated with environmental reward, pleasure, and depressive affect. (e.g., cingulate cortex, nucleus accumbens, caudate, orbital, medial, and dorsolateral prefrontal regions, and ventral striatum; Mayberg 2003, 2006; Osuch et al., 2009). Consequently, we hypothesized that following successful PPP we would observe increased brain activation in response to a pleasurable music listening paradigm in regions such as the ventral striatum (nucleus accumbens), medial orbital (moPFC) and dorsolateral prefrontal cortex (dlPFC). We also anticipated that, following treatment, reduced activity would be observed in the subgenual cingulate cortex and expected all changes in activation to correspond to reduction in depression.

BACKGROUND INFORMATION

The patient in this study, hereafter referred to as “Isabella.” was in her 60s, right-handed, married, and Caucasian, with four years of graduate-level education. She was diagnosed with breast cancer two years prior to her pretreatment evaluation. She received cancer treatment in the form of a left radical mastectomy (followed by six months of chemotherapy) approximately two years prior to PPP. She also received hormone treat-

ment (i.e., tamoxifen) for breast cancer from one year prior to PPP through midway through psychotherapy. Her medication regimen for cholesterol, hypertension, edema, allergies, asthma, and breast cancer was consistent throughout treatment with the exception of tamoxifen. Her depression emerged in conjunction with her cancer diagnosis and her husband suffering a stroke, approximately two years prior to PPP treatment. The depression was manifested as decreased energy, fatigue, listlessness, agitation, and “feeling like a failure”. At the time of her pretreatment evaluation she was diagnosed with major depressive disorder using the Anxiety Disorders Interview Schedule-IV ([ADIS-IV] Brown, Di Nardo, & Barlow, 1994). All sessions were provided on an outpatient basis at a cancer institute within a university medical center. An advanced male clinical psychology doctoral student with extensive training in psychodynamic psychotherapy conducted treatment. Informed consent was obtained, as approved by the University Institutional Review Board.

BASELINE ASSESSMENT

Isabella was recruited in the context of a clinical trial at a university-based medical center cancer institute, which was examining the efficacy of behavioral activation and problem-solving therapy for patients with breast cancer who were also depressed (Hopko et al., 2011). Pragmatic psychodynamic psychotherapy treatment and fMRI were used with this patient in a pilot study examining feasibility of treatment implementation and efficacy of PPP for major depression. As indicated by the ADIS-IV assessment, major depressive disorder was her primary diagnosis. Prior to (and throughout) treatment, Isabella completed the Beck Depression Inventory-II ([BDI-II] Beck, Steer, & Brown, 1996). Isabella’s pretreatment BDI-II score was 31, indicative of severe depression. Her pretreatment Beck Anxiety Inventory ([BAI]; Beck & Steer, 1993) was 5, reflecting minimal somatic anxiety. The Environmental Reward Observation Scale ([EROS]; Armento & Hopko, 2007) assesses environmental reward (range = 0–40), with Isabella reporting moderate (18) environmental reward at pretreatment. This measure also was completed following each therapy session. Isabella also completed the Multidimensional Scale of Perceived Social Support ([MSPSS] range = 12–84; Zimet, Dahlem, Zimet, & Farley, 1988), with higher scores reflecting poorer social support from family, friends, and significant others. She had an MSPSS baseline score of 41, which reflected low to moderate perceived social support. The Hamilton Rating Scale for Depression ([HRSD] Hamilton, 1960) was also

completed at baseline by an advanced clinical psychology doctoral student. Isabella had a baseline HRSD score of 21, reflecting moderate depression.

In addition to self-report measures, Isabella participated in functional brain imaging scans one week prior to therapy and one week following completion of therapy on a 1.5-T Siemens MRI scanner located at the University Medical Center's Department of Radiology. All data preprocessing and analyses were done with Statistical Parametric Mapping (SPM8; Wellcome Department of Cognitive Neurology, London, United Kingdom) with parameters, methodology, and correction for multiple comparisons outlined in Gawrysiak et al. (2012). During her scans, Isabella listened to alternating passages of music, which were selected based on Isabella's preference and identified as "preferred" and "neutral" ([based on a previously established coding system] Gawrysiak et al., 2012; Osuch et al., 2009). Pretreatment brain response was assessed by comparing the images acquired as Isabella listened to preferred and neutral music conditions. No differences were found in any brain region ($p > 0.05$ uncorrected), suggesting that brain response did not respond differentially to preferred or neutral music in any way. Brain response—to confirm activation in the auditory cortex, as would be expected during music listening task—was also examined while the patient listened to music or was at rest. This contrast demonstrated bilateral activations in auditory cortex, suggesting that our music condition elicited brain response that reflected auditory stimulation in manner that supported our paradigm.

TREATMENT COURSE

The course of PPP consisted of eight one-hour sessions administered over 13 weeks. Treatment focused on discussing personal experiences and relationships within the context of the Isabella's cancer, medical treatment, and depression. Additional focus was given to conceptualizing and discussing Isabella's psychosocial history as an exercise to inform and create more adaptive and meaningful ways to relate to others in her present environment.

OPENING PHASE

Session 1

At the first session, the therapist briefly discussed the nature of psychodynamic treatment (following Summers & Barber, 2010), and settled on the details of scheduling and duration, leaving the option open for continuation of therapy at the end of her participation in treatment. They also discussed her presenting complaints, developmental background, and

treatment goals. Early in the session, Isabella stated that she was “a little depressed” and “can’t get away from it,” regarding her efforts to recover. She explained that her current depression began about two years prior when she was diagnosed with breast cancer, resulting in a radical mastectomy of her left breast. Following this cancer treatment, she reported difficulty leaving home, getting out of bed, having “no interest in anything,” and expressed an aversion to sexual intimacy, adding that she experienced significant grief about how her husband had been affected.

Regarding other recent precipitating stressors, Isabella described her husband’s temporarily disabling stroke, one daughter’s chaotic divorce, and another daughter’s increasingly violent marriage. She described each of these situations with an exaggerated sense of responsibility and disappointment. When the therapist identified these two themes, she brought up her career in nursing, from which she had recently retired. She angrily expressed “bitterness” about “taking care of everyone else for too long.” The therapist invited Isabella to explore other important periods in her life characterized by a similar theme of “taking care of everyone.” She was quite capable of engaging in this task. For example, she told a story from her childhood in which she took on the primary responsibility of taking care of her mother who had a physically debilitating disease, that in effect resulted in confinement of both of them to home, and thus highly restricted her contact with peers. She further described teaching her mother to walk, involving emotionally and literally physically draining daily activities as her mother struggled through recovery. In examining Isabella’s personal narrative, a common lifelong theme of loss and resentment emerged in which she continually relinquished her own needs in order to provide care and support for others. Following her cancer diagnosis, she felt inadequate, depleted, and ultimately depressed, as she believed she was incapable of properly addressing her personal needs as well as those of her family.

After discussing her history and the precipitating factors of her depression, Isabella and her therapist established two treatment goals:

- 1) working through Isabella’s multiple losses and related resentment, and
- 2) recovering her sense of pride, resilience, and “toughness” (cf. Summers & Barber, 2010).

The therapist informed Isabella that these goals would be examined within the context of the cancer, its treatment, and depression, with explicit focus on both the “personal” (intrapsychic) and “relationship” (interpersonal) levels of functioning.

Session 2

At the second session, Isabella expressed her sense of physical disgust with herself, communicating that her husband's attempts at affection "just remind me of my deformity." She then returned to discussing the "care-giver" role she had held for most of her life, noticing the ways that she had felt effective and capable when taking care of others, and in turn ineffective and incapable when she required the care of other family members and friends. Being a (cancer) patient brought her a considerable sense of helplessness that she deeply resented. Overall, she was continually disappointed in others' attempts to care for her, leaving her bitter about the resulting imbalance (i.e., feeling that their efforts were meager compared to her nurturing skills).

Isabella then discussed the ways in which she was unable to adequately care for and focus on herself during chemotherapy because her husband had been disabled by a stroke, resulting in high perceived pressure to accommodate his needs. She expressed strong feelings of disappointment in herself, and her self-criticism focused on her tendency to be distracted while caring for him, she reported frequently losing patience with him during his recovery. Isabella's physical scars from the mastectomy became a visceral metaphor for the monumental loss of an essential part of her self-concept, specifically, her capacity to feed and nurture others. During this session the therapist adopted a collaborative and supportive stance and encouraged Isabella to verbalize how the cancer diagnosis and subsequent treatment affected her sense of self and quality of relationships. Discussion also focused on concrete subjects related to depression, where the therapist also educated her about depression and gave direct advice (e.g., increased physical activity, healthier sleep hygiene).

Session 3

At this session Isabella returned to discussing her relationship with her mother. She described how, decades before, she had helped her mother learn to walk, noting her siblings' nonexistent contributions. Their mother had lived in Isabella's home for several years. During the worst of the breast cancer treatment, which coincided with her husband's stroke, Isabella "gave up," and moved her mother into a nursing home. Isabella voiced frustration with being the sole caregiver for others, once again at the expense of her personal needs, "Even now, I'm the only one that's there for her." Quickly after expressing anger towards her brother and sister, Isabella made excessive apologies for her anger and excuses for their absence. She felt guilty for this condemnation, had no ideas of how to cope

with the guilt, and felt ineffective at finding a plausible solution. She remembered that even prior to being diagnosed with cancer, she felt guilty whenever she took personal time to care for herself. The therapist pointed out Isabella's vacillation between anger and guilt, noting her general preference of feeling guilt rather than anger.

At this point, the therapist had established the following tentative core conceptual relationship theme (CCRT; Luborsky, 1977):

Isabella often experienced a longing for personal efficacy, which was the primary motive for her "caregiving" behaviors toward others. People tended to respond with passivity to her heightened activity, allowing her to provide for their needs. In turn, this dynamic resulted in Isabella feeling resentful because her own needs went unmet in the unbalanced relationships that she had worked to establish. This resentment quickly resulted in guilt about the desire to be aggressive to others, a less threatening response that protected the vulnerable and passive objects (the people she cared for), so Isabella became immobilized. Through this process, she experienced intense disappointment, returning her to the original ineffectual thoughts and feelings that elicited the cycle. Her experience of feeling invasively mutilated only served to exacerbate the pathological nature of this "caregiving" cycle, especially because her breasts became the target of scans, surgeries, and biopsies. Isabella identified strongly with this theme, and readily told stories that exemplified this pattern, specifically in her relationship with her daughter and mother. Isabella and her therapist worked to collaboratively understand how her CCRT interfered with her potential to live a meaningful and fulfilling life.

This marked movement into the middle phase of treatment (Summers & Barber, 2010), in which the therapist assisted in facilitating change by helping the patient explore new perceptions of herself and others, process difficult emotions, and consider new behavioral responses to situations.

MIDDLE PHASE

Sessions 4 to 6

Now that Isabella was aware of (and identified with) several instances exemplifying the CCRT, the therapist could take a more directive approach through offering specific suggestions for different behaviors that might assist in improving her symptoms. For example, Isabella was encouraged to talk to her mother more openly about her resentment toward her siblings for their minimal financial and emotional support. Isabella and the therapist talked about the possibility that her mother could understand Isabella's mixed feelings about caring for her and paying for her nursing home expenses. This possibility led Isabella to a new

perception of herself: the possibility that she could more confidently consider voicing her own needs with less guilt. This new perception and self-confidence also translated into increased receptiveness to the therapist's direct suggestions to engage in behaviors that were intrinsically rewarding. For example, the therapist suggested that Isabella take walks with her husband more frequently. Isabella later described an intimate and warm conversation they had on a walk that week.

As therapy progressed, they continued to explore Isabella's patterns of caretaking, and feelings of inefficacy, resentment, selfishness, guilt, and paralysis in more detail. The therapist assisted with helping Isabella to identify related themes in her stories and both current and historical changes in her behavior and relationships. Eventually, Isabella described the core pattern in her relationships with her mother, husband, brother, and one of her daughters. She also brought up her relationship with her oncologist. She expressed guilt about surreptitiously reducing her dose of tamoxifen, although she was convinced that taking tamoxifen was contributing to her depression. Isabella initially explained that she was worried that the oncologist would be angry with her for her noncompliance, but then corrected herself to say that she actually just felt guilty for being deceptive. With barely a comment from the therapist, their shared understanding of her CCRT helped Isabella to recognize this was another scenario in which she experienced guilt over anger. Following this insight, she decided to make an appointment with her physician to talk openly about her medication.

After this appointment, Isabella began the next session expressing relief, explaining that her physician had fully approved stopping tamoxifen altogether and that he surprisingly seemed neither angry nor disappointed. This relief prompted some discussion of her cancer treatment, with a thematic resonance for the psychotherapy itself. Isabella realized that much of her resentment was driven by the intense intrusiveness of her treatment and the related surgeries, biopsies, injections, and scans. She talked about how she was "sick of being experimented on." As Isabella expressed her anger with more confidence and assertiveness, she began to feel more empowered with others and to pursue her personal needs.

As the end of treatment approached, Isabella described an increase in thoughts of self-criticism and worsening mood, despite an increase in energy and motivation. Isabella brought up the loss of her ability to be a mother, when the therapist inquired about the relevance of her mastectomy. Isabella initially responded with anger, saying "that doesn't make sense," explaining that she still wanted to be a woman, while admitting

that she was ready to pull back from being the only mother in her family. Her ambivalence regarding the role of “mother as sole caregiver” was important, as it allowed her to consider the possibility of setting boundaries in a manner that fostered a new sense of confidence in being able to acknowledge and address her own needs and to relinquish some of her assumed role as caregiver to everyone she cared for in her immediate family.

Session 7

This session focused on another instance of Isabella’s CCRT, in which she was planning to visit her daughter and grandson who lived out of state. She described her desire to protect her daughter from an impulsive and hostile husband, while also feeling overwhelmed with taking care of people. She predicted the possibility of feeling emotionally depleted if she spent the trip trying to take care of her daughter rather than enjoying time with her grandson. Isabella made the decision (without the therapist’s prompting) to be more aware of her impulses to take care of her daughter’s problems as a way to manage her own “helpless” feelings. Isabella then associated to a recent incident with her pastor in which she openly criticized his “bigoted” sermon. When asked how often she took on a confrontational role at church, she laughed and said, “I’m starting to feel like my old self again.”

ENDING

Session 8

When Isabella returned for her final session, she appeared more assertive and expressive than she had in earlier sessions. She described a distinct change in her interpersonal patterns with family members. She would have brief, but supportive, interactions with them rather than frantically trying to solve all their problems. In effect, Isabella described a renewed sense of efficacy that came without resentment or guilt.

Isabella reflected on the end of treatment, and remarked on her growing realization that the previous two years had brought about overwhelming feelings of loss and guilt. She acknowledged that she had not realized the ways that her previous pattern of caretaking had been challenged by her new role as a patient, nor had she considered the ways that caretaking could backfire and contribute to feelings of resentment and guilt. Isabella also reported that it was helpful to talk about her emotional life with someone who allowed her to be self-indulgent. Upon review of her depression symptoms she described an increased sense of enjoyment and satisfaction marked by physical and social activity, relief from worry

about her daughter, decreased feelings of disgust about her body, and increased physical affection toward her husband. Isabella expressively wondered how much her medication had caused her depression, but stated that she might not have been forthright with her oncology doctor had she not proactively confronted her worry about anger and guilt.

Conclusion

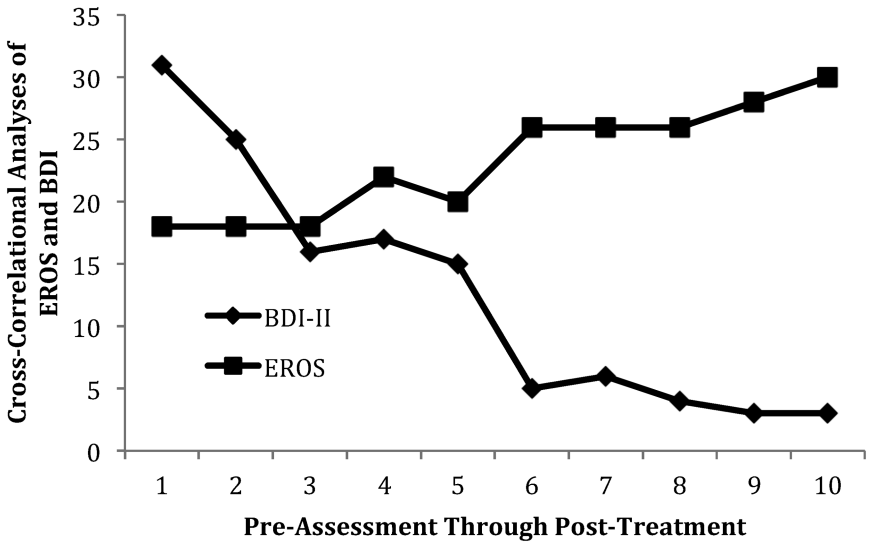
Through a trusting and supportive relationship, mutually agreed upon goals that were rooted in a dynamic formulation of her depression, and an ability to use the therapeutic context to openly examine relational patterns, PPP assisted with mitigating Isabella's depression symptoms and establishing more adaptive interpersonal patterns. Pragmatic psychodynamic psychotherapy proceeded by working to identify key themes of abandonment and loss, resentment about such loss, and internal conflict over her self-worth and efficacy. A CCRT (Luborsky, 1977) was developed to allow for conceptualization of Isabella's adaptive and maladaptive intra- and inter-personal style of relatedness. Change evolved through increased insight about maladaptive relational patterns (e.g., with her oncologist and family members), greater openness to novel styles of relatedness, and confidence to engage in a broader range of meaningful behaviors (e.g., walks with husband) that ultimately resulted in more rewarding outcomes and experiences. In the final phase, Isabella consolidated the insights she had gained about her depression, and practiced new relational patterns with less conflict. Significant changes included directly addressing her needs in the context of her marital relationship, which resulted in her husband helping in household activities, assisting her with medical needs, and ultimately spending more meaningful time together. Moreover, Isabella developed a more assertive and self-advocating stance in communication with her oncologist, which resulted in adjustment of her cancer treatment.

EVALUATING OUTCOME

Isabella achieved full remission of her depression and exhibited clinically relevant reductions in symptoms following treatment, which was consistent with reliable change indices (Jacobson & Truax, 1991) established through treatment outcome research with depressed breast cancer patients (Hopko et al., 2011). Her BDI-II was reduced from 31 to 3 and her HRSD from 21 to 3, both measures reflecting a reduction from moderate-severe to minimal depression. Consistent with behavioral models of depression that highlight increased environmental reward as in-

Figure 1.

CROSS-CORRELATIONAL ANALYSES (CCA) OF EROS AND BDI-II DATA COMPLETED AT PRE- AND POST-TREATMENT AND FOLLOWING EACH THERAPY SESSION.

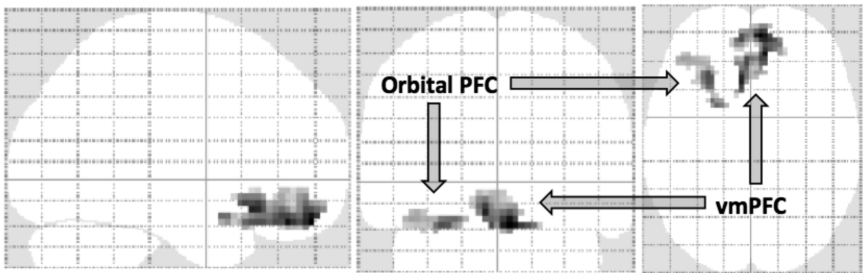


versely associated with depression severity (Hopko, Lejuez, Ruggiero, & Eifert, 2003; Lewinsohn, 1974; Martell, Addis, & Jacobson, 2001), Isabella’s EROS increased from 18 to 30. Her BAI decreased from 5 to 2, reflecting minor reductions in anxiety, and her MSPSS decreased from 41 to 34, reflecting increased social support. To more finely assess the relation of decreased depression and increased environmental reward assessed weekly throughout therapy, a cross-correlation analysis (CCA) was conducted using the Simulation Modeling Analysis software ([SMA] Borckardt, 2008). CCA determines the degree that two measures relate to one another at a specified interval of time. For Isabella, the two measures most highly correlated at lag 0 ($r = -0.90, p = 0.001$; see Figure 1), indicating that BDI-II scores were most strongly related to EROS scores on a session-by-session basis. Accordingly, self-reported environmental reward systematically increased as depression attenuated.

There were no differences in BOLD response to preferred versus neutral music passages pre-treatment ($p > .05$). The BOLD response to preferred music relative to neutral was compared between pre- and post-treatment scans, restricted to our regions of interest (cingulate cortex, nucleus accumbens, caudate, orbital, medial, and dorsolateral prefrontal regions, and ventral striatum). This contrast indicated significant differ-

Figure 2.

GLASS BRAINS PORTRAYING BOLD RESPONSES FOR PREFERRED VERSUS NEUTRAL MUSIC IN THE POST-TREATMENT SCAN.



Images illustrate activations within the orbital prefrontal cortex (oPFC at $-27, 26, -20$; $p = .036$) and the ventral medial prefrontal cortex (vmPFC at $6, 53, -20$; $p < 0.001$). Cluster-defining threshold was a voxel-level $p < 0.005$ and p-values above reflect cluster-level family-wise error correction for multiple comparisons. Neurological convention (right on right) is used and coordinates are in Montreal Neurological Institute space. Statistical maps thresholded at $p < 0.005$ for viewing.

ences in regions of the ventral-medial prefrontal cortex ([vmPFC] $p = .023$, cluster-level uncorrected) and near significant differences in the left orbital prefrontal cortex ([oPFC] $p = .091$, cluster-level uncorrected). Posttreatment, vmPFC and left oPFC BOLD response was higher for preferred relative to neutral music ($p = .000$ and $p = .036$ respectively, corrected for multiple comparisons at the cluster level; Figure 2).

Indeed, the vmPFC and oPFC have been implicated in conscious regulation of emotional states (Phillips, Drevets, Rauch, & Lane, 2003), have been shown to correlate with pleasure ratings of music, and have been observed to distinguish depressed and healthy individuals during music listening tasks (Elliott, Agnew & Deakin, 2008; Osuch et al., 2009). These regions have also been implicated in relative, rather than absolute, reward (Elliott, Agnew & Deakin, 2008) and are frequently included in neurobiological models of depression (Mayberg, 2003, 2006). Consequently, these posttreatment fMRI findings are conceptualized as a plausible neurophysiological reflection of Isabella's adaptive development and increased capacity for reward and pleasure. However, given the single subject design, these findings must be interpreted with caution.

DISCUSSION

This study assessed changes in depression symptom severity following eight sessions of PPP (Summers & Barber, 2010) and utilized functional neuroimaging as a proposed method to gauge treatment outcome and associated mechanisms of change. Findings suggest that PPP not only

reduced depression, but may also promote improved quality of life and greater capacity to experience pleasure in daily activities and behaviors. The patient demonstrated favorable responses to treatment as reflected by clinically significant changes on clinician and self-report measures of depression, and she was deemed to have achieved full depression remission. This pilot case study provides preliminary support for the efficacy of PPP as a treatment for depression, and suggests feasibility and patient tolerability of PPP as a treatment in a medical facility context. Given that PPP is a structured intervention allowing for ideographic case conceptualization, it may represent a treatment approach capable of addressing a broad spectrum of depression manifestations triggered in part by coexistent medical problems. This hypothesis warrants future investigation. In this case self-reported depression and environmental reward exhibited a direct inverse relationship. The CCA indicated depression attenuation was associated with increased environmental reward reflected in session-by-session measurements. Accordingly, these data suggest that more frequent experiences of pleasure and reward in daily experiences correspond with reductions of depression. While it is highly speculative, this observation may reflect Isabella's increased capacity to draw upon inner strength and resources that allowed her to live life with a greater sense of freedom, optimism, and purpose (Shedler, 2010).

Although this case study is restricted in the generalizability of observations of functional brain activity, important implications are noteworthy. First, few examinations of functional brain activity both prior to and after treatment for depression have incorporated a functional task during scanning. Future randomized clinical trials may benefit from using similar music-listening probes to examine brain activity associated with reward responsiveness and pleasure as it relates to psychotherapy and depression. Second, this study demonstrates a novel model for evaluating meaningful life change that is not arbitrary. A criticism of the process of establishing empirical support for psychotherapies is that measures of symptom change may be arbitrary in terms of evaluating the extent to which therapy contributes to meaningful life improvement (Westen, Novotny, Thompson-Brenner, 2004; Kazdin, 2006). Simple measures of symptom reduction provide little information to guide clinicians in best practices as most therapies tend to reduce symptoms (i.e., the "dodo bird effect": Lurbsorky, 1975). Assessing benign neurophysiological responses to pleasure, in conjunction with self-report indices of reward and depression, may serve as plausible and more valid means of evaluating treatment response as

these approaches of measuring symptom change reliably reflect capacity for pleasure and happiness.

Important study limitations are noteworthy. First, treatment was not independently evaluated to assess therapist competence or general adherence to the PPP model. A systematic strategy of assessing treatment adherence may be difficult to develop due to the flexible and adaptive nature of PPP. Special consideration may be required by researchers examining the efficacy of PPP in larger randomized clinical trials. Second, although treatment was associated with reduced depression, data may be confounded by Isabella's discontinuation of tamoxifen, a hormone treatment for breast cancer that has depression listed as a adverse effect for 15% of women (Demissie, Silliman, & Lash, 2001). Third, while the vmPFC and oPFC were noteworthy functional brain activations in this patient at posttreatment, future investigations with larger sample sizes and more heterogeneous patient samples are needed to replicate this finding. Despite these limitations, preliminary results support that time-limited psychodynamic therapy may be efficacious for depressed breast cancer patients in an oncology clinic. Controlled clinical trials for patients who are depressed and have breast cancer are limited and the efficacy of psychodynamic approaches for this population is virtually unstudied (Fann et al., 2008; Hopko et al., 2011). Such work is clearly warranted. Finally, addressing potential problems associated with arbitrary metrics in treatment outcome research (Kazdin, 2006), the combined approach of synthesizing weekly assessment measures, pre-post treatment clinician and patient measures, and corresponding functional neuroimaging assessment may yield data that is highly innovative, more integrative, and potentially more valid than traditional assessment strategies.

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