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The Impact of Sudden Gains and Deteriorations on the Psychotherapy Process

A Dissertation

Presented to

the Faculty of the Morgridge College of Education

University of Denver

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

by

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August 2018

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ABSTRACT

Within the field of psychotherapy research, there has been significant evidence to suggest that people change and improve because of treatment (Lambert & Ogles, 2004). One common phenomenon that has been observed when looking more closely at outcome trajectories has been termed sudden gains/deteriorations. These are defined as sudden changes in outcome (either positive or negative) of 25% or more from the pre-change level of symptoms that are in turn sustained over time (Tang & DeRubeis, 1999). Although there are data regarding how people who experience sudden gains end up after treatment, no studies have examined the impact that sudden gains and deteriorations have more immediately on related outcome domains. The phase model of change in psychotherapy describes three sequential stages of improvement which occur over the course of successful treatment ((1) the “client acquires a greater sense of well-being,” (2) “symptoms associated with diagnoses diminish,” and (3) “functioning in work, relationships, and self-care improves”) (Howard, Lueger, Maling, & Martinovich, 1993; Kopta, Owen, & Budge, 2015, p. 442). Although there is support in the research for each latter phase being contingent on the improvement of those that occur prior (Kopta, Owen, & Budge, 2015), the relationship between sudden gains and deteriorations on these various outcome domains has not been tested. The present study utilized a sample of 16,657 clients who engaged in routine psychotherapy and completed the Behavioral Health Measure-20 before every session. This measure is comprised of three scales that

correspond directly with the components of the phase model (Kopta, Owen, & Budge, 2015). Among clients who experienced sudden gains or deteriorations on BHM-20 scales, multilevel piecewise analyses were used to assess if following a sudden gain or deterioration in one phase, clients experienced change in level and/or slope for the outcome associated with the subsequent phase. We found that: (1) Following a sudden gain in well-being, the mean-level for symptoms increased significantly, and the rate of change decreased significantly, (2) Following a sudden gain in symptoms, the mean-level for life functioning increased significantly, (3) Following a sudden deterioration in well-being, the mean-level and rate of change for symptoms both decreased significantly, and (4) Following a sudden deterioration in symptoms, the mean-level for life functioning decreased significantly. This series of analyses represented the first true test of the impact of sudden gains and deteriorations on clients as they continue to participate in the therapy process and of the relationships between the trajectories of change associated with the phase model.

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CHAPTER 1: INTRODUCTION

From the late 1950s until now, studies have found strong evidence that psychotherapy is effective, whereby 80% of people attending psychotherapy have been shown to have superior mental health statuses as compared with those not receiving care (Smith & Glass, 1977; Smith & Glass, 1980; Wampold, 2001; Wampold & Imel, 2015). The merit behind such assertions has been enhanced over time as psychotherapy researchers have refined the measurement and operationalization of the independent variable (i.e., what constitutes psychotherapy) and the dependent variable (i.e., the outcome of therapy) (Strupp, 1963). Accompanying this discussion of the effectiveness of psychotherapy is one that emphasizes the importance of understanding, not only the degree to which people change from pre to post treatment, but also the trajectories of growth during the process. That said, although the end result of treatment appears overwhelmingly positive, less is known about how people arrive at this level of improvement. There is still significant work to be done in an effort to understand the rates with which people improve, how much, and when they benefit from treatment, and the ways in which outcome domains (e.g., symptoms, well-being, life functioning) co-vary over the course of therapy (Baldwin, Berkeljon, Atkins, Olsen, & Nielsen, 2009; Hansen, Lambert, & Forman, 2002; Owen et al., 2015).

Shedding light on changes that occur over the course of treatment can have vast implications for how the field understands the process of psychotherapy. More

specifically, empirically supported treatments should guide the implementation of psychotherapeutic techniques based upon how and when clients change. Among policy makers, this translates to the determination of session limits and billing policies (i.e. after 10 sessions, a client must pay more out of pocket). Theorists may also incorporate knowledge gleaned from modeling trajectories of change into how they make sense of mechanisms of change in psychotherapy and when they anticipate change will happen among clients based on diagnostic or personality factors. Educators and supervisors can teach clinicians in training about what to expect from clients during treatment and what typical courses of treatment should look like. Similarly, for clinicians, this can enhance recognition of clients who may be off track (i.e. not improving or becoming worse) and call attention to times to engage openly with clients about their perceived progress. Further, if clients are involved in discussion about their processes of change, they may feel more empowered to express their needs and to refine their goals in collaboration with their providers. If these trajectories are neglected, the result may be poorly informed decisions about treatment, both on individual and more global levels, which in turn negatively impact clients and how much they benefit from care.

Models of Change in Psychotherapy

Psychotherapy researchers have developed four different ways of conceptualizing and modeling the underlying trajectories of change that clients undergo while in therapy. The four have been titled the following: (a) Dose-Effect Model, (b) Good Enough Level Model, (c) Growth Mixture Models, and (d) Sudden Gains or Sudden Deteriorations. Each of these models was developed to identify, to better understand, and to empirically

test typical patterns of change that occur during treatment and if, how, and when people engage in meaningful improvements while in therapy.

Treatment-Response Relationships. Two of the aforementioned models, the Dose-Effect Model and the Good Enough Level Model each depict trajectories of change based on conceptual models, which are applied to all clients in a given sample (Baldwin et al., 2009). These models are both useful in that they depict the average representations of change in psychotherapy outcomes. However, in doing so, individual variability is not fully explored (e.g., treated as an error term in the models).

Dose-effect model (Howard, Kopta, Krause, & Orlinsky 1986). The dose-effect model was the first prevailing model among those designed to understand dose-response relationships and to explore the association between the length of treatment and client benefit (Baldwin et al., 2009; Falkenström, Josefsson, Berggren, & Holmqvist, 2016; Howard, Kopta, Krause, & Orlinsky 1986). Conceptually, this model is rooted in a medical understanding of treatment. For example, a person with strep throat is treated by a medical professional and is prescribed a specific dose of medicine to take over a certain number of days. Such a treatment can fluctuate in its strength based on how much and when a person consumes it, but the underlying assumption is that taking enough of it will lead to a cure. As Kopta, Howard, Lowry, and Beutler (1994) explain, dose as a psychotherapy term is likened to that which is taken when a person ingests a prescribed amount of medication.

Accordingly, this model is rooted in the idea that doses of therapy (i.e. sessions of therapy including reflections of feeling, interpretations, and recognition of patterns, for example) are similar to the “active ingredients of medication” (Baldwin et al., 2009).

Therefore, if a client attends a set number of psychotherapy sessions, the client will gain access to the curative components of treatment, which would lead to improvement in psychological functioning. This model posits some predictable association between receiving doses of psychotherapy-based treatment and experiencing changes in psychological outcomes. Accordingly, this model operates under the assumption that the benefit achieved in psychotherapy is a function of the number of sessions attended. Too few sessions can be ineffective and too many sessions may not be helpful either. As such, there is a therapeutic range where doses of therapy have the greatest and most important impact. This theory is what drives the a priori modeling of the effect of dose.

Howard and colleagues conducted the first empirical test of the dose-effect model in 1986. They utilized a probit analysis among a sample of 2,400 patients as a part of a large review. The results indicated that after 8 sessions, 53% of clients had experienced reliable change¹. After 26 sessions, the same was true for 74% of clients (Howard et al., 1996). Findings from this study yield the conclusion that longer-term treatment leads to people experiencing more reliable change as a result of remaining engaged in therapy for more time.

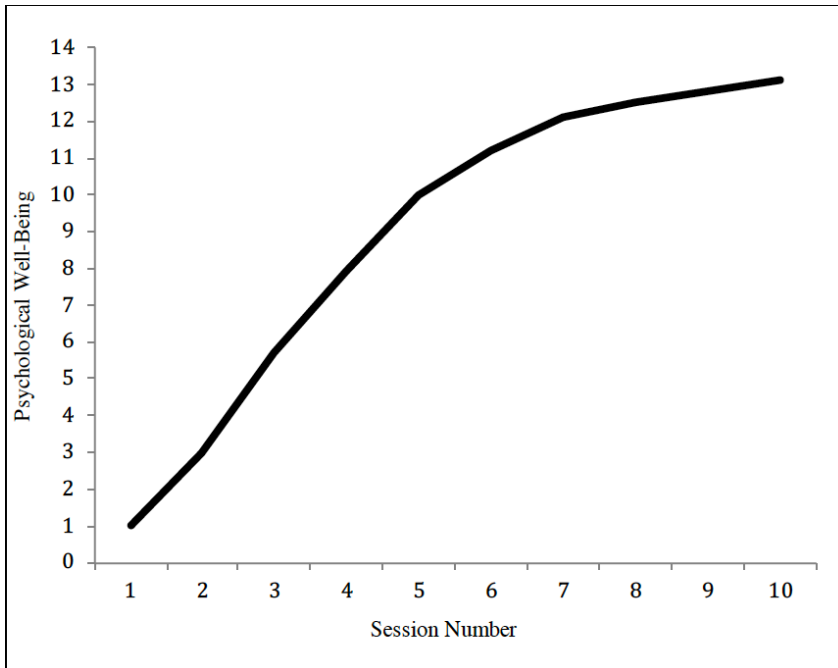
Although the percentage of clients who achieved reliable change increased after more sessions, utilizing the dose-effect model, the relationship between sessions and outcome was found to be curvilinear and negatively accelerating (Howard et al., 1996). Indeed, change occurs more rapidly early on in treatment and then plateaus with later

¹ Reliable change is a determination of how much change is sufficient to deem that it is unlikely to be accounted for by measurement unreliability. The level of change necessary in order for it to be considered reliable is the initial standard deviation of a measure and its reliability (Evans, Margison, & Barkham, 1998).

sessions producing less improvement relative to those that came before (See Figure 1 for an example) (Howard et al., 1996; Kopta et al., 1994).

Figure 1

Example of a Negatively Accelerating Curve of Psychological Well-Being



Baldwin and colleagues (2009) highlight that a key assumption of the dose-effect model (as it was tested by Howard, Kopta, Krause, and Orlinsky (1996)) is that the effect of dose is on average equal across people regardless of how many sessions they attended and of any other variables that might account for individual variability in the outcomes a person has over time. The recognition of this limitation of the dose-effect model led to the development of other models of change accounting for the potentially systematic relationship of therapy dose and treatment response (Stiles, Honos-Webb, & Surko, 1998).

Good-enough level mode (GEL). Another way of retrospectively understanding the treatment-response relationship is based on the logic that people remain in therapy until they and/or their therapists deem that they have improved sufficiently and should discontinue services. In other words, clients attend therapy until they feel “good enough.” Implicit in this model is that clients who present for different numbers of sessions will inherently have different rates of change (Baldwin et al., 2009; Barkham et al., 2006; Barkham, Rees, Stiles, et al., 1996; Stiles, Barkham, Connell, & Mellor-Clark, 2008). Rather than dose driving change, this model asserts the exact opposite. That is, the rate of change is reflective of a person’s presenting concerns, how ingrained their symptoms are, and the way in which they respond to treatment (Baldwin et al., 2009). Session limits that define the “dose” may also have differential effects on the rate of change. This may be a function of the ways in which clients respond to therapy contexts based upon how much time they know they have with their therapist and how they adjust their focus, efforts, and expectations (Barkham et al., 2006). For example, one experimental study assigned clients to receive either 8 or 16 sessions of the same treatment (Barkham et al., 1996). Symptom reduction based on the Beck Depression Inventory (BDI; Beck et al., 1961) was measured after 8 sessions for both groups (marking the end of treatment for 8-session group and the middle of treatment for the 16-session group). On average, clients in the 8-session group experienced greater improvement than did clients in the 16-session group following session 8 (Barkham et al., 1996). At the end of treatment, BDI scores for each group were not significantly different (Barkham et al., 1996). Results from this study also highlighted that the GEL model was not a perfect indicator across outcome measures, as clients’ interpersonal difficulties were better affected in longer-term treatment (the 16-

session group) (Barkham et al., 1996). This might suggest that the treatment-response is partially contingent on time and type of outcome.

Baldwin and colleagues (2009) describe the predictions of the good-enough level model as being two-fold. First, clients who receive low doses of treatment change quickly, and the inverse is true for clients who receive high doses of treatment (Baldwin et al., 2009). This may occur for any number of client or therapist driven reasons, but according to this model, the dose is determined by the rate of change and not the alternative. Additionally, the rate of change is influenced by client expectations regarding when they plan to end treatment (Barkham et al., 1996; Barkham et al., 2006). Attending more sessions without some level of intentionality related to treatment planning should not impact the likelihood of achieving clinically significant change, but rather the rate at which clients do so (Baldwin et al., 2009). Therefore, length of treatment will not lead to meaningful change, but being in treatment long enough based on a unique client's rate of change will lead them to experience quantifiable improvement. The underlying assumption of this model is directly in contrast to that of dose-effect model; the effect of additional sessions is, on average, not equal across people (Baldwin et al., 2009). Indeed, people vary in the rates at which they change in treatment, and therefore, they vary in the amount that they would benefit from having a ten-session maximum as compared to a twenty-session maximum.

Research support. The relevance and applicability of the dose-effect model and the good-enough level model have been widely tested. Researchers have measured these models against one another to test which of their conflicting assumptions holds true across studies. A summary of the literature based upon large client samples engaging in

psychotherapy has provided broad support for the good-enough level model as being a better fit to these data than the dose-effect model. However, many of the studies testing these models utilized one outcome scale and collected data in large quantities and without many predictor variables.

In a test of the GEL model, one study examined the rates of improvement in psychotherapy among clients who attended therapy with planned endings (Barkham et al., 2006). Data were collected from 1,868 clients being seen in primary care mental health practices for anywhere between 1 and 12 sessions. Members from this group of clients either completed a planned course of therapy or agreed with their therapists that termination was appropriate (Barkham et al., 2006). In line with the good-enough level model, the percentage of clients who achieved reliable change and clinically significant change was consistent regardless of the number of sessions attended (Barkham et al., 2006).

Another hallmark study conducted by Baldwin and colleagues in 2009 included a sample of 4,676 patients in individual psychotherapy. The study found that the rate with which patients changed on the Outcome Questionnaire-45 (Lambert et al., 2004) varied as a function of dose of treatment whereby those who received smaller doses changed faster and those who received larger doses changed slower. Based on comparisons of model fit statistics, the results of this study were “most consistent with the good-enough level model;” however, the study also found support for the dose-effect model in that early on in treatment (before session 8), there was increased likelihood of clinically significant change with increased dose (Baldwin et al., 2009, p. 208).

Expanding upon this model of understanding change over sessions, researchers began to test the impact of the number of sessions attended and the frequency with which they were attended. In a sample of 1,027 individuals from a university counseling center in the United States, the good-enough level model was supported via progress measured by the Outcome Questionnaire-45 (Reese, Toland, & Hopkins, 2011). A next step to understand this relationship was taken in this study by introducing time as a moderator. This was done by considering the impact of session frequency and inherently challenging the way the field defined dose as being simply based on number of sessions attended. The results indicated that clients who attended sessions more frequently demonstrated more rapid improvement (Reese et al., 2011). Further, a large archival sample of 21,488 clients from a university counseling center who completed the Outcome Questionnaire-45, utilized multilevel modeling to examine if attending therapy more often (every week as compared to every two weeks) influenced rate of change and clinically significant change (Erekson, Lambert, & Eggert, 2015). Replicating the results of Reese, Toland, and Hopkins (2011), the study found that clients who attended therapy more frequently (weekly) had greater rates of change on the Outcome Questionnaire-45 (Erekson et al., 2015). As such, if clients attended sessions more often, they achieved clinically significant change more quickly. Mathematically, this makes sense, as the slope associated with their change was steeper. Total change achieved did not differ by group, but rate of change did (Erekson et al., 2015). Clinically, this provides support for meeting with clients weekly when it is possible to do so. If therapists and clients can meet on a weekly basis, then they are likely to reach their goals more quickly. However, if this is

not feasible, meeting bi-weekly may impact the pace, but will not necessarily limit the amount of improvement they make over the course of therapy.

Building upon previous studies by examining the impact of treatment duration, Stulz and colleagues (2013) tested the dose-effect and good-enough level models in a sample of 6,375 participants who completed the Behavioral Health Measure-20 (Kopta & Lowry, 2002) as a part of outpatient treatment. They found that regardless of length of treatment, log-linear models assuming the negative acceleration pattern of the dose-effect model fit the data better than did linear latent growth curve models (Stulz, Lutz, Kopta, Minami, & Saunders, 2013). There was also support for the good-enough level model in that rate of change varied across clients and as a function of the treatment length (Stulz et al., 2013). Further, another study examined the fit of the good-enough level and the dose-effect model on each of the three outcomes assessed by the Behavioral Health Measure-20 (well-being, symptom distress, and life functioning) (Owen, Adelson, Budge, Kopta, & Reese, 2016). In a sample of 13,664 clients, the good-enough level model demonstrated better fit across outcome domains in that trajectories of change varied based on sessions attended and that regardless of total dose, clients, on average, ended at similar levels of functioning (Owen et al., 2016). Additionally, the amount of change experienced over the course of therapy was dependent on the outcome variable being assessed. The magnitude of change for well-being and for symptom distress was greater than that observed on the life functioning outcome (Owen et al., 2016). This study also highlighted the importance of the impact of clients being nested within therapists. Which therapist clients received care from accounted for a significant proportion of the variance in rate of change for two of the three outcome variables on the Behavioral Health

Measure-20 (Owen et al., 2016). In particular, therapist effects impacted symptom distress and life functioning. As the authors of this article highlight, therapists may be more consistent in their ability to facilitate change in the domain of well-being. This may be more to do with the prospect of change associated with attending therapy and less to do with the individual therapist. However, the outcomes for which the rates of change that did vary by therapist are more complex in nature and in theoretical conceptualization and, therefore, may be more impacted by a clinician's therapeutic prowess. Owen and colleagues (2016) made an important contribution to the literature on trajectories of change by analyzing multiple outcomes in more depth.

Lastly, Falkenström and colleagues (2016) broadened the scope of inquiry to examine an international sample of primary care and psychiatric care patients. Data from both samples support the good-enough level model. More specifically, in the primary care sample, patients had slower rates of improvement when they were in treatment longer (Falkenström et al, 2016). However, they also experienced a greater magnitude of change (Falkenström et al, 2016). Regardless of sample (primary care or psychiatric care), the results were not indicative of a negatively accelerating curve (Falkenström et al, 2016). Overall, the findings from the aforementioned studies suggest that the good-enough level model is a better fit to the data than is the dose-effect model.

Identifying Groups Whose Members Change Similarly (Growth Mixture Modeling). Rather than prescribing certain expected trajectories of change as both the dose-effect and the good-enough level models do, growth mixture modeling is a technique that operates under the assumption that the population contains heterogeneous subpopulations based on growth parameters (Duncan, Duncan, & Strycker, 2006). The

statistical technique categorizes clients into latent classes or within psychotherapy research, groups of clients who are similar on their trajectories of outcome change. As such, patterns and characteristics of subgroups of clients can be more closely examined (Muthén, 2004; Vermunt, Tran, & Magidson, 2008). Also post hoc in nature, this technique better addresses heterogeneity in the data. In more accurately representing groups within a given sample, this technique can dispel clinical myths or stereotypes that therapists have about how and when they assume their clients are making progress.

Observed trajectories. Several studies have utilized growth mixture modeling, a relatively novel technique within psychotherapy research, to identify groups with different trajectories. For example, Lutz, Stulz, and Köck (2009) tested the heterogeneity of treatment courses in a sample of 162 patients with major depressive disorder. The following three patterns of change emerged in the first 8 weeks of treatment: (1) moderate symptoms and moderate early improvement, (2) moderate/severe symptoms and rapid early improvement, and (3) mild/moderate symptoms and moderate early improvement (Lutz, Stulz, & Köck, 2009). Three subgroups were also identified among a sample of 346 patients being treated for cocaine dependence (Stulz, Gallop, Lutz, Wrenn, & Crits-Christoph, 2010). The three change patterns, which depicted cocaine and overall drug use were identified as being: (1) moderate severity and rapid reduction, (2) moderate severity and moderate reduction, and (3) high severity and moderate reduction (Stulz et al., 2010). Across diagnostic domains, both of these studies capture various subpopulations that exist within treatment samples. This speaks to the flexibility that is required of clinicians as they encounter clients who do not follow common treatment trajectories.

Further support for the utility of growth mixture modeling has continued to accumulate. In a sample of 10,854 clients who completed the Behavioral Health Measure-20 in a naturalistic setting (Kopta & Lowry, 2002), Owen and colleagues (2015) utilized this technique and identified three latent classes of clients based on their trajectories of change. These classes were not prescribed by the researchers but instead deduced from common patterns observed in the data based upon certain groups of clients changing similarly. Descriptively, they labeled these latent classes or groups of clients as, “Early and Late Changers,” “Worse Before Better,” and “Slow and Steady” (Owen et al., 2015). In addition to the shape of the trajectories of these groups being quite different, examination of the intercepts on the Behavioral Health Measure-20 suggests that latent classes can differ in their initial psychological functioning scores (Owen et al., 2015). These studies highlight that trajectories of change may be more complex and variable across people than was previously depicted by the good-enough level and dose-effect models, and that clients’ initial status on outcome variables may impact their later growth in treatment.

Sudden Gains and Deteriorations. Dose-effect, good-enough level, and growth mixture models all depict continuous trajectories of change that occur over the course of therapy. However, what these models do not capture are the session-by-session changes in functioning that may occur as clients engage in psychotherapy. Although it is important to have a general picture of how change occurs across clients, some clients fluctuate on these outcome variables from session to session. Indeed, some clients have trajectories that are non-progressive in nature in which they display non-linear and steeper gains/deteriorations in functioning.

Specifically, Tang and DeRubeis (1999) found that within individuals, patterns of change involved sudden improvements in functioning in a “single between-sessions interval” (p. 894). The magnitude of the reduction in symptoms is meaningful not only as it relates to between session changes that occur, but also in that it accounts for a meaningful portion of the total improvement patients undergo in treatment (Tang & DeRubeis, 1999). The existence of sudden gains led Tang and DeRubeis (1999) to pose a number of questions about their theoretical importance. Among them were “Do they represent transient noise, or do they represent a long-lasting decrease in patients' depression severity?” and “Are they ‘random’ mood swings, or are they triggered by important therapeutic breakthroughs?” (Tang & DeRubeis, 1999, p. 895). Tang and DeRubeis (1999) then engaged in a process of clarifying the identification and description of sudden gains in order to limit ambiguity around their quantitative meaning. By definition, a sudden gain (1) “should be large in absolute terms,” (2) must represent “at least 25% of the pre-gain session score,” and (3) must be sustained after it occurs (Tang & DeRubeis, 1999).

In the first test of immediate, short term, and long-term effects of sudden gains, the gains accounted for on average 51% of the improvement observed in treatment on the Beck Depression Inventory (Tang & DeRubeis, 1999). After controlling for initial levels of depression, patients who were part of the group who experienced a sudden gain had significantly more positive results at post-treatment and at follow-up than did those who did not experience a sudden gain (Tang & DeRubeis, 1999). As such, sudden gains were deemed more than just “transient mood fluctuations” (Tang & DeRubeis, 1999; p. 902). Since the initial operationalization of this term, a mirror phenomenon has been described

in the literature. Termed sudden deteriorations or sudden losses, this phenomenon is one that represents large and sudden decreases in functioning or worsening of symptoms that remain stable over time. Just as sudden gains were found to be associated with enhanced outcomes (Tang & DeRubeis, 1999), sudden deteriorations have been found to be associated with poorer outcomes at the end of psychotherapy (Haugen, Goldman, & Owen, 2015).

Following the identification and definition of sudden gains and deteriorations within the literature, there has been significant research dedicated to further understanding their prevalence, the circumstances around their existence, and their long-term impact. These content areas have been studied in depth across various diagnostic presentations and treatment modalities. Specifically focused on sudden gains, Aderka, Nickerson, Bøe, and Hofmann (2012) conducted a meta-analytic review to summarize the effects of 16 studies of individuals receiving psychotherapy for major depressive disorder or an anxiety disorder. The comprehensive set of analyses conducted as a part of this study greatly augmented the literature on this topic and provided vast support for and understanding of the sudden gains and their impact.

In particular, Aderka and colleagues (2012) found that people who experienced sudden gains on primary outcome measures had greater improvement than those who did not. Across 19 treatment conditions, the effect size for those who experienced a sudden gain as compared to those who did not was 0.62 (95% CI [0.43, 0.80]; Hedge's *g*). The impact of sudden gains on primary outcome measures was also tested at follow-up. To compensate for low sample size, the follow-up comparison was based on a pooled sample of studies with varying follow up durations ($M = 4.44$ months) (Aderka et al., 2012).

There was significantly greater improvement from post treatment to follow-up on the primary outcome for people who experienced sudden gains during treatment (Hedge's $g = 0.56$, 95% CI [0.36, 0.75], $p < .001$) (Aderka et al., 2012). Additionally, the impact of sudden gains was found to be consistent across diagnostic categories such as depression and anxiety.

Although the meta-analytic review spoke broadly about the impact of sudden gains on depression and anxiety symptomology, there have been a number of studies that have examined sudden gains and deteriorations across patients with a host of diagnostic presentations. For example, sudden gains were observed in a sample of women being treated for alcohol use disorders. Sudden gains in urge frequency related to drinking behavior predicted better drinking outcomes at the end of treatment (Drapkin, Epstein, McCrady, & Eddie, 2015). In addition, sudden gains in symptoms of generalized anxiety disorder were also related to greater overall symptom reduction (Deschenes & Dugas, 2012). Relatedly, sudden gains on measures of PTSD symptomology were associated with greater reductions on secondary outcomes (symptom clusters associated with numbing and hyperarousal and depression) (Kelly, Rizvi, Monson, & Resick, 2009). As such, sudden gains that occur during PTSD treatment have been found to have broad prognostic implications. The same can be said regarding the impact of sudden gains on treatment of social anxiety. Individuals who experienced sudden gains had enhanced primary outcomes at post and follow-up as compared to those who did not (Bohn, Aderka, Schreiber, Stangier, & Hofmann, 2013). Abel and colleagues (2016) found that among patients with treatment-resistant depression, symptom severity was less at 12-month follow-up for those who experienced sudden gains compared to those who did not.

Sudden gains are widely observed phenomena, and their impact on therapy outcomes across a host of diagnostic domains is well supported.

Although sudden gains are linked to positive therapy outcomes, there is evidence to indicate that sudden deteriorations have comparable impacts in the negative direction. One study found that patients who experienced “sudden losses” during treatment were those with the smallest effect sizes at the end of treatment (Lutz et al., 2013). Indeed, a study of World Trade Center responders with PTSD found that individuals who experienced sudden deteriorations had worse therapy outcomes compared to those who did not (Haugen, Goldman, & Owen, 2015). Changes of this magnitude, regardless of the directionality, have broad implications for client functioning and symptom severity following treatment.

Sudden gains and deteriorations have not only been observed across diagnostic categories, but they have also been noted as occurring across therapeutic modalities. The meta-analytic review by Aderka and colleagues (2012) hypothesized that sudden gains would be linked to changes in cognitive processes and, therefore, would have stronger effects for clients undergoing cognitive behavior therapy as opposed to other, non-cognitive treatments. This hypothesis was in fact supported, and the mean effect size for CBT interventions (0.75) was significantly greater than that of non-CBT interventions (0.23) (Aderka et al., 2012). Indeed, sudden gains were related to improvements in the short and long-term for both groups. However, this review found the effect size of sudden gains within cognitive therapy to be larger.

A number of other studies looked more closely at the distinctions between treatments and found support for sudden gains in a number of more specific, theoretically

based treatments. For example, sudden gains were found in cognitive therapies (Busch, Kanter, Landes, & Kohlenberg, 2006; Lemmens, DeRubeis, Arntz, Peeters, & Huibers, 2016; Tang, DeRubeis, Hollon, Amsterdam, & Shelton, 2007). This phenomenon was also observed in both individual and group variations of cognitive behavioral therapy (Deschenes & Dugas, 2012; Kelly, Roberts, & Ciesla, 2005) and in studies of behavior activation (e.g., Hopko, Robertson, & Carvalho, 2009; Masterson, Ekers, Gilbody, Richards, Toner-Clewes, & McMillan, 2014). Furthermore, sudden gains also occur within the context of supportive expressive therapy (Tang, Luborsky, & Andrusyna, 2002), interpersonal therapy, (Kelly, Cyranowski, & Frank, 2007; Lemmens, DeRubeis, Arntz, Peeters, & Huibers, 2016) and integrative therapy (Haugen, Goldman, & Owen, 2015).

There is ample support to indicate that sudden gains and deteriorations exist and that they occur across treatment modalities and diagnostic categories. In addition, many studies have supported their lasting impact (either positive or negative in direction depending on gain or deterioration) on therapy outcomes immediately after treatment and at follow-up. However, what is not known relates to the impact that sudden gains and deteriorations have on the therapy process that follows them. No known studies have investigated what immediately follows a sudden gain both on the primary outcome of interest and on other related outcomes. Accordingly, a sudden gain on one outcome variable may impact the rates at which clients improve across the board on any number of outcome variables. To more completely understand the trajectories of change that occur in psychotherapy, the ways in which various psychotherapy outcomes are impacted by sudden gains and deteriorations must be explored in more depth.

The Phase Model

There is a theoretical basis that underlies the suggestion that a sudden gain on one domain may impact the trajectories of change of other interrelated domains. In psychotherapy, the phase theory, defined by Howard, Lueger, Maling, and Martinovich (1993) “posits that discrete yet interacting facets of patients’ conditions change at different rates over the course of psychotherapy” (p. 678). These authors defined a three-phase model of psychotherapy characterized by progressive and sequential improvement. Formally, the three corresponding phases are named remoralization, remediation, and rehabilitation (Howard et al., 1993).

Accordingly, specific change processes lead first to an improved sense of subjective well-being associated with the hope of entering treatment and feeling better as a result (Howard et al., 1993). Clients obtain a sense of optimism about the future and the progress they are capable of making in therapy. This is considered part of the process of remoralization (Howard et al., 1993). As clients continue, the phase model delineates that they would move progressively past this stage to one in which they experience a reduction in symptomology facilitated by therapist interventions around coping skills and cultivating healthier lifestyles. Termed remediation, this might relate to a decrease in specific disorder related difficulties such as worrying, panic attacks, or anhedonia, for example (Howard et al., 1993). After this decrease in symptoms, clients enter the third phase, rehabilitation. At this point, they undergo more gradual and lasting changes related to enhancements in life functioning as a result of changes to longstanding life patterns (Howard et al., 1993). Observable changes in the rehabilitation phase may relate to enhanced ability to engage in role obligations such as parenting or participating in work

responsibilities. Lasting change is a function of each sequential phase occurring and building to lead to rehabilitation in broad life domains, which typifies recovery from psychological illness.

There is initial support for the phase model of psychotherapy (Howard et al., 1993; Lutz, Lowry, Kopta, Einstein, & Howard, 2001). Callahan, Swift, and Hynan (2006) tested the model in an outpatient training clinic utilizing the Outcome-Questionnaire 45.2 (Lambert et al., 1996). Results from this study indicated that among clients who completed effective courses of treatment (i.e. achieving reliable improvement), generally speaking, well-being precedes improvements in symptom distress and changes in life functioning emerge last (Callahan, Swift, & Hynan, 2006). More recently, Kopta and colleagues (2014) found related support for the phase model when examining outcome assessment systems in the university counseling center context. This study used the Behavioral Health Measure-20, whose three scales correspond with the three phases outlined by Howard and colleagues (1993). The results indirectly support the phase model in that they highlight how scores on the life functioning scale were the slowest to change and were the least likely to do so in a meaningful way (Kopta et al., 2014). However, each of these studies looks broadly at changes that occur on average on each of the scales. The studies do not provide direct support for this model by examining within person rate of change and the timing of the growth of well-being, symptoms, and life functioning. Additionally, the interrelatedness of the outcomes and the within person trajectories remain largely unexplored.

The Present Study

Sudden gains and deteriorations can impact primary treatment outcomes (Aderka et al., 2012). To take this research a step further, the present study examined the impact that sudden gains and deteriorations have on the three outcomes associated with the phase model. Before this, these interrelated growth trajectories had not been modeled or conceptualized in conjunction. This represents an important step in more fully understanding the impact of within person shifts in functioning and in more comprehensively validating the phase model of psychotherapy. As sudden gains and deteriorations influence outcomes in the short and long term, this investigation considered the more immediate and potentially large impact that sudden gains/deteriorations have on related trajectories of change.

This study first sought to determine which clients had sudden gains/deteriorations on these three outcome variables and when these significant and sustained changes occurred. We purported that utilizing multilevel piecewise representations of change would allow us to examine: (1) if after a sudden gain in well-being (phase one), there is a change in the level and growth rate for symptoms (phase two), (2) if after sudden gain in symptoms (phase two), there is a change in the level and growth rate of life functioning (phase three), and (3) if after a sudden deterioration in well-being (phase one), there is a change in the level growth rate of symptoms (phase two), (4) if after a sudden deterioration symptoms (phase two), there is a change in the level and growth rate in life functioning (phase three). This series of analyses represented the first true test of both the impact of sudden gains on clients as they continue to participate in the therapy process and of the longitudinal trajectories associated with the phase model.

We hypothesized that:

H₁ Following a sudden gain in well-being, the mean-level and rate of change for symptoms would increase,

H₂ Following a sudden gain in symptoms, the mean-level and rate of change for life functioning would increase,

H₃ Following a sudden deterioration in symptoms, the mean-level and rate of change for well-being would decrease, and

H₄ Following a sudden deterioration in life functioning, the mean-level and rate of change for symptoms would decrease.

CHAPTER 2: METHOD

Participants

Clients. The sample for this study was formed from a pool of 72,846 clients whose data were collected as a part of the CelestHealth System-MH (CHS_MH), which is a nationwide routine outcome monitoring system. This system is continuously collecting data, so in order to conclude that treatment had ended, clients were only included in the analysis if it had been at least 90 days since their previous session. In addition, to limit outliers with exceptionally long treatment episodes (e.g., one client had 173 sessions) and to ensure a sufficient number of observations at each time point, clients were excluded if the maximum number of sessions they attended was more than two standard deviations above the mean. The mean number of sessions in the initial sample was 5.67 ($SD = 8.48$). Therefore, clients were included if they attended fewer than 23 sessions. In order to accurately compute sudden gains and deteriorations and to examine the trajectories of change associated with them, clients had to have attended at least 6 sessions (method and rationale for sudden gain computation provided in data analysis section). The sample of clients who fell within this restricted range (6 to 23 sessions) and who were not currently participating in a treatment episode was 16,657 clients.

The final sample ($n = 16,657$) was comprised of 67.1% women, 29.5% men, and 3.4% of clients who did not report their gender or whose gender did not fall within one of these categories. The majority of the sample endorsed identifying as White (59.1%) and

the remaining 40.94% of clients endorsed a specific racial ethnic minority identity or endorsed identifying as something other than White. Within that 40.9% of clients, 16.5% identified as Asian/Pacific Islander, 12.5% as Black, African American, or Caribbean American, 11.8% as Latinx, 1.1% as Native American/American Indian, 4.8% as Multiracial, and 53.5% selected the option to list their racial/ethnic identity as Other. The mean number of sessions attended was 10.88 ($SD = 4.54$). Session frequency was represented by the average number of days in between sessions ($M = 21.04$, $SD = 13.66$). No diagnostic information was collected, and while some studies of the BHM-20 utilize a clinically distressed sample (Owen et al., 2016; Budge et al., 2012), we did not exclude clients on the basis of clinical severity as we did not want to limit the potential for observation of sudden deteriorations. A descriptive analysis of the frequency and timing of sudden gains and deteriorations across domains is provided in Table 1.

Table 1

Descriptives for Sudden Gains and Deteriorations

	<i>N</i>	First Occurrence <i>M (SD)</i>	Number of Occurrences <i>M (SD)</i>	Range of Occurrences
SG Well-Being	5,885	7.48 (3.53)	0.45 (0.73)	0 – 5
SG Symptoms	1,204	7.48 (3.61)	0.08 (0.29)	0 – 4
SG Life Functioning	4,320	7.79 (3.67)	0.32 (0.61)	0 – 5
SD Well-Being	3,622	8.54 (3.67)	0.26 (0.55)	0 – 5
SD Symptoms	700	9.02 (3.94)	0.04 (0.21)	0 – 3
SD Life Functioning	2,447	8.43 (3.73)	0.17 (0.44)	0 – 4

Notes. SG = Sudden Gain, SD = Sudden Deterioration.

Of the 16,657 clients in the sample, 5,885 experienced at least one sudden gain in well-being, 1,204 at least one in symptoms, and 4,320 at least one in life functioning. Regarding sudden deteriorations, 3,622 experienced at least one in well-being, 700 at least one in symptoms, and 2,447 at least one in life functioning. There were clients whose patterns of sudden gains and deteriorations did not fit with the theory of the phase model. For example, some clients experienced their first sudden gains at the same time for all three domains. Another phenomenon observed in a small sample of clients was that these sudden changes occurred “out of order” (i.e. a sudden gain in symptoms before a sudden gain in well-being). Clients whose data did not fit the theory in these ways for the specific variable relationships we were testing ($n = 1,455$) were excluded from the subsequent piecewise analyses associated with the study hypotheses; however, a more in-depth description of these clients and their patterns of change is provided in Table 2.

Table 2

Clients Whose Patterns of Sudden Gains and Deteriorations Did Not Fit the Conceptual Model for Our Hypotheses

	<i>N</i> (% of sample)
<u>Co-Occurring Sudden Gains or Deteriorations</u>	
Gains on all 3 at once	347 (2.1)
Gains on WB and SYM	320 (1.9)
Gains on SYM and LF	138 (0.8)
Deteriorations on all 3 at once	254 (1.5)
Deteriorations on WB and SYM	184 (1.1)
Deteriorations on SYM and LF	121 (0.7)

Out of Order

Gain in SYM Before Gain in WB	87 (0.5)
Gain in LF Before Gain in SYM	168 (1.0)
Deterioration in SYM Before Deterioration in WB	30 (0.1)
Deterioration in LF Before Deterioration in SYM	97 (0.5)

Notes. Total n for this table is 1,455. Not all these categories are mutually exclusive and therefore, 291 clients are depicted in more than one row. However, clients with co-occurring gains or deteriorations on all three variables are not included with those who experienced two gains/deteriorations at a time.

Therapists. Seven hundred and eighty-four therapists from 70 different university counseling centers were included in the final sample. The average number of clients per therapist was 21.25. Detailed assessments of therapists were not conducted with consistency across treatment settings. However, of those who reported, 488 (62.2%) identified as women and 167 (21.3%) identified as men, and 5 (0.6%) identified with another gender. Gender information was not available for the remaining 124 therapists (15.8%). Regarding self-identified race/ethnicity, 409 (52.2%) identified as White, 42 (5.4%) as Asian American/Pacific Islander, 34 (4.3%) as African American/Black, 17 (2.2%) as Latinx, 2 as Native American/American Indian (0.3%), and racial demography was not available for the remaining 35.6% of therapists. Due to these data being collected as a part of a multi-site computer-based collection system, there was no prescribed treatment approach, and there was diversity amongst therapists in their degrees and areas of specialty. In particular, therapists included psychologists, counselors, psychiatrists, social workers, and trainees in these various fields.

Measure

Behavioral Health Measure-20 (BHM-20; Kopta & Lowry, 2002). The BHM-20; Kopta & Lowry, 2002 is an effective and efficient instrument used to assess psychotherapy outcomes and to provide feedback to therapists. Although this measure is brief (21 items), it provides a comprehensive coverage of mental health syndromes (Kopta, Owen, & Budge, 2015) and assesses common problems seen in outpatient care (Kopta & Lowry, 2002). The BHM-20 is composed of three subscales, which correspond with the three phases outlined as part of the phase model (Well-Being, Psychological Symptoms, and Life Functioning). The total score is considered to be indicative of Global Mental Health. Clients are instructed to respond to the questions based on the past two weeks. The Well-Being Scale is comprised of 3 items that assess distress, emotional well-being, life satisfaction, energy, and motivation (e.g. “How energetic and motivated have you been feeling?”). The Symptoms Scale includes 13 items and assesses the symptoms most relevant for outpatient care (e.g. “In the past two weeks, how much time have you been distressed by... not liking yourself?”). Finally, the life functioning scale, which contains 4 items, measures functioning in relevant role related areas (e.g. “How have you been getting along in the following areas of your life over the past two weeks?... Intimate relationships.”). All items on the scale are rated using a Likert Scale ranging from 0 to 4. Higher scores represent better functioning. The full version of the BHM-20 cannot be displayed as it is protected by copyright law.

The psychometric properties of this measure have been supported since its inception. Kopta and Lowry (2002) tested reliability in four samples (community adults, college students, college counseling clients, and psychotherapy outpatients). Cronbach’s

alphas ranged from: .89 to .90 for Global Mental Health, .65 to .74 for Well-Being, .85 to .86 for Symptoms, and .72 to .77 for Life Functioning (Kopta & Lowry, 2002). More recently, the internal consistency coefficients for the three subscales corresponding with the phase model were .82 for Well-Being, .88 for Symptoms, and .79 for Life Functioning (Owen et al., 2016). Within this sample, the alphas at session one are as follows: Well-Being (.75), Symptoms (.85) and Life Functioning (.74).

In addition, other studies have tested concurrent validity with four different measures of psychological distress/functioning (Outcome Questionnaire-45 [Lambert et al., 2004], BASIS-32 [Eisen, Dill, & Grob, 1994], and COMPASS [Howard, Brill, Lueger, & O'Mahoney, 1992], and SCL-90 [Derogatis, 1977]). Concurrent validity was found to be adequate as the Global Mental Health Scale was strongly correlated with the total scores on each of these measures (*rs* ranging from .76 to .85) (Kopta & Lowry, 2002). Test-retest reliability was also examined in a sample of college students who completed the measure every two weeks. The following coefficients were statistically significant ($p < .001$): .71 for Well-Being, .83 for Symptoms, and .80 for Life Functioning (Kopta & Lowry, 2002).

Procedure

As is explained by Kopta, Owen, and Budge (2015), the BHM-20 is the measure associated with an electronic computer-based data collection system. The CelestHealth System-MH (CHS_MH) is used across a variety of settings to administer and subsequently pool data from the BHM (Bryan, Kopta, & Lowes, 2012; Kopta et al., 2014). Filling out the BHM-20 is a part of standard clinical routine across treatment centers. Prior to engaging in each therapy session, clients complete the BHM-20

electronically on a computer or other internet equipped device. They consent to doing so and are aware that data they contribute will be used for research purposes. Responses are in turn submitted securely and electronically via the CHS_MH system where they are received and stored for future analysis.

Data Analysis Overview

The process of data analysis began with the calculation of sudden gains and deteriorations on each of the subscales. To be quantified as a sudden gain or deterioration, first, the change from the pre-gain session had to represent a significant change on that given scale (Tang & DeRubeis, 1999). The determination of what represented significant change was drawn from the reliable change indices presented by Kopta, Owen, and Budge (2015) (Well-Being = .77, Symptoms = .80, and Life Functioning = .68). These were calculated using the formula presented by Jacobson and Traux (1991) wherein reliable change equaled the difference between a client's pretest score and posttest score divided by the standard error of the difference between the two scores. Second, the magnitude of the change had to be large, representing at least 25% of the pre-gain score (Tang & DeRubeis, 1999). Third and finally, the gains had to be sustained over time (Jacobson & Traux, 1991; Haugen, Goldman, & Owen, 2015). The methodology from Haugen, Goldman, and Owen (2015) was replicated whereby the mean score of three pre-gain sessions was compared with the mean score of the gain score and the two post gain sessions. If the comparison of pre- and post- means yielded a value greater than the reliable change index cited above, the gain was deemed more than just a temporary fluctuation in outcome. Clients who met each of these three criteria on

any given outcome domain were identified as having a sudden gain or deterioration and, therefore, included in the study.

The timing of the first sudden gain or deterioration for each domain was identified. The piecewise models were based upon each person's first sudden gain or deterioration. That point in time determined the coding for the pieces of the model (i.e., pre and post sudden gain or sudden deterioration). Please reference Table 3 for an example of the coding scheme for the three pieces of the model: Slope-Before (i.e. the trajectory for someone with no sudden gain), Level-Change-After (i.e. the change in intercept for the session after the sudden gain) and Slope-Change-After (i.e. the change in trajectory for someone after they have a sudden gain).

Table 3

Example Coding for a Client with a Sudden Gain at Session 5

<u>Session Number</u>	<i>Slope-Before</i>	<i>Level-Change-After</i>	<i>Slope-Change-After</i>
1	0	0	0
2	1	0	0
3	2	0	0
4	3	0	0
5	4	0	0
6	5	1	1
7	6	1	2

Notes. This coding is based upon a continuous rate of change, wherein the impacting event (a sudden gain) happens at session 5 and the level change and change in trajectory for the subsequent phase begin at session 6.

More specifically, for hypothesis 1, the coding for the trajectory of symptoms was based on the timing of a sudden gain in well-being. That allowed for the detection of a significant change in mean-level of symptoms and rate of change of symptoms after the sudden gain in well-being. The same model structure was tested for hypothesis 2, whereby the coding for life functioning was based on the timing of the sudden gain in symptoms. For hypothesis 3, the coding for symptoms trajectory was based on the timing of the sudden deterioration in well-being. In the same vein, for hypothesis 4, the coding for life functioning was centered around the sudden deterioration in symptoms. Each of these models directly tested the relationships of the phase model by utilizing sudden

gains and deteriorations to examine the interrelatedness of the associated outcome domains.

As this study involves longitudinal measurement of psychotherapy, time points were nested within clients, and clients were nested within therapists (i.e. each therapist treated multiple clients within the sample). Accordingly, we employed multilevel modeling techniques using HLM 7.0 to account for the interdependence of observations (Raudenbush & Bryk, 2002; Raudenbush, Bryk, & Congdon, 2013). We conducted a series of four MLM models for each of the four hypotheses (explained in detail in the results section) to determine if our hypothesized models including a change in level and slope following a sudden gain or deterioration best fit the data. The variables in our analyses included: 1) Slope-Before (i.e., a continuous trajectory across therapy), 2) Slope-Change-After (i.e. the change in trajectory after the sudden gain), and 3) Level-Change-After (i.e., the change in intercept or the immediate increase following a sudden gain). Table 4 displays the equations including these variables that were used for model comparison.

Table 4

Equations Used to Test Hypotheses

<i>Equation</i>	
<u>Model</u>	
No Change	$Outcome_{t_{ij}} = \pi_{0ij} + \pi_{1ij} * (Slope-Before_{t_{ij}}) + e_{t_{ij}}$
Slope Change	$Outcome_{t_{ij}} = \pi_{0ij} + \pi_{1ij} * (Slope-Before_{t_{ij}}) + \pi_{2ij} * (Slope-Change-After_{t_{ij}}) + e_{t_{ij}}$

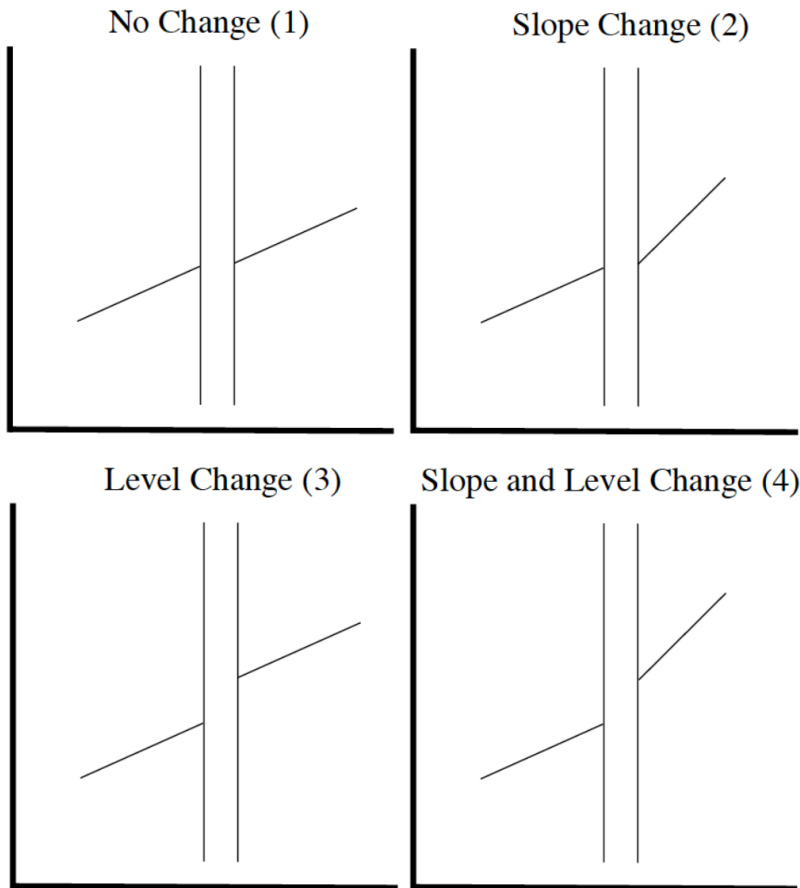
Level Change $Outcome_{t_{ij}} = \pi_{0ij} + \pi_{1ij}*(Slope-Before_{t_{ij}}) +$
 $\pi_{2ij}*(Level-Change-After_{t_{ij}}) + e_{t_{ij}}$

Level and $Outcome_{t_{ij}} = \pi_{0ij} + \pi_{1ij}*(Slope-Before_{t_{ij}})$
Slope Change $+ \pi_{2ij}*(Level-Change-After_{t_{ij}}) + \pi_{3ij}*(Slope-Change-After_{t_{ij}}) + e_{t_{ij}}$

For visual representations of these models, reference Figure 2.

Figure 2

Four Potential Models of the Impact of a Sudden Gain



Note. The space between the trajectories represents time between the session where the gain is measured and the session after.

The following process was utilized for the identification of the best fitting model. For each hypothesis, we compared the deviance statistics of the four models we constructed. This method allowed for the statistical comparison of the relative fit of nested models. We also utilized Bayesian Information Criterion (BIC) model fit statistics as metric of model comparison (see McCoach & Black, 2008). Lower estimates for BIC are indicative of better model fit, and it is commonly asserted that differences of more than 10 points are considered evidence for one model over another (Raftery, 1995).

Moderators. To provide some supplemental context, once a best fitting model was identified, we added the following moderators by grand mean centering them in the model: session frequency (i.e. the average number of days in between sessions), total number of sessions attended, number of sudden gains within the domain being examined, and number of sudden deteriorations within the domain being examined.

CHAPTER 3: RESULTS

Hypothesis 1: Following a sudden gain in well-being, the mean-level and rate of change for symptoms will increase.

The first hypothesis was that following clients' first sudden gains in well-being, there would be significant and positive changes in both mean-level and trajectory for symptoms. Put more simply, we predicted that a dramatic and positive shift in well-being would lead to a one-time increase in symptom functioning and an acceleration of the rate at which symptoms change for the remainder of therapy (i.e., symptoms progress more quickly than they had been up until the point of the gain). Therefore, we tested if the sudden gain in well-being was associated with current change to symptom levels and how symptom levels change in the future. Results for the test of this hypothesis were based on a subsample of 4,048 clients whose first sudden change in well-being was a sudden gain that was not preceded by or occurring at the same time as a sudden gain in symptoms. The model that best fit the data was model 4, which included change in slope and change in mean-level following a sudden gain in well-being. This decision was based upon information gleaned from deviance tests and BIC values, which both supported retention of model 4. When compared to the next best fitting model (model 3: including only level-change-after), the chi-square difference test was statistically significant ($\chi^2 = 729.70$, $df = 9$, $p < 0.001$), and the BIC was lower by a value of 689. See Appendix A for model

comparisons, Appendix B for coefficients from the best fitting model, and Appendix C for intraclass correlations (ICCs).

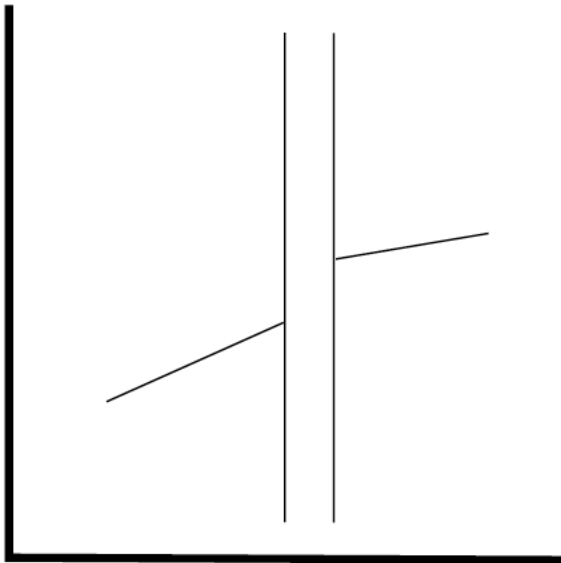
The final full model equation was as follows:

$$\text{Symptoms}_{tij} = \pi_{0ij} + \pi_{1ij} * (\text{Slope-Before}_{tij}) + \pi_{2ij} * (\text{Level-Change-After Well-Being SG}_{tij}) + \pi_{3ij} * (\text{Slope-Change-After Well-Being SG}_{tij}) + e_{tij}$$

In this model, Symptoms_{tij} is the symptoms outcome score at time t for client i treated by therapist j , and π_{0ij} is the overall intercept. The intercept represents the average level of symptoms at time 0 (i.e. session 1) ($b = 3.05, p < 0.001$). $\text{Slope-Before}_{tij}$ is the average growth slope or the increase in the symptoms outcome per session up until the sudden gain (after controlling for the level and slope change after the SG). The coefficient for $\text{Slope-Before}_{tij}$ ($b = .003, p < 0.001$) was significant and positive indicating that on average, clients' symptoms scores improved across sessions up until the sudden gain in well-being. Because of the way time is centered (around the session after the sudden gain in well-being), $\text{Level-Change-After Well-Being SG}_{tij}$ can be interpreted as a one-time shift in symptoms the session after the sudden gain in well-being. For this model, the coefficient was significant and positive ($b = 0.34, p < 0.001$), indicating that on average, clients' symptom functioning increased following the sudden gain. $\text{Slope-Change-After Well-Being SG}_{tij}$ represents the change in trajectory after the sudden gain. If this coefficient is added to the $\text{Slope-Before}_{tij}$ coefficient, that yields the value of the true after-gain slope. In this case, this coefficient was statistically significant ($b = -.002, p < 0.001$). Therefore, the slope for symptoms decreases slightly after a sudden gain in well-being but is still on a positive trajectory overall. A visual representation of the final model is displayed in figure 3.

Figure 3

Final Model for Hypothesis 1



Note. Figure not drawn to scale.

Therefore, there is partial support for hypothesis 1. Our hypothesized model including Slope-Before_{ij}, Level-Change-After Well-Being SG_{ij}, and Slope-Change-After Well-Being SG_{ij} did best fit the data. In addition, as predicted, we did see a positive change in the mean-level. However, on average, the positive rate of change for symptoms decreased slightly after the sudden gain in well-being. Therefore, the directionality of the change in slope after the sudden gain was contrary to what we anticipated in that the already positive rate of change did not increase further after the gain.

Hypothesis 2: Following a sudden gain in symptoms, the level and rate of change for life functioning will increase.

The second hypothesis was that following clients' first sudden gains in symptoms, there would be significant and positive changes in both mean-level and trajectory for life functioning. Similar to what is described for hypothesis 1, we predicted that a

meaningful, positive shift in symptoms would lead life functioning to change for the better and for the rate of change for life functioning to accelerate (to progress more quickly than was already occurring in therapy). Therefore, we tested if the sudden gain in symptoms was associated with change to both the life functioning level the session after and the way in which life functioning changed during the remainder of therapy. Results for the test of this hypothesis were based on a subsample of 189 clients whose first sudden change in symptoms was a sudden gain that was not preceded by or occurring at the same time as a sudden gain in life functioning. The model that best fit the data was model 3, which included the change in mean-level following a sudden gain in symptoms. This model had the lowest BIC, and the chi-square difference test between model 3 and model 4 was not significant ($\chi^2 = 15.23$, $df = 9$, $p > .05$). Therefore, we retained the more parsimonious model, which did not include the slope change variable. Reference Appendix A for model comparisons, Appendix B for coefficients from the best fitting model, and Appendix C for intraclass correlations (ICCs).

The final full model equation was as follows:

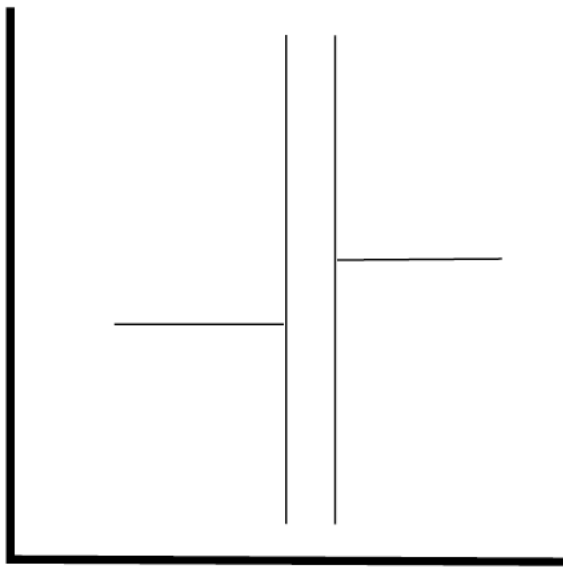
$$\text{Life Functioning}_{tij} = \pi_{0ij} + \pi_{1ij} * (\text{Slope-Before}_{tij}) + \pi_{2ij} * (\text{Level-Change-After Symptoms SG}_{tij}) + e_{tij}$$

In this model, Life Functioning_{tij} is the outcome score at time *t* for client *i* treated by therapist *j*, and π_{0ij} is the overall intercept. The intercept represents the average level of life functioning at time 0 (i.e. session 1) ($b = 2.01$, $p < 0.001$). As the best fitting model does not control for Slope-Change-After, Slope-Before_{tij} represents the average slope or the change in life functioning over the entire course of therapy. The coefficient for Slope-Before_{tij} ($b = -0.001$, $p > .05$) was not significant indicating that on average, clients' life

functioning scores do not change across sessions (after controlling for the level-change-after the SG). Because of the way time is centered (around the session after the sudden gain in symptoms), Level-Change-After Symptoms SG_{tij} can be interpreted as a one-time shift in life functioning the session after the sudden gain in symptoms. For this model, the coefficient level-change-after was significant and positive ($b = 0.44, p < 0.001$), indicating that on average, clients' life functioning increased following the sudden gain. Of note, the coefficient for slope in model 1 (no change model) was significant and positive ($b = 0.03, p < 0.001$); however, model 3, which included the level change variable had better fit. Accordingly, the Level-Change-After variable better accounted for growth in life functioning during therapy for clients with sudden gains in symptoms. Reference figure 4 for a visual representation of the model.

Figure 4

Final Model for Hypothesis 2



Note. Figure not drawn to scale.

Therefore, there is only limited support for hypothesis 2. Our hypothesized model including Slope-Before_{ij}, Level-Change-After Symptoms SG_{ij}, and Slope-Change-After Symptoms SG_{ij} was not retained. Instead, the model including only Slope-Before_{ij} and Level-Change-After Symptoms SG_{ij} best fit the data. Within that model, as predicted, we did see a positive change in mean-level. Therefore, the directionality of the level change variable was in line with what we anticipated.

Hypothesis 3: Following a sudden deterioration in well-being, the level and rate of change for symptoms will decrease.

The third hypothesis was that following clients' first sudden deteriorations in well-being, there would be significant and negative changes in both mean-level and trajectory for symptoms. Indeed, we anticipated that a dramatic drop in well-being would lead symptom functioning to decrease and would slow the rate of improvement of symptom functioning thereafter. Therefore, the trajectory may have still been positive, but we suspected a sudden deterioration would inhibit how quickly future change occurred. Results for the test of this hypothesis were based on a subsample of 2,254 clients whose first sudden change in well-being was a sudden deterioration that was not preceded by or occurring at the same time as a sudden deterioration in symptoms. The model that best fit the data was model 4, which included change in slope and change in mean-level following a sudden gain in well-being. When compared to the next best fitting model (model 3: only including level-change-after), the chi square difference test was statistically significant ($\chi^2 = 334.29$, $df = 9$, $p < 0.001$) and the BIC was lower by a value of 295. Accordingly, we retained the more complex model including both mean-level change and slope change. See Appendix A for model comparisons, Appendix B for

coefficients from the best fitting model, and Appendix C for intraclass correlations (ICCs).

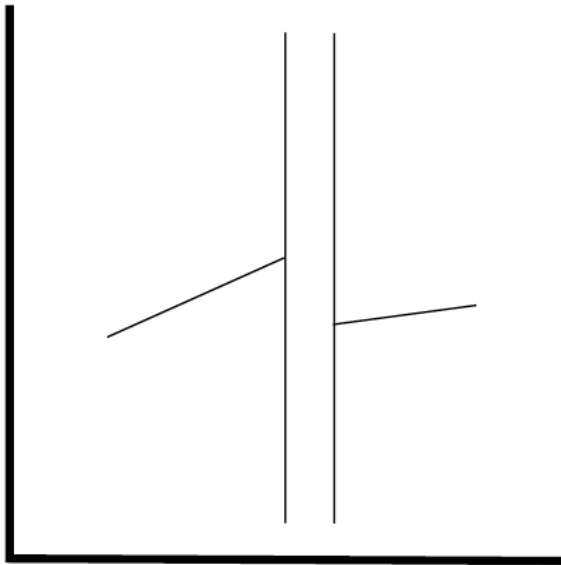
The final full model equation was as follows:

$$\text{Symptoms}_{tij} = \pi_{0ij} + \pi_{1ij} * (\text{Slope-Before}_{tij}) + \pi_{2ij} * (\text{Level-Change-After Well-Being SD}_{tij}) + \pi_{3ij} * (\text{Slope-Change-After Well-Being SD}_{tij}) + e_{tij}$$

In this model, Symptoms_{tij} is the symptoms outcome score at time t for client i treated by therapist j , and π_{0ij} is the overall intercept. The intercept represents the average level of symptoms at time 0 (i.e. session 1) ($b = 3.07, p < 0.001$). $\text{Slope-Before}_{tij}$ is the average growth slope or the increase in the symptoms outcome per session (after controlling for the level and slope change after the SD). The coefficient for $\text{Slope-Before}_{tij}$ ($b = 0.06, p < 0.001$) was significant and positive indicating that on average, clients' symptoms scores improved across sessions up until the sudden deterioration. Because of the way time is centered (around the session after the sudden deterioration in well-being), $\text{Level-Change-After Well-Being SD}_{tij}$ can be interpreted as a one-time shift in symptoms the session after the sudden deterioration in well-being. For this model, the coefficient was significant and negative ($b = -0.49, p < 0.001$), indicating that on average, clients' intercept for symptom functioning decreased following the sudden deterioration. $\text{Slope-Change-After Well-Being SD}_{tij}$ represents the change in trajectory after the sudden deterioration. The addition of the $\text{Slope-Change-After Well-Being SD}_{tij}$ coefficient to the $\text{Slope-Before}_{tij}$ coefficient yields the value of the true after-deterioration slope. In this case, this coefficient was statistically significant ($b = -0.01, p < 0.001$). Therefore, the trajectory remains positive after the sudden deterioration, but the rate of symptom change decreases slightly. Reference figure 5 for a visual representation of the model.

Figure 5

Final Model for Hypothesis 3



Note. Figure not drawn to scale.

Therefore, there is full support for hypothesis 3. Our hypothesized model including Slope-Before_{ij}, Level-Change-After Well-Being SD_{ij}, and Slope-Change-After Well-Being SD_{ij} did best fit the data. As predicted, there was significant negative change in the mean-level and a decrease in the rate of change for symptoms after the sudden deterioration in well-being (although overall the rate of change is positive throughout).

Hypothesis 4: Following a sudden deterioration in symptoms, the level and rate of change for life functioning will decrease.

The fourth hypothesis was that following clients' first sudden deteriorations in symptoms, there would be significant and negative changes in both mean-level and trajectory for life functioning. Indeed, we anticipated that a large and sudden decrease in symptoms would lead ratings of life functioning to drop and would slow the rate of

improvement of life functioning thereafter. Therefore, the trajectory may still be positive, but we suspected a sudden deterioration would inhibit the process of future change. Results for the test of this hypothesis were based on a subsample of 89 clients whose first sudden change in symptoms was a sudden deterioration that was not preceded by or occurring at the same time as a sudden deterioration in life functioning. The model that best fit the data was model 3, which included the change in mean-level following a sudden gain in symptoms. This model had the lowest BIC, and the chi-square difference test between model 3 and model 4 was not significant ($\chi^2 = 86.36$, $df = 9$, $p > 0.05$). Therefore, we retained the more parsimonious model, which did not include the slope change variable. Reference Appendix A for model comparisons, Appendix B for coefficients from the best fitting model, and Appendix C for intraclass correlations (ICCs).

The final full model equation was as follows:

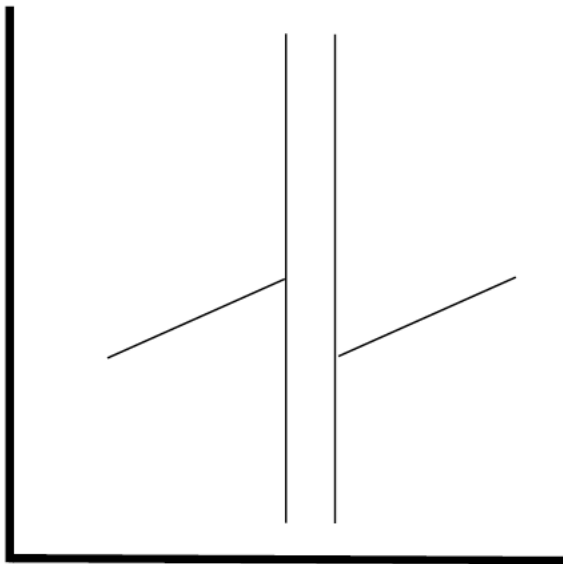
$$\text{Life Functioning}_{tij} = \pi_{0ij} + \pi_{1ij} * (\text{Slope-Before}_{tij}) + \pi_{2ij} * (\text{Level-Change-After Symptoms SD}_{tij}) + e_{tij}$$

In this model, Life Functioning_{tij} is the outcome score at time *t* for client *i* being treated by therapist *j*, and π_{0ij} is the overall intercept. The intercept represents the average level of life functioning at time 0 (i.e. session 1) ($b = 2.19$, $p < 0.001$). As the best fitting model does not control for Slope-Change-After, Slope-Before_{tij} represents the average slope or the change in life functioning over the entire course of therapy. The coefficient for Slope-Before_{tij} ($b = 0.05$, $p < 0.001$) was positive and significant indicating that on average, clients' life functioning scores improve across sessions (after controlling for the change in level after the SD). Because of the way time is centered (around the session

after the sudden deterioration in symptoms), Level-Change-After Symptoms SD_{tij} can be interpreted as a one-time shift in life functioning the session after the sudden deterioration in symptoms. For this model, the coefficient was significant and negative ($b = -0.38, p < 0.001$), indicating that on average, clients' life functioning decreased following the sudden deterioration. Reference Figure 6 for a visual representation of the model.

Figure 6

Final Model for Hypothesis 4



Note. Figure not drawn to scale.

Therefore, there is only limited support for hypothesis 4. Our hypothesized model including $Slope_{tij}$, Level-Change-After Symptoms SD_{tij} , and Slope-Change After Symptoms SD_{ij} was not retained. Instead, the model including only $Slope_{tij}$ and Level-Change-After Symptoms SG_{ij} best fit the data. Within that model, as predicted, we did

see a negative change in mean-level. Therefore, the directionality of the level change variable was in line with what we anticipated.

Moderators

Although we had no formal hypotheses about moderation, we added the following predictors to the best fitting model for each hypothesis: session frequency (represented as the average number of days between sessions within the treatment episode), total number of sessions attended, number of sudden gains, and number of sudden deteriorations. The models associated with hypotheses 1 and 3 (symptoms outcome centered around sudden gains/deteriorations in well-being) both ran with all the moderators included. However, the models associated with hypotheses 2 and 4 (life functioning outcome centered around sudden gains/deteriorations in symptoms) would not run with the number of sudden gains and number of sudden deteriorations variables included. This was due to limited variability in the number of sudden gains and deteriorations in symptoms for clients who were eligible for inclusion in that analysis. Accordingly, we only presented the moderation effects of session frequency and number of sessions for hypotheses 2 and 4. Results from the moderator analyses are displayed in Table 5. Note that all moderation effects were considered within the context of one final model and, therefore, the interpretation of each effect must be understood as after controlling for all of the others.

Table 5

Moderator Analysis: Best Fitting Piecewise Models

	SYM	LF	SYM	LF
	(SG-WB)	(SG-SYM)	(SD-WB)	(SD-SYM)
	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)	<i>b</i> (SE)
Intercept	3.08 (.01)*	2.00 (.04)*	3.12 (.01)*	2.23 (.06)*
Freq.	-.001 (.002)	.003 (.003)	.002 (.001)*	.004 (.004)
# Sess.	-.01 (.002)*	.01 (.01)	-.01 (.002)*	.002 (.01)
# SGs	-.16 (.02)*	--	.05 (.02)**	--
# SDs	-.04 (.02)*	--	.001 (.02)	--
Slope _{Before}	.03 (.002)*	-.01 (.01)	.07 (.002)*	.06 (.01)*
Freq.	-.001 (.0001)*	-.001 (.001)	.0001 (.0001)	-.0002 (.0001)
# Sess.	-.003 (.0003)*	.001 (.001)	-.005 (.0003)*	-.002 (.001)
# SGs	-.015 (.004)*	--	.01 (.003)*	--
# SDs	.017 (.005)*	--	.03 (.004)*	--
Level _{ChangeAfter}	.33 (.01)*	.41 (.03)*	-.5 (.009)*	-.41 (.06)*
Freq.	.002 (.0004)*	-.001 (.002)	-.002 (.001)*	-.01 (.004)
# Sess.	-.001 (.001)	-.01 (.01)	.01 (.002)*	-.01 (.01)
# SGs	.06 (.01)*	--	-.03 (.01)*	--
# SDs	-.03 (.02)*	--	-.04 (.02)*	--

Slope _{ChangeAfter}	-.01 (.003)*	--	-.01 (.003)	--
Freq.	.0003 (.0002)*	--	-.0001 (.0002)	--
# Sess.	.001 (.0004)	--	.0004 (.0005)	--
# SGs	.04 (.005)*	--	.01 (.004)*	--
# SDs	-.05 (.06)*	--	-.06 (.005)*	--

Notes. * $p < .05$. Moderators include: Freq. (average number of days between sessions within the treatment episode), # Sess. (total number of sessions the client attended), # SGs (total number of sudden gains in the particular domain being analyzed), and # SDs (total number of sudden deteriorations in the particular domain being analyzed).

Hypothesis 1 with moderation. The final model retained for hypothesis 1 included variables to represent a slope change and level change in symptoms following the first sudden gain in well-being. We moderated this model with the grand mean centered variables: session frequency, number of sessions attended, number of sudden gains in well-being, and number of sudden deteriorations in well-being.

Session frequency. Session frequency (i.e., the average number of days between sessions in the treatment episode) was not significantly associated with clients' initial symptom levels ($b = -0.001, p > 0.05$). However, session frequency was negatively associated with Slope-Before ($b = -0.001, p < 0.001$) and positively associated with both Level-Change-After ($b = 0.002, p < 0.001$) and Slope-Change-After ($b = 0.0003, p < 0.001$) a sudden gain in well-being. Therefore, on average, clients with more days in between their sessions change at a slightly slower pace up until a sudden gain in well-being, and then after the sudden gain, number of days in between sessions is positively associated with an added change in both level and slope.

Number of sessions. Number of sessions (i.e. total number of sessions a client attended as a part of the treatment episode being analyzed) was significantly and negatively associated with where clients' symptom levels at the start of therapy ($b = -0.01, p < 0.001$). Therefore, on average, clients who attended more sessions started with more symptoms (lower symptoms scores represent more clinical distress). Further, clients who on average attended more sessions still had positive trajectories of change, but they changed more slowly over the course of therapy ($b = -0.003, p < 0.001$). Number of sessions was not a significant predictor of either level-change-after ($b = -0.001, p > 0.05$) or slope-change-after ($b = 0.001, p > 0.05$) the sudden gain in well-being.

Number of sudden gains in well-being. The total number of sudden gains clients experienced in well-being was on average significantly and negatively associated with both their initial symptom levels ($b = -0.16, p < 0.001$) and their rates of change up until the first sudden gain in well-being ($b = -0.015, p < 0.001$). Therefore, on average, clients who had more sudden gains, started off with more symptoms and experienced slower rates of change (although still positive) up until their first sudden gain in well-being. However, after the first sudden gain in well-being, higher numbers of sudden gains were positively associated with both a change in intercept ($b = 0.06, p < 0.001$) and slope ($b = 0.04, p < 0.001$) for the symptoms outcome.

Number of sudden deteriorations in well-being. The total number of sudden deteriorations clients experienced in well-being was on average significantly and negatively associated with initial symptom levels ($b = -0.04, p < 0.05$). Therefore, on average, clients who experienced more sudden deteriorations, started therapy with more symptoms (i.e. lower symptom ratings). However, number of sudden deteriorations was

positively associated with Slope-Before ($b = 0.17, p < 0.001$) where on average, clients with more sudden deteriorations experienced faster rates of change up to the sudden gain than clients with fewer sudden deteriorations. After the sudden gain in well-being, number of sudden deteriorations was negatively associated with level change ($b = -0.03, p < 0.05$) and slope change ($b = -0.05, p < 0.001$) for symptoms. Therefore, on average, the positive change in intercept occurs to a lesser degree for clients with more sudden deteriorations and the change in slope is significant and negative (as sudden deteriorations increase, the overall trajectory changes from positive to negative).

Hypothesis 2 with moderation. The final model for hypothesis 2 included a level change in life functioning following a sudden gain in symptoms. We moderated this model with the grand mean centered variables: session frequency and number of sessions attended. The model including number of sudden gains in symptoms and number of sudden deteriorations in symptoms would not run due to these variables being highly correlated and there being multicollinearity among predictors. Session frequency assessed via the average number of days between sessions did not significantly moderate any portion of the model. Neither did the number of sessions attended. Accordingly, there was no moderation by either of these variables for the life functioning outcome.

Hypothesis 3 with moderation. The final model retained for hypothesis 3 included variables to represent a slope change and level change in symptoms following the first sudden deterioration in well-being. We moderated this model with the grand mean centered variables: session frequency, number of sessions attended, number of sudden gains in well-being, and number of sudden deteriorations in well-being.

Session frequency. Session frequency (i.e., the average number of days between sessions in the treatment episode) was significantly associated with clients' initial symptom levels ($b = 0.002, p < .05$). Therefore, clients who on average had more days in between their sessions started with fewer symptoms (higher ratings represent less symptom distress). Session frequency was not significantly associated with Slope-Before ($b = 0.0001, p > .05$) or Slope-Change-After ($b = -0.0001, p > .05$). Accordingly, rate of change for symptoms before or after the sudden deterioration in well-being was not moderated by session frequency. However, Level-Change-After was significantly associated with session frequency ($b = -0.002, p < 0.001$). Therefore, clients who on average had more days in between their sessions experienced a greater decrease in symptoms intercept following a sudden deterioration in well-being.

Number of sessions. Number of sessions (i.e. total number of sessions a client attended as a part of the treatment episode being analyzed) was significantly and negatively associated with where clients' symptom levels at the start of therapy ($b = -0.01, p < 0.001$). Therefore, on average, clients who attended more sessions started with more symptoms (lower symptoms scores represent more clinical distress). Further, clients who on average attended more sessions still showed positive change in therapy, but they changed more slowly over the course of therapy ($b = -0.005, p < 0.001$). Number of sessions is not a significant predictor of Slope-Change-After ($b = 0.004, p > 0.05$), but it is significantly associated with Level-Change-After the sudden deterioration in well-being ($b = 0.01, p < 0.001$). Therefore, on average, the more sessions a client attends, the less of a negative change in symptoms intercept they will experience following a sudden deterioration in well-being.

Number of sudden gains in well-being. The total number of sudden gains clients experienced in well-being was on average significantly and positively associated with clients' initial symptom levels ($b = 0.05, p < 0.01$) and clients' rate of change up until the first sudden deterioration in well-being ($b = 0.01, p < 0.01$). Therefore, on average, clients who experienced more sudden gains, started off with fewer symptoms and experienced faster rates of positive change up until their first sudden deterioration in well-being. However, after the first sudden deterioration in well-being, higher numbers of sudden gains were negatively associated with change in intercept ($b = -0.03, p < 0.05$), wherein clients with more sudden gains experienced more of a decrease in intercept than those with fewer sudden gains. In addition, higher numbers of sudden gains were positively associated with change in slope ($b = 0.01, p < 0.05$), whereby for every one unit change in number of sudden gains, the added value to the Slope-Change-After coefficient was .01.

Number of sudden deteriorations in well-being. The total number of sudden deteriorations clients experienced in well-being was not significantly associated with their initial symptom levels ($b = 0.01, p < 0.05$). Number of sudden deteriorations was positively associated with Slope-Before ($b = 0.03, p < 0.001$) wherein on average, clients with more sudden deteriorations experienced faster rates of change up to their first sudden deterioration than clients with fewer sudden deteriorations. After the sudden deterioration in well-being, number of sudden deteriorations was negatively associated with Level-Change-After ($b = -0.04, p < 0.05$) and Slope-Change-After ($b = -0.06, p < 0.001$) for symptoms. Therefore, on average, the negative change in intercept is greater for clients with more sudden deteriorations as is the negative change in slope (as sudden deteriorations increase, the overall trajectory changes from positive to negative).

Hypothesis 4 with moderation. The final model for hypothesis 4 included a level change in life functioning following a sudden deterioration in symptoms. We moderated this model with the grand mean centered variables: session frequency and number of sessions attended. The model including number of sudden gains in symptoms and number of sudden deteriorations in symptoms as moderators would not run due to these variables being highly correlated and causing multicollinearity among predictors. Similar to what was found for hypothesis 2, session frequency or the average number of days between sessions did not significantly moderate any portion of the model for hypothesis 4. Neither did the number of sessions attended. Accordingly, the trajectory of change for life functioning and the level change after a sudden deterioration in symptoms were not moderated by either of these variables.

CHAPTER 4: DISCUSSION

This dissertation examined the impact of sudden gains and deteriorations on trajectories of change. Since their theoretical inception by Tang and DeRubeis in 1999, sudden gains have sparked much discussion because of the importance of the “upward spiral” in psychological functioning that tends to occur after them. To date, many studies have conducted analyses with one sole outcome variable at a time (i.e. studying the association between a sudden gain in symptom reduction and symptom reduction at the end of therapy) (see Haugen, Goldman & Owen, 2015 for an example). This approach has been helpful to increase understanding of the frequency of sudden gains and the clinical utility of recognizing them when they occur. However, as of late, researchers have begun to broaden the scope of inquiry to include improvement on other processes of change (i.e. the working alliance or perceived coping skills) that occurs following sudden gains in outcome (Wucherpfenning, Rubel, Hofmann, & Lutz, 2017). To our knowledge, this is the first study to examine the interrelated impact of sudden gains and deteriorations across outcome domains and more specifically, of the outcomes associated with the phase model.

We predicted that sudden gains or deteriorations in well-being (phase one) would be associated with changes to the level and slope for the symptoms outcome (phase two) the session after they occurred. The same conceptual frame was applied to the life functioning outcome wherein sudden gains or deteriorations in symptoms (phase two)

would be associated with changes to the level and slope for life functioning (phase three) the session after they occurred. Implicit in the examination of these hypotheses is the sequential nature of the phase model and the potential for interdependence of its outcomes.

Sudden Gains

More specifically, the first question we sought to answer was how symptoms might differ after a sudden gain in well-being. We anticipated that sudden boosts in well-being (otherwise termed remoralization or phase 1) would have not only an immediate effect on the level of symptom functioning, but also a lasting effect on the trajectory of change for symptoms. What we found was that sudden gains in well-being did interrupt the trajectory of change for symptoms in a meaningful way. In particular, clients' first sudden gain in well-being was followed by a one-time improvement in symptoms (change in mean-level) and also a slowing down of the trajectory of symptom change. Overall, the trajectory of change remained positive (i.e. clients kept improving), but the rate decreased after the sudden gain.

According to the phase model, if clients undergo remoralization, then the process of symptom remediation will follow. The results from hypothesis one highlight that clients suddenly feeling more hopeful, energetic, and motivated seemingly helped them to experience their physiological responses and symptoms differently thereafter (i.e., if they reported less distress and more life satisfaction, then their symptoms of not liking themselves or feeling hopeless about the future felt less intense). Although we anticipated acceleration in the rate of change in symptom functioning, there was a slight deceleration in symptoms trajectory following the sudden gain in well-being. The attenuation of the

trajectory may stem from there being little room to grow after the significant increase in symptoms the session after the gain in well-being. This finding might have differed in a sample that included only clinically distressed clients as they might have not yet reached the ceiling for symptoms after the change in mean-level following a sudden gain in well-being. For example, in one distressed sample of clients, the mean score for symptoms was 2.25 before therapy and 2.87 after therapy (Owen et al., 2016). In our sample, clients on average started with a symptom rating of 3.05 (out of 4) and then they grew up until the sudden gain and also experienced a change in mean-level of 0.34. Accordingly, growth at the end of therapy was more truncated than it would have been if clients in our sample were more distressed.

The next question we addressed followed the same structure as the first but with regard to sudden gains in symptoms and their association with life functioning. It was our prediction that following sudden symptom improvements (i.e., phase 2 or remediation) that people would be able to function better in the roles associated with their daily lives (phase 3 or rehabilitation) and that this would accelerate change in this domain. However, this hypothesis was not supported. Rather, we only observed a one-time boost in life functioning the session after a sudden gain in symptoms (level change only). In addition, the rate of change for life functioning across sessions was not significant (i.e. life functioning did not change in a meaningful way up until the gain or in the sessions subsequent to the gain). The only significant change to the life functioning trajectory occurred the one session following the sudden gain in symptoms.

There are likely several explanations for these results. First, previous studies have found that the magnitude of change for life functioning is less than that of the other

phases (Owen et al., 2016). Also, this subsample only includes clients whose first sudden gain is in symptoms. These clients may have a unique pattern of change in which the sudden gain in symptoms may cause them to feel so much relief that it accounts for a dramatic shift in how they function in their life roles. This may not be the case for clients who experience continuous remediation of symptoms. Indeed, Baldwin and colleagues (2009) state that clients' rates of change vary based on how they responded to treatment. Moreover, in studies that do not assess for sudden gains in symptoms and that, therefore, likely include clients with and without them, life functioning changes in a positive linear fashion over the course of therapy (e.g., Sembill, Vocks, Kosfelder, & Schöttke, 2017). Of note, when we did not control for the change in mean-level after the sudden gain in symptoms (the no change model), the trajectory for life functioning during therapy was positive and significant (supporting the finding from Sembill et al., 2017). What this tells us is that without accounting for the impact of the sudden gain, the trajectory for life functioning appears continuous and positive. When we control for immediate growth in life functioning after the sudden gain in symptoms, the rate of change is no longer significant. Had we not compared these models and controlled for the gain, we would have interpreted the overall trajectory for life functioning to be positive, when it was really an artifact of one-time shift in life functioning the session after a sudden gain in symptoms. Patterns of growth in life functioning may vary depending on whether or not clients experience sudden gains in symptoms. Practically, therapists might expect gradual growth, but for clients with sudden gains in symptoms, life functioning may not progress in that way. This finding highlights the importance of accounting discontinuity in our existing models of change (i.e. Dose Effect, Good Enough Level Model, and trajectories

resulting from growth mixture modeling) to more fully understand improvement in therapy.

Sudden Deteriorations

The third question we sought to answer was whether sudden deteriorations in well-being would negatively impact symptoms and the rate at which they change. We posited that symptom functioning would decrease and that people would improve more slowly subsequent to a sudden deterioration in well-being. The data supported this hypothesis. On average, clients exhibited positive change in symptoms until the sudden deterioration in well-being, and then afterward, there was a significant decrease in both mean-level (i.e. symptoms score after the deterioration) and trajectory for symptoms. The after-deterioration direction of change remained positive, but on average clients' symptoms scores improved at a slower rate following the sudden deterioration in well-being.

These findings may suggest that there is an inhibitory effect of sudden deteriorations in well-being. If clients are suddenly less motivated and hopeful about themselves and about therapy, then they may not progress as quickly as they were before. Prior to this analysis, the phase model has been conceptualized with regard to sequential growth across domains (change in phase one followed by change in phase two and then phase three) (Callahan et al., 2006; Howard et al., 1993; Kopta et al., 2014; Lutz, Lowry, Kopta, Einstein, & Howard, 2001). This study provides initial support that negative changes (i.e. sudden deteriorations) in phase one actually have the potential to hinder change in the subsequent phase, phase two. Demoralization can occur with regard to the self (i.e., pessimism about one's own prospects), to others (i.e., feeling let down by a role

model), or about therapy (i.e., therapist reflects an interpersonal pattern and client feels hopeless about if therapy can help). Each of these experiences can potentially inhibit the process of therapy and heighten symptom distress. Therefore, sudden deteriorations in well-being should be thought of as having a deleterious effect on the change process for symptoms and should be flagged as meaningful turning points requiring therapeutic intervention.

The fourth and final question we addressed was if sudden deteriorations in symptoms (phase two) would have a detrimental effect on life functioning (assessed via decreases to the mean-level and rate of change). While we expected support for both of these changes after the interruption in the time series caused by the sudden deterioration, we only found a significant change in mean-level for life functioning. Life functioning decreased significantly the session after the sudden deterioration. This speaks to the interrelated nature of the phases and that discontinuity in phase two is seemingly mirrored in phase three. A decline in symptoms may immediately impair clients' abilities to attend to and function in their roles. For example, powerful, intense mood swings as assessed by the symptoms subscale might lead clients to be unable to engage fully at work and in intimate relationships.

Of interest was that for this model, after we controlled for the one-time decrease in mean-level, the overall trajectory of change for life functioning was significant and positive. Therefore, clients' life functioning improved throughout therapy with the exception of the one-time dip following the sudden deterioration in symptoms. A previous study found that clients with sudden deteriorations had the smallest effect sizes, although the effects were still positive (Lutz et al., 2013). This fit with our data in that

after sudden deteriorations in symptoms, there was a downward shift for life functioning (minimizing overall change), but then clients seemingly reoriented to the tasks of therapy and kept progressing at the steady rate they were before. The deterioration may represent a setback, but clients then catch up and experience a small amount of positive change. Although speculative, it may be that clients react to added symptom distress and then can recover or compensate in their lives and continue to grow in therapy.

Across the four final models, using piecewise representations of change was fruitful in that it revealed the sophisticated relationships between the outcomes of the phase model and how they are impacted by sudden gains and deteriorations. This study is among the few to examine what happens after sudden gains whereas more studies have attempted to understand what proceeds sudden gains (i.e. expression of hope and emotional processing before a gain; Abel, Hayes, Henley, and Kuyken (2016)). It is conceived that sudden gains may also elicit the positive emotional reactions associated with hope that are linked to the remoralization process (Howard, Moras, Brill, Martinovich, & Lutz, 1996). Remoralization (or demoralization) (be it associated with a sudden gain or deterioration in well-being or stemming from the experience of having a sudden gain or deterioration in general) is followed by significant changes in both mean-level (the session following) and slope for symptoms (for the remainder of therapy). On the other hand, sudden gains and deteriorations in symptoms were only followed by an immediate change in mean-level for life functioning. The measurable impact for sudden changes in symptoms occurred in the subsequent session and did not influence the trajectory of change thereafter. Accordingly, the sudden gains and deteriorations

associated with the outcomes of the phase model are related to one another, but the changes that occur after they happen vary by phase.

Significant Moderation Effects

The effects of the moderators we analyzed also varied by phase. The moderators we included were session frequency (average number of days between sessions), maximum number of sessions attended, number of sudden gains, and number of sudden deteriorations. These variables were analyzed due to their conceptual connection with the trajectories we were analyzing (i.e. their length and the timing of data points), but we did not make formal hypotheses about moderation effects due to a lack of theoretical rationale for them. There were only significant moderation effects for the final models associated with hypotheses one and three.

Hypothesis 1.

Session frequency. Session frequency was a significant moderator for the model that best fit the data for hypothesis one. More specifically, including session frequency as a predictor for each of the components in the model revealed that its impact changes after a sudden gain in well-being. Clients with more days in between their sessions progress more slowly up until the sudden gain, and then afterward, their mean-level of symptoms and the rate at which their symptoms change increases. The first portion of the trajectory fits with the existing literature wherein studies have found that attending sessions more frequently has been associated with faster improvement (e.g., Reese et al, 2011; Erekson et al., 2015); however, the latter portion of the trajectory does not. The sequential nature of the phase model may explain why this is so. If clients have yet to experience a positive shift toward remoralization and they are not coming in for therapy as often, then their

symptom change may be inhibited. Yet, after the sudden gain in well-being, clients may feel hopeful and optimistic about therapy and then having more days in between sessions might have the opposite effect. Clients may then feel empowered in their daily lives and engage in intersession processes that foster symptom change and growth (Owen et al., 2012; Zeeck, Hartmann, & Orlinsky, 2006). This moderation effect provides additional support for the phase model in that for clients who do not use (or unable to use) therapy as often, a sudden gain in phase one can have an even more meaningful and lasting impact on subsequent change in phase two.

Number of Sessions. Among clients whose first sudden gain was in well-being, those who attended a greater number of sessions reported more symptoms at the outset of therapy. In addition, clients who attended more sessions improved over the course of therapy, but they changed at a slower pace. There was no association between number of sessions and discontinuity in the trajectory for symptoms after the gain. Therefore, sudden gains in well-being are not further enhanced by clients receiving more services. The gain may be so activating and positive that it supersedes the influence of how many sessions clients attend. More broadly, this fits with the Good-Enough Level Model, which asserts that rate of change is reflective of clients' presenting concerns, how ingrained their symptoms are, and the way in which they respond to treatment (Baldwin et al., 2009; Barkham et al., 2006; Barkham, Rees, Stiles, et al., 1996; Stiles, Barkham, Connell, & Mellor-Clark, 2008; Owen et al., 2016). Accordingly, clients in this subsample who attended more sessions were those who started with more symptoms and who changed more slowly.

Number of sudden gains in well-being. The total number of sudden gains in well-being clients experienced in therapy significantly moderated all portions of the symptoms outcome trajectory for hypothesis one. Clients who experienced more sudden gains started therapy with a higher level of symptom distress. This makes sense as these clients then had more room to grow and subsequently experience sudden gains. Clients with greater numbers of sudden gains also experienced slower rates of positive symptom change up until their first sudden gain in well-being. However, after the sudden gain in well-being, more sudden gains in this phase were associated with an increased immediate change and acceleration in symptoms. As the symptom trajectories are centered around the first sudden gain in well-being, these additional sudden gains correspond with the “after” portions of model. Therefore, numerous sudden gains after the initial one enhanced the trajectory of change for symptoms during the remainder of therapy (exemplifying the upward trend following a sudden gain described by Tang & DeRubeis (1999)). Less is known about the characteristics of clients who fit the profile of having many gains in remoralization and who then are primed to undergo symptom change. For example, these clients may represent those who were provided resources in therapy that continually enhance their outcomes (i.e., a trans* client feeling affirmed and appreciated in session and then connected to medical providers for appointments to discuss gender confirmation). Yet another possibility has to do with response to therapy wherein clients who can tolerate relinquishing their defenses and being exposed to activating affect can experience that process as being positively reinforcing thereafter.

Number of sudden deteriorations in well-being. Number of sudden deteriorations also significantly moderated all portions of the trajectory for symptoms. Clients who

experienced more sudden deteriorations started therapy with more symptoms and changed more quickly up until the sudden gain in well-being. However, after the initial sudden gain in well-being, clients with more sudden deteriorations had less of a positive change in mean-level, and their overall symptom trajectory switched from positive to negative. Clients may have an initial sudden gain in well-being that is positive, but if they had a greater number of sudden deteriorations in well-being afterward, their symptoms trajectories became negative. This speaks to the importance of progression through the phases, wherein if repeated negative shifts in well-being happen, then clients may feel more hopeless and their symptoms increase. That is, this pattern reflects a downward spiral in symptom functioning, which could be related to a number of factors including treatment failure, multiple negative life events, or repetitive activation of inhibitory affect.

Hypothesis 3.

Session frequency. Session frequency was also a significant moderator for the model that best fit the data for hypothesis three. In particular, clients whose therapy was more spaced out started with fewer symptoms. This makes sense as clients might wish to come in less often if their symptoms are less severe. Of note is that clients who attended therapy more sporadically experienced a greater decrease in mean-level following a sudden deterioration in well-being. This intuitively fits as attending therapy more often may buffer the immediate impact of a sudden deterioration. It might speak to the relational quality or the engagement in services if clients are attending with greater frequency. However, if services are not available as readily or clients are less engaged in

treatment for whatever reason and cannot attend as often, sudden deteriorations in well-being lead symptoms to regress to a greater degree.

Number of sessions. For hypothesis three, the moderation effects of number of sessions also fit with what was expected based on the GEL model. Indeed, clients who attended more sessions started with more symptoms and changed more slowly over the course of therapy. However, what was uncovered via this moderation was that clients who attended more sessions were less negatively impacted by the sudden deterioration in well-being. Therefore, having more sessions seemingly served as a buffer for negative symptom change. According to Barkham and colleagues (2006), clients respond to therapy differently based on what they expect. If clients have awareness that therapy will continue, even though they feel a sudden decrease in hope, they can count on returning to therapy to work toward their goals.

Number of sudden gains in well-being. The total number of sudden gains in well-being clients experienced while in therapy also significantly moderated all portions of the symptoms outcome trajectory for hypothesis three. Clients who experienced more sudden gains started off with fewer symptoms, and they changed more quickly up until their first sudden deterioration. After the sudden deterioration in well-being, clients with more sudden gains experienced a greater drop in symptom functioning. Therefore, the initial sudden deterioration in well-being had a one-time negative impact even for clients with more subsequent sudden gains. Following a deterioration, more sudden gains in well-being correspond with acceleration to the symptoms trajectory. In spite of the initial negative impact of the deterioration, clients' symptoms seem to rebound afterward if they have more sudden gains in well-being. This finding also fits with the phase model in that

sudden changes to phase one impact the degree to which clients experience symptoms. The more sudden gains in phase one, the more clients will change in phase two.

Number of sudden deteriorations in well-being. For hypothesis three, number of sudden deteriorations in well-being was a meaningful predictor of symptom growth. Clients with more sudden deteriorations experienced faster symptom change up until their first deterioration. However, after that initial deterioration, clients with a greater number of subsequent deteriorations in well-being had more of a decrease in symptom functioning, and a deceleration of symptom trajectory. As the number of sudden deteriorations goes up, this trajectory was increasingly inhibited and eventually became negative in its overall direction (i.e. symptom functioning actually decreased for people with more sudden deteriorations in well-being). If clients are floundering in phase one, then phase two declines even more. Clients who experience a sudden deterioration first and who then continue to experience more of them represent clients who are most at risk of negative treatment outcomes. There are likely several reasons for this pattern, such as a mismatch within the therapeutic relationship that results in repeated experiences of demoralization, which may intensify psychological symptoms.

Patterns of Gains and Deteriorations

There were also some differences observed in terms of the frequency of sudden gains and deteriorations across phases. For example, 35.3% of the sample reported experiencing at least one sudden gain in well-being, 7.2% with at least one in symptoms, and 25.9% with at least one in life functioning. Regarding sudden deteriorations, 21.7% of clients reported having at least one in wellbeing, 4.2% with at least one in symptoms, and 14.5% with at least one in life functioning. While clients may fall into more than one

of these categories, this does highlight that sudden gains and deteriorations in phases one and three occur a greater percentage of the time than they do in phase two. This variability may stem from the nature of these various outcomes. For instance, symptoms are often conceptualized as being more endogenous, and, therefore, remediation may follow a more continuous path. However, phase one (remoralization) and phase three (rehabilitation) may change more sporadically and suddenly. These phases may be more situationally bound and influenced by external factors (i.e., positive or negative therapeutic relationship formation relationship for phase one or earning a particularly high or low grade in a class for phase three).

Within the sample, there were some clients whose sudden gains and deteriorations did not fit with the theory of the phase model. These were clients who either experienced co-occurring sudden gains or deteriorations (e.g., gains on all three at once) or gains that were out of order (e.g., the gain in symptoms occurred in advance of the gain in well-being). A total of 1,455 clients (8.7% of the sample) were excluded as a result of having one or more of these patterns of sudden gains or deteriorations. These clients may have been those to experience significant life events triggering co-occurring change or issues specific to one phase that led it to undergo a sudden change out of sequence. Regardless, this is only a small portion of the sample meaning that data from most clients were eligible for analysis. Had we found that a greater percentage of clients displayed trends of change that did not fit with the phase model, we would not have been able to move forward with our analyses because the data would not have matched the theory upon which our hypotheses were founded. Indeed, this study provides an additional form of support for phase model in that for the vast majority of clients, measurable improvement

in earlier phases (operationalized via sudden gains and deteriorations) is a pre-condition for change in subsequent phases (Howard et al., 1993).

Strengths

The present study offers a significant contribution to the field in terms of our understanding of what follows sudden gains and deteriorations, but also how we conceptualize the relationships between the outcomes of the phase model. That said, the findings must be interpreted within the context of the study's methodological strengths and weaknesses. In particular, one strength relates to the size of the sample, which gave us sufficient power to run such sophisticated models (complex, multi-level, longitudinal analyses). Our final sample included 16,657 clients, whereas many studies of sudden gains and deteriorations are much smaller with n's ranging from ~36 to ~200. Therefore, this is one of the first studies to examine this phenomenon on such a large scale. Further, the sample is collected from 70 university counseling centers across the country. While there is uniformity of the type of treatment center, there is diversity based on university characteristics, geographic location, and counseling center practices. Accordingly, our sample is widely generalizable and representative of college students receiving therapy. Further, one of the strengths of our study is the novel methodology we employed. This study is among the first to actually test the phase model by examining the interaction of phase model variables in the sequence they are theorized to occur.

Limitations

The results of the current study should also be understood with regard to the limitations inherent in its design. While the large sample size is a strength of our study, along with it comes a lack of specificity regarding the therapists and clients who

comprise our pool of participants. We have some information regarding client demographics, but we do not have any diagnostic information for them. Accordingly, we could not control for presenting problem, but previous studies have found that the impact of sudden gains is consistent across diagnostic categories (Adkera et al., 2012). In addition, we have very limited information about therapist demographics and no information about theoretical orientation. As the data were collected in naturalistic settings, clients were not randomly assigned to therapists, and they engaged in treatment as usual. There was no standard amount of time between sessions, and there were variable policies across sites with regard to session limits. In addition, process variables (e.g., the working alliance; Wucherpfennig et al., 2017) are becoming increasingly relevant in the discourse about sudden gains in studies with smaller n's; however, these variables were not collected uniformly by sites participating in the CelestHealth System-MH.

With regard to our analyses, we opted to center our trajectories around the first sudden gain or deterioration per domain. This was necessary in order to pick one point to represent the interruption of the time series. However, in doing so, we lost some of the richness of the data (i.e., clients having multiple sudden gains and deteriorations across domains). This limitation relates to the preliminary nature of this study and can be expanded upon in future studies of this phenomenon. Furthermore, in a sample of 351 clients, a recent study found that log-linear trajectories best represented two of the phases (well-being and symptoms) and that life functioning improved in a linear fashion (Sembill, Vocks, Kosfelder, & Schöttke, 2017). Our study only examined linear

trajectories as it represented a first step in understanding the complex relationships between these phenomena.

Implications

Practice and training. “Patient focused psychotherapy research” is designed with the intent of monitoring how individuals change over the course of psychotherapy and the ways in which this information is conveyed to therapists in the form of feedback in the process (e.g., Howard, Moras, Brill, Martinovich, & Lutz, 1996; Lambert, 2001; Lutz, 2002). Routine outcome monitoring systems like CelestHealth System-MH, which was used in this study, make the synthesis of client data quick and efficient. Further, these systems and their progress reports bridge the gap between science and practice by allowing therapists access to visual representations of client change. To our knowledge, the calculation of sudden gains and deteriorations is not programmed into any of the mainstream systems already in place.

In fact, it is common that existing systems (including CelestHealth System-MH) do not include normative comparisons for change and instead just display where clients fall with regard to the clinical cutoff. Therapists then must eye-ball graphs within electronic medical records to detect sudden gains and deteriorations.

At first glance, therapists may view fluctuations in client outcomes as a normal part of the therapy process. In addition, many therapists experience a healthy skepticism when a client comes in and reports a significant and sudden change to their functioning (e.g., wondering why or what happened to spark such a shift). Rather, this study showed that trusting in the change clients report may have value as some of these fluctuations represent sudden gains and deteriorations, which impact multiple outcome domains. If

therapists attune to these shifts in their clinical assessment and if routine outcome monitoring systems can flag these changes in outcome, therapists can intervene with intentionality, seek consultation, and engage in practice informed by research.

The implications of the calculation of sudden deteriorations are particularly relevant to clinical practice. While it is important to know when therapy is going well, if clients experience sudden and dramatic negative changes in psychotherapy, they are at risk of regressing across various outcome domains. Moreover, therapists may not detect these relevant changes in trajectory and might miss opportunities to alter the course of therapy to better meet the needs of their clients. Therapists want to do well in their roles and want their clients to be success stories in therapy. Rousmaniere (2016) states that focusing on stalled or deteriorating cases is an important learning objective because psychotherapists often miss their own cases with the potential for deterioration (Hatfield, McCullough, Frantz, & Krieger, 2010). Therapists may become aware of clients feeling worse, but their bias may lead them to view this downward trend as something fleeting. If clients share that they are feeling worse or if they are off track in a routine outcome monitoring system, it may be more than a random fluctuation. Awareness of sudden deteriorations can prompt therapists to conduct more in-depth assessment of working alliance (i.e. goals for therapy, tasks being employed to reach those goals, and the bond between therapist and client that facilitates the work of therapy; Bordin, 1979) and to engage in deliberate practice (Miller, Hubble, Chow, & Seidel, 2013; Miller, Hubble, Chow, & Seidel, 2015; Miller, Hubble, & Duncan, 2007).

Studies have shown that in the sessions following sudden gains, there is evidence of an increase in the therapeutic alliance (Lutz et al., 2013; Wucherpennig et al., 2017).

There is some process that happens that enhances the relationship after the gain occurs. Now that we know that multiple outcomes may be impacted by sudden gains and deteriorations, it is important for clinicians to consider how the therapeutic process may change as well. Flückiger and colleagues (2013) highlight that therapeutic dyads may differ in their ability to build upon sudden gains and to reinforce the positive change associated with them (Flückiger, Grosse Holtforth, Del Re et al., 2013). Accordingly, it is this aspect of training and clinical process that must be further explored. If the fluctuation meets criteria for a sudden gain, clinical intervention should focus on capitalizing on the forward momentum across domains and within the relationship. However, less is known about the potential for relational ruptures that may follow sudden deteriorations, yet even the possibility of them should certainly be a focus of clinical practice. Therapists should be trained to view these as opportunities for connection and re-evaluation of the relationship.

Research. The present study only begins to highlight the complexity of psychotherapy data and the trajectories of change clients undergo in therapy. The growth models presented in the introduction (Dose-Effect Model and Good-Enough Level Model) and the use of growth mixture modeling techniques all yield typical patterns of change that occur during psychotherapy. These ways of understanding change are disseminated widely and frame the conversation about how long clients should receive care and how much therapy is enough. However, average trajectories of continuous change in psychotherapy mask the sophistication of the data. For example, growth mixture modeling techniques have captured more of the nuance of how people change by identifying trajectories common to groups. In one study, Lutz and Colleagues

distinguished three different groups, one of which included people with “moderate/severe symptoms and rapid early improvement” (Lutz, Stulz, & Köck, 2009). Indeed, it is possible that those rapid changes are the result of sudden gains and that rapid early movement category is actually one filled with people with sudden gains.

The present study captures the complexity of psychotherapy data. There were clients within this sample who experienced up to five distinct sudden gains and three deteriorations in a given phase. Existing research of continuous trajectories does not account for this heterogeneity and might really be missing the mark (depending on the outcome domain). There is error within our existing models based on the ways these sudden shifts play out both in the session they occur and in the sessions that follow.

Future Directions. While this study has added to the literature in meaningful ways, it has also uncovered many avenues for future research. Not only do we not fully understand how these sudden gains impact existing statistical models, but also we have limited awareness of how they relate to session process and our theoretical conceptions of change. Sudden gains and deteriorations may occur as a result of something happening in therapy or outside of therapy in broader life contexts. Retrospectively analyzing session recordings before and after sudden gains and deteriorations might provide insight into the processes unfolding between clients and therapists.

Future studies should also seek to examine the associations between sudden gains and deteriorations across all three of the outcome domains at once. Sudden gains may occur in a cascading fashion (one triggering the next and then the next). This study does not call attention to if the mean-level changes meet criteria for subsequent sudden gains, and future studies should seek to do so. In addition, the field would benefit from

longitudinal studies of psychotherapy process that can be analyzed in conjunction with sudden gains. Shifts in process (e.g., working alliance or cultural concealment) may trigger changes in slope and mean-level. For example, if a client stops concealing an identity status (i.e. comes out as gay) and this change is reflected on a longitudinal cultural concealment scale, this sudden gain in a process variable may then interrupt the trajectory of outcome change in a positive way. Previous studies have looked at what happens to process variables after sudden gains, but it may be worthwhile to do the opposite as well.

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APPENDIX A: MODEL FIT STATISTICS FOR PIECEWISE ANALYSES

Model	Comparison Model	Deviance Test	p-value	BIC
<u>H₁: WB Gain on SYM</u>				
1. No Change	--	--	--	45,057
2. Slope Change	2 v. 1	1,620.55	<0.01	4,3467
3. Level Change	3 v. 1	5,021.62	<0.01	40,065
4. Level and Slope Change	4 v. 3	729.70	<0.01	39,376
<u>H₂: SYM Gain on LF</u>				
1. No Change	--	--	--	3,499
2. Slope Change	2 v. 1	10.96	>0.05	3,518
3. Level Change	3 v. 1	143.15	<0.01	3,386
4. Level and Slope Change	4 v. 3	15.23	>0.05	3,410
<u>H₃: WB Det on SYM</u>				
1. No Change	--	--	--	28,888
2. Slope Change	2 v. 1	147.08	<0.01	28,771
3. Level Change	3 v. 1	4,519.04	<0.01	24,399
4. Level and Slope Change	4 v. 3	334.29	<0.01	24,104
<u>H₄: SYM Det on LF</u>				
1. No Change	--	--	--	1,722
2. Slope Change	2 v. 1	2.88	>0.05	1,750
3. Level Change	3 v. 1	86.36	<0.01	1,666
4. Level and Slope Change	4 v. 3	4.30	>0.05	1,701

Notes. The models are labeled by hypothesis. Hypothesis 1 = Well-Being (WB) Sudden Gain and Symptoms (SYM) Outcome Trajectory, Hypothesis 2 = Symptoms (SYM) Sudden Gain and Life Functioning (LF) Outcome Trajectory, Hypothesis 3 = Well-Being (WB) Sudden Deterioration and Symptoms (SYM) Outcome Trajectory, and Hypothesis 4 = Symptoms (SYM) Sudden Gain and Life Functioning (LF) Outcome Trajectory.

APPENDIX B: COEFFICIENTS FOR BEST FITTING MODELS EXAMINING THE
IMPACT OF SUDDEN GAINS AND DETERIORATIONS

	Intercept (π_0)	Slope _{Before} (π_1)	Slope _{ChangeAfter} (π_2)	Level _{ChangeAfter} (π_3)
	<i>b (SE)</i>	<i>b (SE)</i>	<i>b (SE)</i>	<i>b (SE)</i>
<u>WB Gain on SYM</u>	3.05 (0.01)*	0.03 (0.002)*	-0.02 (0.002)*	0.34 (0.01)*
<u>SYM Gain on LF</u>	2.01 (0.04)*	-0.001 (.01)	--	0.40 (0.03)*
<u>WB Det on SYM</u>	3.07 (0.01)*	0.06 (0.002)*	-0.01 (0.002)*	-0.49 (0.01)*
<u>SYM Det on LF</u>	2.19 (0.06)*	0.05 (0.01)*	--	-0.38 (0.06)*

Notes. The primary numbers in the table are the unstandardized coefficients for the fixed effects. Standard errors are in parentheses. * $p < .001$. Slope (time) was measured in sessions.

APPENDIX C: INTRACLASS CORRELATIONS (ICCs) FOR BEST FITTING MODELS

	Level 2	Level 3
<u>WB Gain on SYM</u>	0.53	0.04
<u>SYM Gain on LF</u>	0.54	0.01
<u>WB Det on SYM</u>	0.58	0.04
<u>SYM Det on LF</u>	0.51	0.002