Scheduled Healing: The Relationship Between Session Frequency and Psychotherapy Outcome in a Naturalistic Setting

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ABSTRACT

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The dose-effect relationship in psychotherapy has been examined extensively, but few studies have included session frequency as a component of psychotherapy "dose." Those studies that have examined the effects of session frequency have indicated that it may affect both the total amount of recovery and the speed of recovery. No studies were found examining the clinical significance of this construct in a naturalistic setting. The change trajectories of 16,003 clients were examined using multi-level modeling and including session frequency as a fixed effect. Of these clients, subgroups were identified that were scheduled approximately once a week or approximately once every two weeks. These groups were compared to each other for differences in speed of recovery and clinically significant change. Results indicated that more frequent therapy was associated with steeper recovery curves. When comparing groups scheduled once a week to those scheduled once every two weeks, more clinically significant gains were identified in those attending once a week, and more significant deterioration was identified in those attending once every two weeks. These findings are discussed in light of the existing literature and the implications for future psychotherapy research and clinical practice.

Keywords: frequency, psychotherapy, outcome, dose-response, dose-effect

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Table of Contents

List of Tables

List of Figures

Scheduled Healing: The Relationship Between Session Frequency and Psychotherapy Outcome in a Naturalistic Setting

There is not an agreed upon method for delivering psychotherapy. Despite years of discussion regarding the pragmatics of practice (e.g., the number of sessions given, how frequently sessions are given, how long each session should be), these practices have historically rested on a foundation of tradition rather than evidence (e.g., 50-minute session delivered weekly). As second-party payers and managed care have become more prominent in managing mental health care, more emphasis has been placed on not only maximizing the effectiveness of treatment, but also minimizing treatment intrusiveness and cost (Austad & Berman, 1991). In psychotherapy, this has led to research attempting to identify an optimal range of the amount of therapy; in other words, a specific amount of time or number of sessions that is generally found to be helpful across a broad population. Studies to date have focused primarily on the number of sessions required for positive change in psychotherapy, with some, but limited attention given to the frequency of psychotherapy.

This dearth of research may be particularly problematic as scheduling practices in naturalistic settings may be shifting. Traditionally, psychotherapy sessions have been scheduled once a week. Practitioners may be influenced to attenuate this frequency by practical and economic constraints, however, allowing more clients to be in active, albeit less than weekly, therapy simultaneously. Although increasing the number of individuals receiving therapy is economically desirable, the effects of decreasing session frequency on the efficacy of psychotherapy are relatively unknown. The following review will examine the available literature on the effect of number of sessions attended and frequency of sessions on psychotherapy outcome, with particular emphasis on session frequency. A theoretical model will then be presented, placing session frequency in the context of the structure of psychotherapy and the mechanisms of psychotherapeutic change.

Literature Review

Number of Sessions Needed: The Dose-Effect Investigation

The number of sessions necessary for psychotherapeutic change has been of interest since the 1950s (Hansen & Lambert, 2003). Early studies examined therapy duration as a function of the number of sessions attended by the client, and measured outcome through clinician judgment (Cartwright, 1955; Seeman, 1954; Standal & van der Veen, 1957; Strassberg, Anchor, Cunningham, & Elkins 1977), client self-report (Weitz et al., 1975), or criterion measures (e.g., university student graduation; Johnson, 1965). Consistent correlations were observed between the number of sessions received and positive outcome, though this finding was dependent on the type of outcome measured. Number of sessions was differentially correlated with the different outcome measures; specifically, improvement in “personal integration” and “emotional problems” were more strongly correlated with the number of psychotherapy sessions attended than other measures of outcome (Johnson, 1965; Standal & van der Veen, 1957). Researchers also observed an attenuation of positive outcome as the number of sessions exceeded 20 (Strassberg et al., 1977). Although this early research relied on small sample sizes and measures of outcome that are less valid and reliable than methods used today, it provided the groundwork for more recent research on the number of sessions needed for positive outcome, or the dose-effect relationship.

The dose-effect relationship. The dose-effect relationship is a research method and terminology adopted from clinical drug trials by Howard, Kopta, Krause, and Orlinsky (1986). In drug trials, dose indicates the amount of the drug administered, and effect is the measured response to the drug; in psychotherapy research then, a "dose" could be conceptualized as a session of therapy, and an effect, a measure of symptom relief or recovery. In their seminal study, Howard et al. (1986) performed a meta-analysis of 15 studies (including several listed above) where researchers had collected and reported psychological improvement as it varied with the number of psychotherapy sessions received. Using data gathered from 2,400 patients, the researchers found that recovery rates could be represented by a negatively accelerating curve, where approximately 53% of patients would be expected to have measurably improved in 8 sessions, 75% at 26 sessions, and 85% at 52 sessions.

This conceptualization of dose-effect in psychotherapy and the estimated parameters for the number of sessions needed for significant change spurred replications, elaborations, and specifications in the literature. Several studies improved upon the original meta-analysis by using more standard and reliable measures of change in a naturalistic setting, and by specifying parameters for clinically significant change. These studies have found a similar positive relationship between the number of sessions and the total proportion of those achieving significant change; they also found a similar negatively accelerating curve, indicating that each incremental increase in the number of sessions yields a decreasing proportion of clients achieving significant change (Barkham et al., 2006; Stiles, Barkham, Connell, & Mellor-Clark, 2008).

The original dose-effect study and its replications listed above relied on a single change index over an entire course of therapy to evaluate change. Because significant change could potentially occur before the final session of therapy, other studies have evaluated the dose-effect response using session-by-session outcome measures (Callahan & Hynan, 2005; Hansen & Lambert, 2003; Kadera, Lambert, & Andrews, 1996). These studies have found general support for the dose-effect model as well, and estimate that 13 to 18 sessions are sufficient for 50% of clients to recover, where recovery was indicated by clinically significant change on the OQ-45 (calculated as 14 points) in conjunction with ending below the clinical cutoff score (Hansen, Lambert, & Foreman, 2002).

Some have suggested that the negatively accelerating dose-effect curve is not representative of individual clients, but is a relic of differential morbidity, where individuals who respond more quickly to therapy drop out earlier and leave only those who do not respond quickly in the analyses of the effects of greater numbers of sessions. It has been hypothesized, therefore, that the number of sessions attended is contingent upon how quickly a client responds to therapy rather than vice versa (i.e., number of sessions predicting recovery; Barkham et al., 2006; Stiles, Barkham, Connell, & Mellor-Clark, 2008). This hypothesis has garnered some support with a recent study examining a university-based counseling center. While an analysis of the entire sample demonstrated the negatively accelerating curve found in Howard et al.'s original study, stratifying the sample by the number of sessions was a better fit statistically, and indicated different rates of change according to the number of sessions attended (Baldwin, Berkeljon, Atkins, Olsen, & Nielsen, 2009). Instead of diminishing returns as the number of sessions increase, then, findings may indicate simply that individuals respond to psychotherapy at different rates and attend the number of sessions needed to recover. This is referred to as the Good Enough Level (GEL).

In all of the investigations of the dose-effect relationship described above, dose has been operationalized as a single session of therapy, without time between sessions being accounted for. For example, two clients may have received four sessions, or the same "dose"; the first client, however, may have received four sessions within four weeks, while the second client may have received four sessions within two months. It would be difficult to assume, in this hypothetical case, that both clients received an identical dose of therapy. It seems possible that the nature of a "dose" may be affected by its temporal relationship to other doses, and that time, therefore, may be an important variable to consider when operationalizing "dose" in psychotherapy.

Session Frequency

The nature of the relationship between session frequency and the dose-effect relationship in psychotherapy has remained relatively unstudied in general psychotherapy practice. Studies that have explored this relationship, however, can be grouped into three categories: session frequency in psychoanalytic therapy, session frequency in behavioral or cognitive behavioral therapy, and session frequency in naturalistic settings.

Psychoanalytic therapy. The discussion of session frequency has been prominent in the psychoanalytic literature, and consists primarily of theoretical expostulations on the implications of decreasing session frequency from the traditional practice of up to six sessions a week, to two or three times a week or less. It has been argued that decreased session frequency may lead to decreased session efficiency and decreased therapy effectiveness (Gedo & Cohler, 1992). Session frequency has also been identified by psychoanalysts as a differentiating factor between psychoanalysis and other psychotherapies, where seeing a patient less than three times a week may not qualify as a psychoanalytic intervention (Carrere, 2010; Richards, 1997; Schwartz, 2003).

Two studies attempted to observe the effects of session frequency in routine practice of psychoanalytic psychotherapy. Both relied on retrospective evaluations by patients after completing therapy, and on naturalistic data regarding session frequency and dose. Each was asked to rate his or her recovery in therapy, including decrease in symptom distress and increase in morale. Both studies indicated a relationship between the frequency of sessions and patients' perceptions of recovery, where patients being seen only once a week had less positive perceptions of their experience than patients being seen two times a week or more. In fact, positive perceptions of recovery were incrementally related with the frequency of sessions, with once a week indicating the least amount of recovery, twice a week somewhat more, and three times a week the most recovery in therapy (Freedman, Hoffenber, Vorus, & Frosch, 1999; Sandell et al., 2000). This provides some evidence that patients' perceptions of their own recovery may be affected positively by increased session frequency. A follow-up study to Sandell et al. (2000) found an interaction effect in long-term follow-up (i.e., 3 years, with measures taken each year) between duration and frequency, where outcome was better among the low frequency/low duration group and among the high frequency/high duration group (Sandell, Blomberg, & Lazar, 2002). These findings illustrate the potentially complex relationship between session frequency and other parameters, including the number of sessions and duration of the course of treatment; ultimately, they indicate that session frequency seems to be related not only to immediate perception of therapy, but to long-term outcome.

Behavioral and cognitive behavioral therapies. Session frequency has also been examined empirically in conjunction with behavioral interventions and, more specifically, exposure. Many studies have demonstrated a difference between massed and spaced exposure-based sessions when treating fear symptoms. The specific parameters of massed or spaced exposure vary from study to study; in general, however, massed exposure indicates an intensive approach to exposure (e.g., several hours in a single day), and spaced exposure indicates exposure sessions that are distributed over a greater period of time (e.g., exposure sessions every five days). Massed exposure tends to show better immediate reductions in fear and avoidance behaviors, and spaced exposure tends to show better retention of learning and lower relapse rates (Abramowitz, Foa, & Franklin, 2003; Bohni, Spindler, Arendt, Hougaard, & Rosenberg, 2009; Chambless, 1990; Foa, Jameson, Turner, & Payne, 1980; Rowe & Craske, 1998; Tsao & Craske, 2000). Though these findings are attenuated by small sample sizes (all less than or equal to 40 participants), if applied broadly, they suggest that frequency may affect the amount of recovery in a patient, and may differentially affect short- and long-term outcomes in psychotherapy.

Cognitive-behavioral therapy researchers have similarly examined the effect of frequency on outcome, and have found that in addition to affecting the amount of recovery, frequency may affect the speed of recovery. In a comparison of obsessive-compulsive disorder treatment administered either daily (for 14 days) or weekly (for 14 weeks), therapeutic effects seemed to be equally effective, even at a three month follow-up (Storch, et al., 2007; Storch, et al., 2008; see also Emmelkamp, Van Linden, Rüphan, & Sanderman, 1989). If these two approaches are indeed equivalent in effect, the more frequent treatment appears to have the advantage of a faster recovery. Though these studies have used a specific treatment for a specific disorder, they suggest that increased frequency may decrease the amount of time a patient suffers; this is a suggestion that warrants examination in a naturalistic setting, where patients may at times be receiving therapy at protracted frequencies (i.e., once every two weeks) that have thus far remained unstudied.

Naturalistic settings. Three studies were identified that have attempted to better understand the effects of session frequency in a naturalistic setting, where data were gathered from a working clinic rather than a controlled trial. The first study examined session frequency as the average number of sessions attended each week, and included dose (or number of sessions) and duration (or total length of the treatment) as variables in the analysis. The researchers found that neither absolute dose nor duration was a significant predictor of outcome, but that fewer sessions and more months of therapy were associated with worse outcomes. Further, they found that higher session frequency for those in therapy less than five months was associated with better outcomes, and higher session frequency for those in therapy more than five months was associated with worse outcomes (Reardon, Cukrowicz, Reeves, & Joiner, 2002). These findings would seem to suggest that more frequent sessions are associated with better final outcomes for subjects who received a shorter course of therapy, but with worse final outcomes for subjects who received a longer course of therapy.

There are several issues, however, that hamper clear interpretation of these results. Initial symptom severity was not included and could reasonably explain the findings, independent of session frequency. The study also utilized a small sample size (N = 74, split in half to compare groups) that may not be representative of a larger population; for example, of their total sample, 42 deteriorated and 25 experienced no change, indicating a disproportionately large number of individuals getting worse over the course of therapy compared to other naturalistic outcome studies. Finally, outcome was operationalized as post-hoc ratings of functioning, using case notes and available measures as indicators of total change over the course of therapy. How well these change ratings reflect actual change across therapy is unknown.

The second study examined how the number and frequency of sessions within the first three months of therapy were associated with final outcome in 256 clients. This association was compared across three theoretical orientations: psychodynamic psychotherapy, cognitive behavioral therapy, and psychoanalytic psychotherapy. No association was found between initial frequency and outcome for psychodynamic and cognitive behavioral therapies; psychoanalytic therapy, however, tended to have better outcomes when it was initially less frequent, but regular (Kraft, Puschner, & Kordy, 2006). This conclusion is incongruent with previous findings for psychoanalytic psychotherapy, discussed above, that showed a linear relationship between increased frequency and better outcomes (see Freedman et al., 2009, and Sandell et al., 2000), but congruent with Sandell, Blomberg, and Lazar's (2002) longitudinal follow-up that suggested low frequency and a shorter duration were associated with better outcomes. This could perhaps be explained by the restriction of the analysis of session frequency in Kraft, Puschner, and Kordy's study to the first three months of therapy. As with the first study presented (Reardon et al., 2002), there are limitations that prevent extrapolation of these results to the effects of scheduled frequency—most notably, an operationalization of frequency as total number of sessions attended within the first three months of therapy, and lack of inclusion of relevant covariates (e.g., initial symptom severity).

The third study utilized the Outcome Questionnaire-45 (OQ-45) at every third session to track the change trajectories of 1,207 students seeking counseling at a university counseling center (Reese, Toland, & Hopkins, 2011). In light of the recent research regarding faster recoveries for individuals who attended fewer sessions of therapy, or the GEL model (discussed above; see Baldwin et al., 2009), the researchers explored whether or not session frequency improved that model of therapy recovery, and if so, the nature of frequency effects. Session frequency was defined by subtracting the total number of sessions attended by one and dividing that number by the number of weeks in therapy (yielding a single session frequency average for each individual). They found that session frequency significantly contributed to the GEL model, and that it functioned independent of the number of sessions attended. It was also found that higher session frequency (i.e., more sessions in fewer days) was related to faster recovery.

Limitations to this study include the OQ-45 being given once every third session rather than every session and the operationalization of frequency as a fixed variable for each individual (where session frequency in fact varies over time, depending on scheduling practices). Additionally, none of these three studies examined the clinical significance of their findings.

Overall, the existing literature suggests that session frequency may be associated with psychotherapy outcome. Specifically, frequency has been implicated as an important factor in (a) the total amount of change in psychotherapy, where increased frequency may lead to better outcomes; and (b) the speed of recovery in psychotherapy, where more frequent therapy may lead to faster response.

Session Frequency and the Generic Model of Psychotherapy

In addition to some accumulation of empirical evidence for the importance of session frequency in psychotherapy outcome, session frequency can be conceptualized as an integral part of the theorized structure and mechanisms of psychotherapy. While different theoretical models provide different explanations of how therapy functions to benefit clients, several factors remain consistent across therapies; these commonalities have been outlined by Orlinsky (2009) using available empirical evidence in a "generic" model of psychotherapy. This model incorporates the external structure of psychotherapy (or therapeutic operations), direct therapeutic interventions, and the therapeutic bond as integral elements to all psychotherapies.

When considering scheduling specifically, session frequency is theorized to have an effect on the therapeutic operations as well as the therapeutic bond. The interaction between time between sessions and the effectiveness of therapeutic operations remains unknown, though it stands to reason that gains may be less likely to add upon each other as the length between sessions increases. Infrequent scheduling may also attenuate the development and stability of the therapeutic alliance, as a client and therapist may feel less connected and less actively involved with each other and the therapy. Additionally, a client may attach meanings to infrequent scheduling that are harmful to the alliance, such as “My therapist is too busy for me,” “I must not be important enough,” or even, “My therapist must not like me.” If both therapeutic operations and the therapeutic bond are impaired, it follows that the psychotherapy would be less efficacious, either decreasing the total amount of change experienced or increasing the amount of time needed in therapy to produce change equivalent to one scheduled more frequently.

Current Study

As reviewed above, a large body of research has demonstrated the importance of considering the “dose” of psychotherapy and its relation to outcome. Most of these studies have ignored session frequency when defining dose. Some implications regarding frequency can nevertheless be drawn from the literature: first, that it may affect the overall amount of change experienced in therapy; second, that it might affect the speed of recovery; and third, that there may be interactions between variables that change the relationship between frequency and outcome. These implications are theoretically supported by a general model of psychotherapy (Orlinsky, 2009). There is also some evidence for the association of scheduling frequency and psychotherapy outcome in a naturalistic setting. There are no studies that have yet incorporated measurement of outcome at each session, session frequency as a time varying parameter, and examination of the clinical significance of session frequency. The current study is intended to address these limitations and replicate current findings by comparing differences in psychotherapy outcome between those scheduled regularly once a week and those scheduled regularly once every two weeks as well as examining the overall effect of session frequency as a continuous, time varying variable.

In conjunction with the scientific and theoretical literature, pragmatic concerns have inspired the current research design. Because most randomized-controlled trials examining the efficacy of psychotherapy have relied on weekly psychotherapy sessions (Hansen, Lambert, and Forman, 2002), there is specific evidence to support the efficacy of this traditional scheduling practice. In an informal examination of the list of research supported treatments provided by Division 12 of the APA (APA Presidential Task Force on Evidence-Based Practice, 2006), 47 of the 56 treatments that specified session frequency were given weekly or more frequently for the majority of each intervention. Evidence-based treatments that are intended to be transported from randomized clinical trials to routine care are based on weekly sessions of psychotherapy. As mentioned earlier, however, practical and economic constraints have led therapists in naturalistic settings to lessen session frequency to once every two weeks. Indeed, the proportion of clients scheduled regularly once every two weeks to clients scheduled regularly once a week, in the counseling center examined in the current study, has increased from approximately 5% in 1996, to 24% in 2010. This practice lacks a known consequence or an evidence base. Because of this lack of research, the important theoretical implications of session frequency, and the incongruence between research supported scheduling practices and actual scheduling practices in naturalistic therapy, this study was designed to address the following questions:

1. Is the amount of recovery in psychotherapy associated with therapy scheduled once a week versus once every two weeks?
2. Is speed of recovery in psychotherapy associated with therapy scheduled once a week versus once every two weeks?
3. What is the overall effect of session frequency on psychotherapy recovery curves?

Method

Participants

Archival outcome and appointment data were drawn from the counseling center database of a large western university. Those included in the database (N = 24,448) were university students who received individual psychotherapy between 1996 and 2011. Therapy at the counseling center is offered free of charge and without session limits to full-time students of the university. Clients are referred or self-referred for a wide range of problems, the majority of which are adjustment, anxiety or depression related. Individual therapy generally consisted of the traditional 50 minute hour. Therapists at the counseling center are psychologists or supervised psychologists in training (doctoral students in counseling or clinical psychology) who provide treatment according to their theoretical preference, including cognitive-behavioral, psychodynamic, client-centered, existential, systems, and integrative modalities.

Consideration for inclusion in this study was restricted to individuals who had only attended individual therapy (i.e., no group treatment), attended at least two sessions of therapy and completed at least two measures of outcome (N = 16,003), allowing for clients to be exposed to a scheduling effect.

Selection and Grouping Procedures

Scheduling practices. An informal survey of 17 therapists at the counseling center was used to better understand and generate hypotheses about current scheduling practices at the counseling center. Therapists estimated the percentage of clients they see once a week (M = 34%), once every two weeks (M = 54%), and less frequently (M = 11%). They also reported their *ideal* proportions of session frequency, with a mean of 66% for once a week, 27% for once every two weeks, and 8% for less frequently. When asked about these scheduling practices, 12 therapists indicated that they were not able to see clients more frequently due to a full schedule, 3 therapists indicated that it was according to client severity, and 2 therapists were unsure. Most therapists expressed that they would like to see clients once a week and that they often begin therapy with higher frequencies and taper to lower frequencies later in therapy.

As traditional scheduling generally considers weekly units, individuals scheduled regularly once a week (1WK) or regularly once every two weeks (2WK) were identified. Three selection procedures were employed in order to identify these groups and isolate the effects of scheduling on recovery trajectories.

Mean Selection Procedure. A mean and standard deviation were calculated for the number of weeks between each scheduled session for each client. For example, a client who had attended three sessions one week apart and three sessions two weeks apart would receive a mean of 1.5 and a standard deviation of 0.5. Three increasingly broad parameters were used to define 1WK and 2WK groups. The narrowest parameters identified individuals who had a mean of either 1 or 2 and a standard deviation of 0. The next, broader set of parameters identified individuals with a mean within .125 of 1 or 2 and a standard deviation equal to or less than .125. The broadest set of parameters identified individuals with a mean within .25 of 1 or 2 and a standard deviation equal to or less than .25. For ease in discussing results, this selection method will be referred to as the Mean selection procedure; groups defined by the narrowest parameters will be referred to as M Groups 1, groups defined by the intermediate parameters as M Groups 2, and groups defined by the broadest parameters as M Groups 3. These broadening parameters were non-overlapping, where individuals who were grouped by narrower parameters were not included within the groups identified by broader parameters. Wider parameters than those listed were considered (i.e., M = within 0.5 weeks, SD = 0.5), but were ruled out as identified cases did not seem representative of the construct of interest (i.e., regularly scheduled therapy at either once a week or once every two weeks).

Proportion Selection Procedure. The second selection procedure calculated the proportion of sessions scheduled within one day of one- or two-week periods. Using the same example discussed in the Mean procedure, the client would receive a proportion of .50 for sessions scheduled once a week and .50 for sessions scheduled once every two weeks. Three increasingly broad parameters were also used with this procedure. The narrowest parameters identified individuals who received 100% of sessions within 1 week for the 1WK group, and individuals who received 100% of sessions within 2 weeks for the 2WK group. The next, broader parameters included individuals who received at least 75% of their sessions within 1 or 2 week periods; the broadest parameters included individuals who received at least 66% of their sessions within 1 or 2 week periods. This selection method will be referred to as the Proportion selection procedure; groups defined by the narrowest parameters will be referred to as P Groups 1, groups defined by the intermediate parameters as P Groups 2, and groups defined by the broadest parameters as P Groups 3. As with the Mean procedure, groups identified by these broadening parameters were non-overlapping.

Quarters Selection Procedure. The simplest and most inclusive selection procedure simply calculated the mean frequency of sessions for each individual and included those within .25 of 1 week or 2 week means. This selection method will be referred to as the Quarters procedure. Table 1 presents a summary of each of the above selection and grouping procedures.

Time Period Selection. Session frequency was calculated for each individual over the first month of therapy (Month 1), the first two months of therapy (Month 2), the first three months of therapy (Month 3), and over the entire course of therapy. Each of the above

Table 1

Summary of Selection and Grouping Procedures for Comparisons of Therapy Once a Week (1WK) versus Therapy Once Every Two Weeks (2WK)

Procedure	Description		Advantages of Procedure
	1WK	2WK	
Mean Procedure			
M Group 1	*M* = 1 week *SD* = 0	*M* = 2 weeks *SD* = 0	Accounts for average frequency (*M*) and the frequency regularity (*SD*), restricting selection to individuals who regularly attended once a week or once every two weeks.
M Group 2	*M* = within .125 weeks of 1 *SD* = .125	*M* = within .125 weeks of 2 *SD* = .125	
M Group 3	*M* = within .25 weeks of 1 *SD* = .25	*M* = within .25 weeks of 2 *SD* = .25	
Proportion Procedure			
P Group 1	100% of sessions scheduled at 1WK intervals	100% of sessions scheduled at 2WK intervals	Less affected by frequency outliers (e.g., a single session scheduled 2 months after the last) than the mean procedure.
P Group 2	75% of sessions scheduled at 1WK intervals	75% of sessions scheduled at 2WK intervals	
P Group 3	66% of sessions scheduled at 1WK intervals	66% of sessions scheduled at 2WK intervals	
Quarters Procedure	*M* = within .25 of 1 week	*M* = within .25 of 2 weeks	Less restrictive than either of the above procedures, capturing a broader section of the population.

parameters was applied to these time periods. For example, individuals who were regularly scheduled either once a week or once every two weeks within the first month of their course of therapy were identified and grouped; this procedure was followed for all time periods, considering session frequency during the first two months, first three months, and entire course of therapy. Each selection procedure listed above, therefore, has four different time iterations, allowing for examination of the effects of session frequency early in therapy as well as over an entire course. These procedures and time iterations are illustrated in Figure 1.

Measures and Procedure

Outcome Questionnaire-45 (OQ-45). Psychological outcome was assessed during treatment using the OQ-45 (Lambert, Gregersen, & Burlingame, 2004), a 45-item self-report instrument designed to measure client distress and functioning over the last week and typically administered prior to each therapy session to track progress in therapy. Items are rated on a 5-point Likert scale: 0 = never, 1 = rarely, 2 = sometimes, 3 = frequently, 4 = almost always. They cover three broad domains: a) symptom distress, b) interpersonal relations, and c) social role performance. Total scores range from 0 to 180, with higher scores reflecting more severe distress and lower scores reflecting less distress. Accordingly, decreasing scores from week to week indicate improved mental health functioning.

Previous research has provided evidence for the utility of the OQ-45 as a measure of treatment progress and outcome. According to the test manual, the OQ-45 demonstrates an excellent level of internal consistency ($\alpha = .93$) and exhibits concurrent validity with symptom distress measures such as the Symptom Checklist-90-R, Beck Depression Inventory, State-Trait Anxiety Inventory, Zung Self-Rating Depression Scale, Zung Self-Rating Anxiety Scale, Taylor Manifest Anxiety Scale, Inventory of Interpersonal Problems, and Social Adjustment Scale-Self

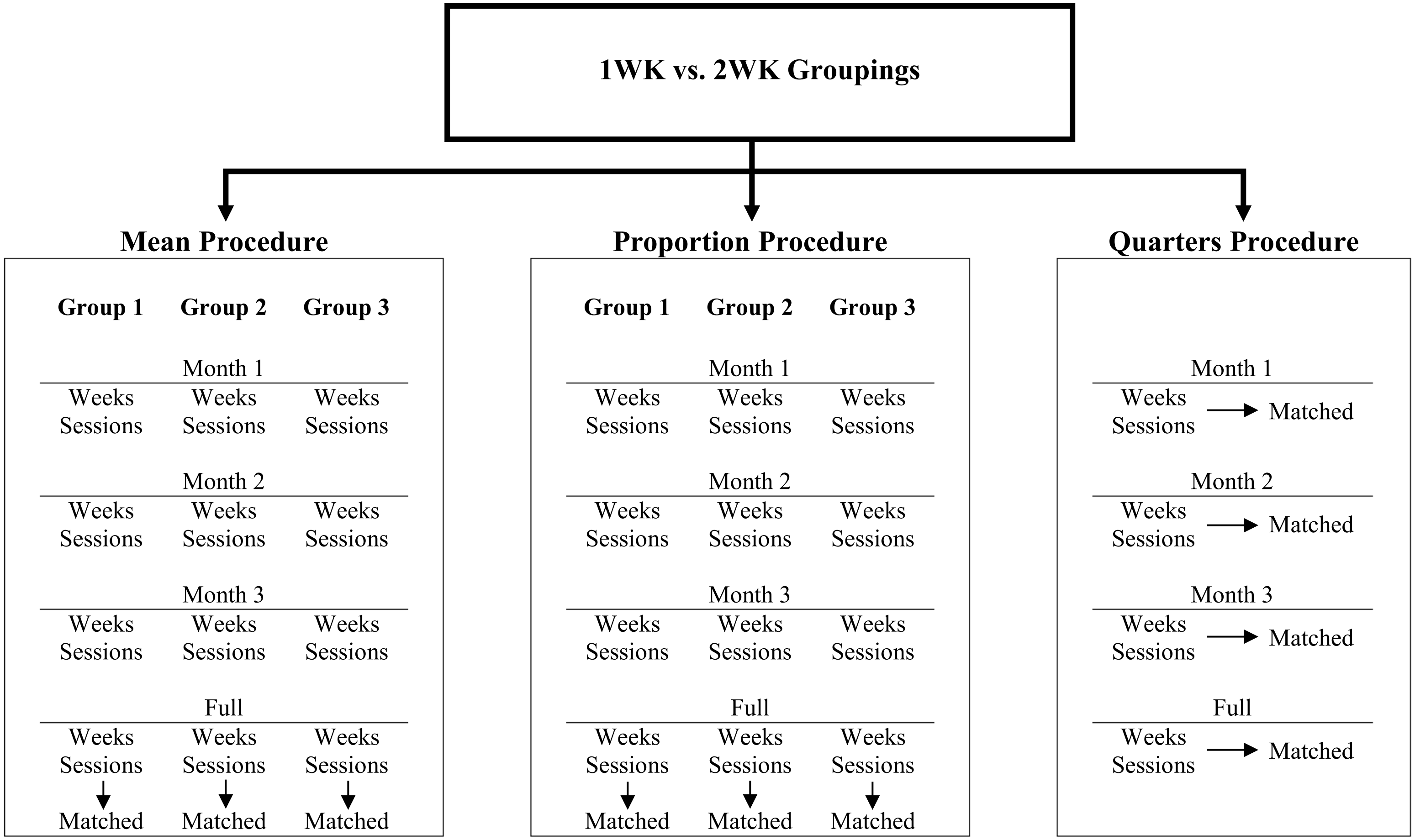


Figure 1. Illustration of Selection and Grouping Procedures for Comparisons of Therapy Once a Week (1WK) versus Therapy Once Every Two Weeks (2WK). Group 1 = most stringent selection methods; Group 2 = intermediate selection methods; Group 3 = broadest selection methods; Month 1 = frequency in just the first month of therapy considered; Month 2 = frequency in just the first two months considered; Month 3 = frequency in the first three months considered; Full = session frequency over the full course of therapy considered; Weeks = weeks as time in multi-level models; Sessions = sessions as time in multi-level models; Matched = 1WK and 2WK groups matched on initial symptom severity as measured by the OQ-45.

Report. Test-retest reliability was reported as .84 over a 3-week period. The OQ-45 is also reported, however, as sensitive to change, improving an average of 17.47 points in a sample of 40 patients receiving psychotherapy. Norms have been established for individuals between the ages of 18 and 80 within university, private practice, community mental health, outpatient, and inpatient settings; normative data has been accumulated both nationally and internationally (Lambert, et al., 2011).

The OQ-45 was administered in the current study either by paper or personal digital assistant (i.e., PDA) to patients at the beginning of each therapy session, providing a measure of functioning for each session attended. Client and therapist were both aware that outcome scores were stored for research purposes, and informed consent was obtained at intake.

OQ-45 scores will primarily be explored as a continuous variable; the OQ-45, however, also offers cut-offs for reliable change (RC) and clinically significant change (CS), derived from the model of statistically operationalized clinically significant change proposed by Jacobson and Truax (1991). RC is defined as change in observed scores that exceed the amount of variation expected within the standard error of measurement using a 95% confidence interval. In the case of the OQ-45, this equals at least 14 points. CS is distinguished by two criteria: a) the change observed is equal to or exceeds the RC index, and b) the score leaves the clinical range of functioning (in the case of the OQ-45, scores > 63) and enters the normal range of functioning (OQ-45 ≤ 63). This cutoff is calculated by deriving the midpoint between the means of a clinical normative group and a normal population, and indicates that if a score falls on either side of the cutoff point, it is more likely to belong to the population to whose mean it is closest (Lambert et al., 2004). Both RC and CS were used to help interpret results beyond statistically significant change in groups of individuals. Additionally, a change of 14 points in a negative direction (where the client is worse than when they began) defines reliable deterioration, another category explored for significant differences between groups. It is important to note that these categories are non-overlapping, and that a significant portion of each group experienced neither reliable change nor reliable deterioration.

Variables of interest. Several important variables were calculated for each case. The variable used to examine session frequency as a continuous variable for all subjects was calculated as a cumulative mean frequency at each session. For example, a person scheduled one week out would receive a 1 for their cumulative mean at the second session. If this person were then scheduled two weeks out, they would receive a 1.5 mean at the third session, and if scheduled two weeks out again, they would receive a cumulative mean of 1.67 at the fourth session, and so on. A cumulative standard deviation for session frequency was also calculated for each participant to examine the effects of session regularity. These variables were calculated over the entire course of therapy, and also calculated for just the first month of scheduling, the first two months of scheduling, and the first three months of scheduling. This was achieved by freezing the cumulative mean and the cumulative standard deviation at the one, two, or three month mark for each individual (with the mean and standard deviation at this mark being carried forward for all remaining sessions), and allowed for investigation of the effects of session frequency during these time periods on overall recovery curves.

Other important covariates were calculated, including: (a) dose, or the number of sessions attended, (b) duration, or the total number of weeks attended during a single course of therapy, (c) initial symptom severity, defined by the first OQ-45 measure recorded, (d) the ratio of attended appointments to scheduled appointments (i.e., attended/scheduled, a ratio between 0 and 1), and (e) the total number of weeks between each session, from session to session (to examine the simple effects of time between sessions, independent of overall session frequency). Diagnosis of client was made by the treating clinician without the aid of formal research quality criteria. As diagnoses were not reliably recorded in the dataset, they were not included in the analysis.

Data Analysis

Using the multiple sampling procedures indicated above, differences between groups in the amount of change over the entire course of therapy were compared using analyses in SPSS. Mean differences in total change across therapy between 1WK and 2WK groups were analyzed without covariates using independent sample *t*-tests, as well as with covariates, using ANCOVA and including total number of sessions and initial severity. Proportions of individuals meeting criteria for RC, CS, and deterioration in 1WK and 2WK groups were also compared using χ^2 analyses. RC, CS, and deterioration represent independent, non-overlapping groups, where a substantial number of each sample do not meet any of the three criteria. These criteria are therefore independently useful in understanding recovery and deterioration patterns in each of the groups.

Multi-level modeling (Singer & Willet, 2003; also referred to as hierarchical linear modeling) was used to detect differences between 1WK and 2WK speed of recovery, using initial severity, attended/scheduled ratio, and number of attended sessions as covariates, and controlling for therapist effects by including primary therapist as a random variable. This statistical method is particularly suited to the data in that it accounts for multiple OQ-45 scores nested within individuals, which are in turn nested within groups (i.e., 1WK or 2WK). Accounting for this relationship, individual and group estimates of mean and slope were calculated and compared. The PROC HPMIXED procedure in SAS, a procedure designed for efficient analysis of large numbers of observations and similar to the PROC MIXED procedure in SAS, was used to estimate group and individual differences. The PROC HPMIXED procedure relies on sparse matrix techniques and estimates covariance parameters using restricted maximum likelihood. Separate analyses were run for groups identified by each selection procedure and each time period (i.e., session frequency during the first month, first two months, first three months, or the entire course of therapy). Covariates listed above that were hypothesized to affect OQ-45 score trajectories were also included, and to facilitate interpretation the initial severity and total number of sessions were centered on their grand means. Thus, model estimates for intercept and slope corresponded to clients with average initial severity (M = 69.8) and total number of sessions attended (M = 6.8).

The Kaplan-Meier Survival Analysis in SPSS was used to assess clinically significant differences between 1WK and 2WK groups, where time to RC and CS were examined. This procedure predicts the proportion of subjects who will reach a specified criterion (i.e., RC or CS) by a certain time, and censors (or eliminates from the predictive model) subjects who either reached the criterion or who finished therapy without reaching the criteria at any given time point. Multi-level modeling and survival analyses were run using two time variables: (a) days in therapy (allowing for a comparison between groups over time), and (b) number of sessions attended (allowing for a session-by-session comparison).

Additionally, each of the above analyses was used to examine datasets matched on initial symptom severity (or the first OQ-45 score). Matched datasets were constructed for all selection procedures over the entire course of therapy and for the Quarters procedure at Month 1, Month 2, and Month 3 (see Figure 1).

Multi-level models were also used to examine the overall effect of session frequency as a continuous variable. These were run at Month 1, Month 2, Month 3, and over the entire course of therapy, and with both sessions as a time variable and weeks as a time variable (see Figure 2 for an illustration of each of the continuous models run). Model fit was assessed using the

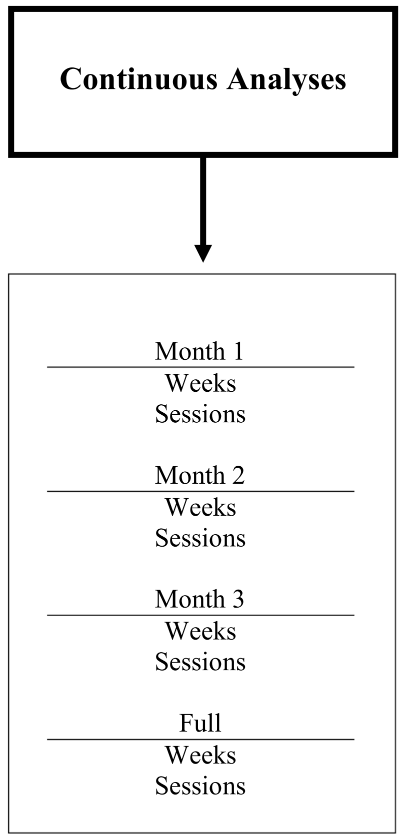


Figure 2. Illustration of Analyses Using Continuous Session Frequency Data. Month 1 = frequency in just the first month of therapy considered; Month 2 = frequency in just the first two months considered; Month 3 = frequency in the first three months considered; Full = session frequency over the full course of therapy considered; Weeks = weeks as time in multi-level models; Sessions = sessions as time in multi-level models.

Akaike Information Criterion (AIC; Akaike, 1973) and the Bayesian Information Citerian (BIC; Schwartz, 1978). In both these statistics, smaller numbers indicate a better model fit for the data. Transformations were tested for best fit for time variables (i.e., days in therapy and sessions in therapy), including the natural log, cubic, and quadratic transformations. For simplicity of interpretation, a single time transformation that best fit the model was used. For analyses of session frequency as a continuous variable, the natural log of days and sessions was used; for analyses comparing 1WK and 2WK groups, linear time was used.

Results

Descriptive Statistics

Of the total sample, 61.5% of participants were female and 36.4% male, with 2.1% unspecified. Their mean age was 22.8, with 85.0% reporting White as their primary ethnicity, 6.0% Hispanic, 2.5% Asian, 1.2% Pacific Islander, 0.9% American Indian, 0.7% Black, and 3.7% other. Additionally, 15.2% of participants sought multiple courses of treatment at different time periods included in the dataset. These courses were identified as a break of three months or more in therapy attendance. The average number of sessions attended per course of therapy was 6.8, and the average number of weeks per course of therapy was 11.3.

Demographics and descriptive statistics for each group selection method (i.e., mean and standard deviation, proportion, or quarters), at each timeframe (i.e., scheduling patterns during the first month, first two months, first three months, or entire course of therapy), as well as demographics for groups matched on initial severity, can be seen in Tables 2 and 3. Generally, 1WK and 2WK groups did not differ significantly in age, gender, and ethnicity composition. The 1WK groups tended to have higher initial severity and attend more sessions than the 2WK groups. Month 1 and Month 2 groups did not differ between 1WK and 2WK in the total number of days in therapy, while Month 3 groups and groups based on the entire course of therapy showed fewer days in therapy for 1WK groups. Narrower parameters for group selection (i.e., M Groups 1 and P Groups 1) tended to yield groups that had shorter courses of therapy and fewer sessions than broader selection parameters.

Similarly, groups matched on initial severity were equivalent in age, gender, and ethnicity composition. Although the total number of sessions attended was still generally greater for 1WK groups, these differences narrowed; matched groups based on the Quarters procedure yielded nearly identical total sessions attended. As would be expected, the total number of days in therapy was significantly lower for 1WK groups.

Question 1: Amount of Recovery

For each question, an overall summary of the analyses will be given followed by a detailed report of each analysis according to the different time frames being considered. In order to assess differences between groups in the amount of recovery experienced over the entire course of therapy, two methods were used. First, independent samples *t*-tests were used to determine differences between 1WK groups and 2WK groups on the total amount of change over the course of therapy. Twenty-four of 28 comparisons showed significant differences favoring the 1WK groups. In order to statistically control for relevant covariates, univariate ANCOVAs were used, including initial severity and number of sessions attended in the analyses. It should be noted that this method of statistical control has been criticized as difficult to interpret when groups differ significantly on the variables that are being controlled (Lord, 1967). As these groups are significantly different in both covariates that were included, ANCOVA results should be interpreted with caution. These analyses generally indicated greater means for change in therapy in the 1WK groups compared to the 2WK groups and were statistically significant for 14 of the 28.

Table 2

Demographics for Therapy Once a Week (1WK) and Therapy Once Every Two Weeks (2WK) Groups

	n		Age		Initial OQ		Total Sessions		Total Days		% Female		% Ethnic Minority	
	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK
Entire Course														
M Groups 1	803	292	22.4*	22.9*	69.4*†	64.0*†	2.8*†	2.4*†	12.7*††	19.7*††	61.9	58.0	6.7	4.6
M Groups 2	365	64	22.6	22.6	69.3	64.4	4.2*††	3.5*††	22.6*††	34.7*††	63.4*†	45.2*†	5.8	0.0
M Groups 3	877	229	22.3	22.3	69.9*†	64.9*†	3.9*††	2.8*††	20.1*†	23.9*†	64.5	64.9	5.3	5.9
P Groups 1	727	254	22.3*†	22.9*†	67.2*†	61.2*†	3.1*††	2.5*††	14.7*††	21.2*††	61.6	54.9	5.5*	2.4*
P Groups 2	554	50	22.4	22.4	70.0*††	59.9*††	8.0*††	5.4*††	56.3	62.6	66.7	58.0	5.6	0.0
P Groups 3	797	122	22.5	22.4	69.1*†	63.9*†	6.8*††	4.3*††	52.2	45.5	65.0	56.4	4.2	0.9
Quarters	3,781	2,766	22.3*	22.9*	70.9*	69.1*	5.5*†	7.9*†	33.8*††	94.7*††	64.2	63.0	5.5	5.3
First Month														
M Groups 1	1,673	674	22.7	23.0	69.7*†	65.0*†	6.2*†	4.9*†	65.6	66.7	62.4	60.9	6.3	4.7
M Groups 2	914	148	22.7	23.0	69.7	69.6	8.3*†	6.6*†	83.7	82.8	63.4	58.3	5.9	4.2
M Groups 3	1,950	490	22.7	22.6	71.1*†	66.1*†	7.3*††	5.1*††	74.3	69.2	63.9	61.3	4.6	5.3
P Groups 1	3,045	1,064	22.6*	22.9*	69.8*†	66.2*†	6.4*†	4.9*†	66.6	68.3	62.7	59.6	5.9	4.8
P Groups 2	738		22.7		70.7		11.1		104.8		65.7		4.1	
P Groups 3	1,795	31	22.8	22.6	70.5	69.7	8.4	10.0	89.6	105.1	64.3	70.0	5.0	0.0
Quarters	6,691	2332	23.2	23.2	70.4*†	65.0*†	7.1	6.2	81.5	82.4	64.0	62.6	5.6	5.2

(continued)

Table 2 (continued).

	n		Age		Initial OQ		Total Sessions		Total Days		% Female		% Ethnic Minority	
	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK
First Two Months														
M Groups 1	1,014	373	22.5*	23.1*	69.7*†	64.4*†	3.8*†	3.1*†	31.9	36.3	61.2	60.8	6.5	5.0
M Groups 2	509	92	22.8	22.8	69.7	66.2	6.8*†	4.7*†	61.1	60.9	63.9*†	48.9*†	6.0*	0.0*
M Groups 3	1,190	316	22.5	22.7	70.6*†	64.5*†	5.7*††	3.8*††	49.1	48.6	64.6	64.2	5.1	5.2
P Groups 1	1,821	593	22.5*	22.9*	69.8*†	64.9*†	4.1*†	3.2*†	34.0	39.6	62.4	58.0	6.3	4.5
P Groups 2	1,250	126	22.8	22.9	69.6	66.5	10.7*††	7.7*††	105.6	106.2	65.1	60.2	4.8	2.3
P Groups 3	1,416	267	22.8	23.2	71.0*†	66.6*†	8.5*††	5.8*††	88.1	82.1	65.4	63.6	4.5	4.7
Quarters	5,366	2,738	23.2	23.3	70.6	69.0	7.1*†	5.9*†	73.1	82.7	63.8	62.1	5.3	5.9
First Three Months														
M Groups 1	915	339	22.5	22.9	69.6*†	64.2*†	3.1*†	2.6*†	19.1*†	25.2*†	61.9	60.2	6.5	4.2
M Groups 2	423	73	22.7	22.5	70.0	65.9	5.1*††	3.8*††	37.6	43.3	62.9*†	48.6*†	6.5*	0.0*
M Groups 3	1,015	269	22.3	22.5	70.0*†	64.3*†	4.7*†	3.2*†	33.6	37.3	64.7	65.8	5.1	5.3
P Groups 1	1,626	519	22.4	22.7	69.6*†	64.7*†	3.3*†	2.6*†	20.2*†	26.7*†	62.6	58.4	6.2	4.2
P Groups 2	1,129	115	22.7	23.2	70.3*†	65.1*†	10.5*††	6.6*††	100.2	93.3	65.0	57.1	5.0	2.7
P Groups 3	1,270	244	22.9	23.0	70.8*†	67.6*†	8.4*††	5.3*††	86.1*†	70.4*†	64.1	64.7	4.7	5.1
Quarters	4,633	2,893	23.1	23.1	70.6	69.4	6.9	6.4	65.7*†	89.9*†	64.4	62.5	5.6	5.6

Note. * $p < .05$, indicating significant differences between means or proportions, as indicated by independent *t*-tests and tests of χ^2, respectively. Cohen's *d* statistics were calculated for statistically significant results, and are indicated in the table by † $d > .2$ and †† $d > .5$. Values for Age, Initial OQ, Total Sessions, and Total Days are means. When considering only the first month of therapy, P Groups 2 did not have any subjects that met criteria for the 2WK group.

Table 3

Demographics for Matched 1WK and 2WK Groups

	n		Age		Initial OQ		Total Sessions		Total Days		% Female		% Ethnic Minority	
	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK	1WK	2WK
Entire Course														
M Groups 1	285	285	22.7	22.9	64.3	64.3	2.8*†	2.4*†	12.8*††	19.7*††	54.9	58.4	8.2	4.3
M Groups 2	352	352	22.9	22.7	63.9	63.9	4.2*††	3.5*††	22.7*††	34.7*††	57.9	45.2	6.6*†	0.0*†
M Groups 3	581	581	21.9	22.3	64.1	64.1	3.9*††	2.8*††	20.2*†	23.9*†	68.2	64.4	2.7	5.9
P Groups 1	239	239	22.3*†	23.0*†	61.3	61.3	3.0*††	2.5*††	14.4*††	21.3*††	56.6	54.9	6.0	2.6
P Groups 2	299	299	22.4	22.4	62.8	62.8	8.0*††	5.4*††	45.1	45.5	68.2	58.0	3.9	0.0
P Groups 3	422	422	22.2	22.3	62.4	62.4	6.1*††	4.3*††	45.1	45.5	62.3	56.9	3.8	0.9
Quarters	2,717	2,717	22.5*	22.8*	69.1	69.1	5.4*†	7.9*†	33.6*††	95.0*††	63.1	62.9	5.5	5.2
Quarters, Month 1	2,327	2,327	22.7	22.8	67.0	67.0	5.2*	5.7*	31.2*††	64.6*††	64.8	62.1	5.0	4.4
Quarters, Month 2	2,721	2,721	22.4*	22.8*	68.0	68.0	5.2*	5.8*	31.2*††	65.9*††	63.5	62.6	4.9	5.5
Quarters, Month 3	2,872	2,872	22.4*	22.8*	69.0	69.0	5.3*	5.8*	31.9*††	66.5*††	64.2	62.3	5.2	5.5

Note. * $p < .05$, indicating significant differences between means or proportions, as indicated by independent *t*-tests and tests of χ^2, respectively. Cohen's *d* statistics were calculated for statistically significant results, and indicated in the table as † $d > .2$ and †† $d > .5$. Values for Age, Initial OQ, Total Sessions, and Total Days are means. When considering only the first month of therapy, P Groups 2 did not have any subjects that met criteria for the 2WK group.

To better assess clinically significant differences in the amount of recovery achieved in therapy, χ^2 analyses were used to compare differences in the proportion of CS, RC, and deterioration (i.e., 14 points of change on the OQ-45 in a negative direction) between groups. It is important to note that these analyses did not control for the total number of sessions attended, and only in the case of matched datasets did they control for initial severity. Results were congruent with those above, where 1WK groups tended to have greater proportions of participants attaining CS and RC, and smaller proportions of subjects deteriorating. These differences were statistically significant between groups in 8 of 21 tests of CS, 12 of 21 tests of RC, and 9 of 21 tests of deterioration.

Effects of Month 1 scheduling. Groups selected by considering only the first month of scheduling patterns showed significantly more OQ-45 change for 1WK groups in independent groups *t*-tests in M Groups 1, M Groups 3, P Groups 1, and Quarters with Cohen's *d* ranging from .11 to .18 (see Table 4). ANCOVA results indicated showed significant differences in M Groups 3, $F(1, 2440) = 7.65$, $p = .006$, $d = .14$ and Quarters, $F(1, 9023) = 19.97$, $p < .001$, $d = .12$. No other ANCOVA results were significant at the Month 1 period.
Similarly, significant differences were found in a limited number of χ^2 analyses, indicated significantly higher CS for the 1WK group in M Groups 3 and Quarters and higher RC for the 1WK group in M Groups 1, M Groups 3, P Groups 1, and Quarters; odds ratios indicate that those in the 1WK group are between 1.21 and 1.78 times more likely to achieve these gains. Significantly higher proportions of deterioration were found for the 2WK group in Quarters, with an odds ratio indicating that those in the 2WK group were 1.32 times more likely to deteriorate (see Table 5).

Table 4

Independent Sample t-tests Detecting Differences in Total Change in OQ-45 Scores Between 1WK and 2WK Groups

	Mean Total Change (Standard Deviation)				
	1WK	2WK	*t*	*df*	*Cohen's d*
Entire Course					
M Groups 1	9.83 (14.93)	5.63 (16.14)	4.03**	1093	0.24
M Groups 2	12.07 (16.96)	5.53 (13.39)	2.93**	427	0.28
M Groups 3	10.49 (16.72)	7.51 (16.54)	2.41*	1104	0.14
P Groups 1	11.41 (15.7)	6.63 (16.73)	4.11**	979	0.26
P Groups 2	13.80 (20.53)	6.82 (17.14)	2.33*	593	0.19
P Groups 3	12.40 (18.07)	10.45 (16.87)	1.12	917	
Quarters	11.63 (17.76)	10.72 (19.77)	1.95	6545	
First Month					
M Groups 1	9.82 (18.13)	7.53 (17.61)	2.80**	2345	0.12
M Groups 2	12.24 (19.84)	11.06 (18.77)	0.68	1060	
M Groups 3	11.88 (19.08)	7.75 (16.48)	4.40**	2438	0.18
P Groups 1	10.49 (18.47)	8.21 (17.6)	3.51**	4107	0.11
P Groups 2	12.16 (19.69)	14.13 (21.4)	-0.55	1824	
P Groups 3	9.82 (18.13)	7.53 (17.61)	2.80	2345	
Quarters	11.99 (19.33)	8.84 (17.75)	6.90**	9021	0.12
First Three Months					
M Groups 1	9.42 (15.23)	5.54 (16.29)	3.94**	1252	0.22
M Groups 2	11.88 (17.35)	6.32 (14.55)	2.59**	494	0.23
M Groups 3	10.45 (17.15)	6.46 (16.34)	3.42**	1282	0.19
P Groups 1	9.80 (15.89)	6.07 (15.96)	4.65**	2143	0.20
P Groups 2	12.70 (20.12)	9.55 (21.71)	1.59	1242	
P Groups 3	12.65 (20.29)	9.76 (17.07)	2.09*	1512	0.11
Quarters	11.77 (18.55)	9.76 (19.06)	4.52**	7524	0.10
Matched Data					
Quarters, Entire Course	11.37 (17.26)	10.63 (19.71)	1.49	5432	
Quarters, Month 1	10.58 (18.28)	8.88 (17.75)	3.22**	4652	0.09
Quarters, Month 2	11.39 (18.37)	9.23 (18.44)	4.34**	5440	0.12
Quarters, Month 3	11.35 (18.29)	9.79 (19.07)	3.16**	5742	0.08

Note. *$p < .05$. ** $p < .01$. Matched Quarters Data were matched on initial symptom severity (i.e., initial OQ-45 scores).

Table 5

χ^2 *Statistics Examining Clinically Significant Differences in Total Recovery*

	% CS		OR	% RC		OR	% Deterioration		OR
	1WK	2WK	1WK	1WK	2WK	1WK	1WK	2WK	2WK
Entire Course									
M Groups 1	17.6*	12.3*	1.52	34.0*	25.0*	1.55	2.1*	7.5*	3.78
M Groups 2	23.3	12.5		41.1	29.7		4.4	3.1	
M Groups 3	17.3	13.1		36.7	31.4		4.8*	8.7*	1.89
P Groups 1	19.8*	13.8*	1.54	37.3*	28.7*	1.48	1.9*	7.5*	4.19
P Groups 2	25.3	16.0		46.4*	30.0*	2.02	7.2	6.0	
P Groups 3	22.5	18.9		43.7	41.0		4.5	4.1	
Quarters	20.6	21.1		40.7	39.8		5.1*	8.1*	1.64
First Month									
M Groups 1	19.2	16.5		36.6*	32.3*	1.21	6.3	7.7	
M Groups 2	23.3	25.0		42.6	40.5		7.1	5.4	
M Groups 3	21.7*	13.5*	1.78	42.7*	33.5*	1.48	6.4	8.4	
P Groups 1	19.4	16.8		37.8*	33.4*	1.21	6.5	7.6	
P Groups 2	29.5			50.1			6.8		
P Groups 3	22.7	25.8		43.7	41.9		7.0	9.7	
Quarters	22.2*	17.9*	1.31	42.5*	36.2*	1.30	6.5*	8.4*	1.32
First Three Months									
M Groups 1	17.3*	11.8*	1.56	34.0*	25.4*	1.51	2.7*	7.4*	2.88
M Groups 2	25.5	15.1		40.7	31.5		4.7	2.4	
M Groups 3	17.1*	11.5*	1.59	37.0*	28.6*	1.47	5.5*	9.7*	1.85
P Groups 1	17.3*	12.5*	1.46	34.3*	26.8*	1.43	3.8*	7.3*	1.99
P Groups 2	23.9	22.6		44.2	43.5		7.6	9.6	
P Groups 3	23.1	17.6		46.3*	38.1*	1.40	7.2	7.0	
Quarters	21.2*	19.2*	1.13	41.5*	38.0*	1.16	5.7*	8.6*	1.56
Matched Quarters Data									
Entire Course	20.2	21.2		39.9	39.5		4.9*	8.2*	1.73
First Month	20.7*	17.9*	1.20	40.2*	36.3*	1.18	6.8	8.3	
First Two Months	20.9*	18.3*	1.18	40.1*	37.4*	1.12	6.1*	8.9*	1.50
First Three Months	20.2	19.4		40.5	38.1		5.6*	8.6*	1.59

Note. $^*p < .05$; CS = Clinically Significant Change; RC = Reliable Change; OR = Odds ratio, where the odds of CS and RC are based on receiving therapy once a week, and the odds of deterioration are based on receiving therapy once every two weeks. Matched Quarters Data were matched on initial symptom severity (i.e., initial OQ-45 scores).

Effects of Month 2 scheduling. Groups selected by considering only the first two months of scheduling showed more robust differences between 1WK and 2WK groups in *t*-test, ANCOVA, and χ^2 analyses. Independent groups *t*-tests indicating more recovery, on average, for the 1WK group include M Groups 1 ($t(1385) = 3.33$, $p = .001$, $d = .18$), M Groups 2 ($t(599) = 2.06$, $p = .04$, $d = .17$), M Groups 3 ($t(1504) = 3.80$, $p = .001$, $d = .20$), P Groups 1 ($t(2412) = 4.26$, $p < .001$, $d = .17$), P Groups 2 ($t(1374) = 2.77$, $p = .006$, $d = .15$), and Quarters ($t(8102) = 6.28$, $p < .001$, $d = .14$). Significant ANCOVA results include M Groups 1, $F(1, 1387) = 4.48$, $p = .034$, $d = .13$, P Groups 1, $F(1, 2414) = 6.81$, $p = .009$, $d = .12$, P Groups 2, $F(1, 1376) = 5.86$, $p = .016$ $d = .23$, and Quarters, $F(1, 8104) = 17.67$, $p < .001$, $d = .10$.

The χ^2 analyses showed significant advantages for the 1WK group in CS for M Groups 1, M Groups 3, and Quarters; in RC for M Groups 1, M Groups 3, P Groups 1, P Groups 2, P Groups 3, and Quarters; and significantly more deterioration in the 2WK group for M Groups 1, M Groups 3, P Groups 1, and Quarters.

Effects of Month 3 scheduling. Groups selected by considering only the first three months of scheduling continued to show similar differences to those found in Month 2. Specifically, *t*-tests yielded results indicating more change over the course of therapy for the 1WK group for M Groups 1, M Groups 2, M Groups 3, P Groups 1, P Groups 3, and Quarters, with effect sizes ranging from .10 to .23 (see Table 4). ANCOVA results were significant for M Groups 1, $F(1, 1254) = 6.65$, $p = .01$, $d = .16$, M Groups 2, $F(1, 496) = 4.23$, $p = .04$, $d = .26$, M Groups 3, $F(1, 1284) = 4.18$, $p = .04$, $d = .14$, P Groups 1, $F(1, 2145) = 9.55$, $p = .002$, $d = .16$, and Quarters, $F(1, 7526) = 10.12$, $p = .001$, $d = .08$.

The χ^2 analyses showed significant advantages for the 1WK group in CS for M Groups 1, M Groups 3, P Groups 1, and Quarters and in RC for M Groups 1, M Groups 3, P Groups 1, P

Groups 3, and Quarters; odds ratios indicated that 1WK groups were between 1.13 and 1.59 more likely to achieve these gains. Significantly more deterioration was seen in the 2WK group for M Groups 1, M Groups 3, P Groups 1, and Quarters, with odds ratios ranging between 1.56 and 2.88 (see Table 5).

Effects of scheduling over the entire course of therapy. Groups selected by considering scheduling over the entire course of therapy showed significant differences favoring 1WK groups in M Groups 1, M Groups 2, M Groups 3, P Groups 1, and P Groups 2, with effect sizes ranging from .14 to .28 (see Table 4). Fewer differences were found ANCOVA analyses, indicating more change in the 1WK group include M Groups 1, $F(1, 1095) = 4.18$, $p = .04$, $d = .14$ and M Groups 2, $F(1, 429) = 4.27$, $p = .04$, $d = .28$.

Significant χ^2 analyses indicating higher CS for the 1WK group in M Groups 1 and P Groups 1, the two narrowest selection procedures. RC was higher for the 1WK group in M Groups 1, P Groups 1, and P Groups 2. Odds ratios ranged from 1.48 and 2.02. Deterioration was significantly elevated in the 2WK group for M Groups 1, M Groups 3, P Groups 1, and Quarters, with odds ratios ranging from 1.64 to 4.19 (see Table 5).

Matched data. Datasets matched on initial severity were run for all of the Quarters groups and significant differences between 1WK and 2WK groups were found using *t*-tests for Month 1, Month 2, and Month 3, with effect sizes ranging from .08 to .12 (see Table 4). ANCOVA analyses showed differences over all time periods (Entire course of therapy, $F(1, 2717) = 5.87$, $p = .02$, $d = .07$; Month 1, $F(1, 2327) = 8.87$, $p = .003$, $d = .09$; Month 2, $F(1, 2721) = 15.89$, $p < .001$, $d = .11$; Month 3, $F(1, 2872) = 9.82$, $p = .002$, $d = .08$).

The χ^2 analyses of CS, RC, and deterioration were examined using the Quarters selection method, and differences between 1WK and 2WK groups narrowed but remained significant for proportions of CS and RC in Month 1 and Month 2, with odds ratios ranging from 1.12 and 1.20. Differences in proportions of deterioration were also significant between 1WK and 2WK groups in Month 2, Month 3, and over the entire course of therapy, with odds ratios ranging from 1.50 to 1.73 (see Table 5).

Question 2: Speed of Recovery

Multi-level models were used to identify significant differences between the recovery slopes of 1WK and 2WK groups. Models were run both with the number of days in therapy as the time variable (in order to assess differences in slope over days in therapy) and with the number of sessions attended in therapy as the time variable (in order to detect differences in slope over sessions in therapy, i.e., are there differences between slopes when controlling for the number of sessions attended). Sessions as a time variable was used to detect the possible dilution or concentration of session impact when scheduled more or less frequently. Initial severity and the running ratio of appointments attended to appointments scheduled were also included in the models. Initial severity was centered on the grand mean. Multiple OQ-45 scores were nested within individuals who were nested within therapists. In each model, the 2WK group was used as a reference group and the 1WK group was included as a variable. A significant interaction between the 1WK variable and the time variable would indicate a significant difference between the recovery slope of the 1WK and 2WK groups.

By days in therapy. When comparing recovery curves of 1WK and 2WK groups over days in therapy, the 1WK group tended to recover more quickly. This was particularly true in the models using session frequency during the first three months and over the entire course of therapy. P Groups 1, M Groups 1, M Groups 2, M Groups 3, and Quarters all showed significantly steeper recovery curves for those being seen once a week. P Groups 2 and P

Groups 3 did not show significant differences between groups, perhaps suggesting that these selection procedures identified more heterogeneous groups than the Mean selection method.

When datasets matched on initial severity were used, significant differences remained in each of the groups listed above over the entire course of therapy, as well as in Quarters at Month 1, Month 2, and Month 3. Effect sizes for these differences in slope range from $d = .06$ (Matched Quarters, Month 2) to $d = .28$ (Matched P Groups 1, entire course), meeting, in some cases, Cohen's (1988) criteria for a small effect size (where d is greater than or equal to .2). Examining a table assigning percentages of nonoverlap between groups by effect size (Cohen, 1988), the slopes of 1WK and 2WK groups largely overlap, but range from 7.7% (when d equals .1) to 21.3% (when d equals .3) of the sample not overlapping. Estimates of the differences between slopes as well as effect sizes can be found in Table 6.

In order to assess clinically significant differences in speed of recovery, survival analyses comparing the predicted time to RC and CS in 1WK and 2WK groups were calculated. Differences between time to RC between groups were significant at at least the $p < .05$ level, favoring the 1WK group, in all analyses but P Groups 2 and P Groups 3. This pattern was similar for analyses of CS, but with M Groups 2 not yielding significant differences at Month 1. Matched datasets indicated similar results, where the 1WK group reached RC and CS significantly faster than the 2WK groups for Quarters across all time periods (see Table 7). For example, matched Quarters at Month 3 predicted that 50% of participants in the 1WK group would reach RC at week 13.7 and CS at week 57.4, compared to participants in the 2WK group who were predicted to reach RC at week 26.3 and CS at week 67.6. When analyzed by number of sessions, the differences were eliminated, indicating 50% RC at session 11 (1WK) and 12 (2WK) and CS at session 29 (1WK) and 28 (2WK).

Table 6

Multi-level Model 1WK Effects on OQ-45 Slope in Reference to 2WK Groups by Days

	Fixed Effects		
	Estimate	*SE*	*Cohen's d*
Entire Course			
M Groups 1	-2.570**	.729	.17
M Groups 2	-2.016**	.622	.19
M Groups 3	-0.909	.495	
P Groups 1	-2.290**	.658	.17
P Groups 2	-0.324	.348	
P Groups 3	0.039	.327	
Quarters	-0.946***	.080	.14
First Month			
M Groups 1	0.054	.086	
M Groups 2	-0.023	.146	
M Groups 3	-0.302**	.099	.06
P Groups 1	-0.050	.067	
P Groups 2			
P Groups 3	0.070	.340	
Quarters	-1.125***	.186	.09
First Three Months			
M Groups 1	-0.654	.411	
M Groups 2	-1.465***	.363	.19
M Groups 3	-0.956**	.271	.11
P Groups 1	-1.170***	.308	.12
P Groups 2	-0.192	.133	
P Groups 3	-0.024	.137	
Quarters	-0.530***	.080	.08
Matched Data			
Quarters, Entire Course	-0.976***	.090	.13
Quarters, Month 1	-1.001***	.246	.08
Quarters, Month 2	-0.456***	.115	.06
Quarters, Month 3	-0.676***	.097	.10
M Groups 1, Entire Course	-2.625**	.691	.26
M Groups 2, Entire Course	-2.174**	.763	.26
M Groups 3, Entire Course	-1.270*	.626	.13
P Groups 1, Entire Course	-2.714***	.691	.28
P Groups 2, Entire Course	-0.247	.392	
P Groups 3, Entire Course	0.025	.368	

Note. $*p < .05$. $** p < .01$. *** $p < .0001$. Estimate = the interaction between the 1WK group and the number of days in therapy, indicating the estimated difference in the slope of OQ-45 scores between 1WK and 2WK groups. A negative estimate indicates a steeper slope, or faster recovery for the 1WK group. A positive estimate indicates a less steep slope, or slower recovery. SE = the standard error of the estimate.

Table 7

Kaplan-Meier Survival Analyses Examining Clinically Significant Differences in Speed to Recovery

	Log Rank χ^2			
	By Weeks		By Sessions	
	CS	RC	CS	RC
Entire Course				
M Groups 1	25.59**	46.41**	0.68	0.86
M Groups 2	10.30**	10.86**	1.29	0.12
M Groups 3	5.38*	9.33**	1.30	3.99†*
P Groups 1	22.35**	37.14**	0.54	0.04
P Groups 2	2.17	4.34*	0.08	0.14
P Groups 3	0.18	0.19	1.93	9.95†**
Quarters	242.74**	468.85**	44.99**	104.06**
First Month				
M Groups 1	6.29*	11.01**	0.04	0.01
M Groups 2	0.84	0.03	5.69†*	4.20†*
M Groups 3	9.12**	9.89**	0.11	0.50
P Groups 1	6.25*	14.56**	0.95	1.18
P Groups 2				
P Groups 3	.09	0.16	0.27	0.04
Quarters	14.89**	26.59**	1.58	3.45
First Three Months				
M Groups 1	22.12**	37.81**	1.42	1.23
M Groups 2	4.98*	5.32*	0.23	0.01
M Groups 3	7.85**	12.71**	0.00	0.24
P Groups 1	28.63**	50.63**	0.44	0.09
P Groups 2	0.13	0.00	4.07†*	10.57†**
P Groups 3	0.76	1.65	1.64	2.46
Quarters	94.56**	176.85**	5.86*	11.60**
Matched Quarters Data				
Entire Course	206.15**	419.51**	35.41**	90.78**
Month 1	4.91*	10.93**	3.36	6.39†*
Month 2	29.59**	41.50**	0.03	1.54
Month 3	70.28**	148.54**	2.49	8.52**

Note. **p < .05*, ***p* < .01; † indicates results that favor the 2WK group for speed of recovery; CS = Clinically Significant Change; RC = Reliable Change; to conserve space, analyses of the first two months of session frequency were not included. These were generally consistent with analyses of the first month and the first three months.

Congruent with analyses of the total amount of change, these analyses show fewer significant results when based on only the first month of session frequency and more significant results when based on the first three months of session frequency. Groups based on session frequency over the entire course of therapy also tended to show significant differences in speed of change.

By sessions in therapy. When comparing recovery curves of 1WK and 2WK groups using sessions as the time variable, differences between groups were generally eliminated, indicating that a single "dose" of therapy is roughly equivalent between 1WK and 2WK scheduling patterns. This pattern emerged in both multi-level models and survival analyses.

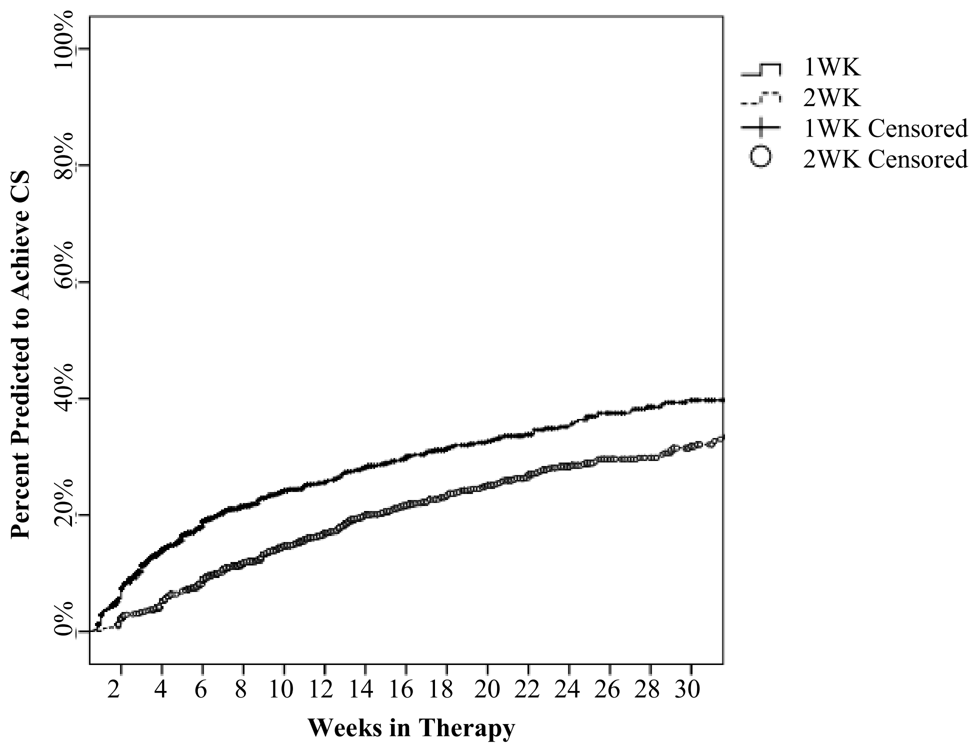
The majority of multi-level models indicated no statistically significant differences between groups, with a few notable exceptions. M Groups 2 and Matched Quarters indicated small but significant differences between 1WK and 2WK groups ($p = .046$ and $p = .048$, respectively), with a difference of -1.88 and -0.21 points, respectively, on the slope of the OQ-45 recovery curves at each time point (indicating faster recovery for the 1WK groups).

Similarly, survival analyses largely showed no differences between groups when examined by session, with some exceptions. The Quarters method yielded results indicating faster recovery (both RC and CS) for the 1WK group at Month 3 and over the entire course of therapy. When matched datasets were used, results remained significant for both RC and CS over the entire course of therapy, and for RC at Month 3. Conversely, several analyses showed small but significant advantages for RC in the 2WK group, including M Groups 3 and P Groups 3 over the entire course of therapy, M Groups 2 at Month 1, and P Groups 2 at Month 3. Only two analyses found significant advantages in CS for the 2WK group (M Groups 2 at Month 1 and P Groups 2 at Month 3). χ^2 results for all survival analyses, including analyses by weeks and by sessions, can be found in Table 7. Figure 3 illustrates typical survival curves for each of the selection procedures (using the example of matched Quarters at Month 3), where the 1WK group showed significantly faster recovery when using weeks as the time variable and where differences disappeared when using sessions as the time variable.

Question 3: Overall Effects

Session frequency as a continuous variable was examined for all subjects ($N = 16{,}003$) over the entire course of therapy. The impact of session frequency in Month 1, Month 2, or Month 3 on overall change trajectories was also explored. Models controlled for initial symptom severity and total dose, consistent with the literature reviewed in the introduction and the GEL model. Cumulative standard deviation, attended/scheduled ratio, and the independent number of weeks between each session were also included as potential contributors to variance in change trajectories. An intraclass correlation examining the amount of variance in OQ-45 scores between subjects and within subjects in a model with no predictors was calculated. The amount of variance between subjects was .64, indicating that 64% of the variance in OQ-45 scores is attributable to differences between individuals (and that there is variance to be explained by between subject predictors). Therapist effects were added to the model and were found to produce a better fit than the model without therapist effects, indicated by decreases in AIC and BIC; these were therefore retained in the final model. Models were then created iteratively through simultaneous entry of all predictor variables and subsequent retention of only those variables that remained significant.

By days in therapy. Table 8 presents the final model estimating fixed and random effects based on weeks in therapy. The intercept estimate indicates an average initial OQ-45 score of 72.49 (for clients with average initial severity and average treatment dose).



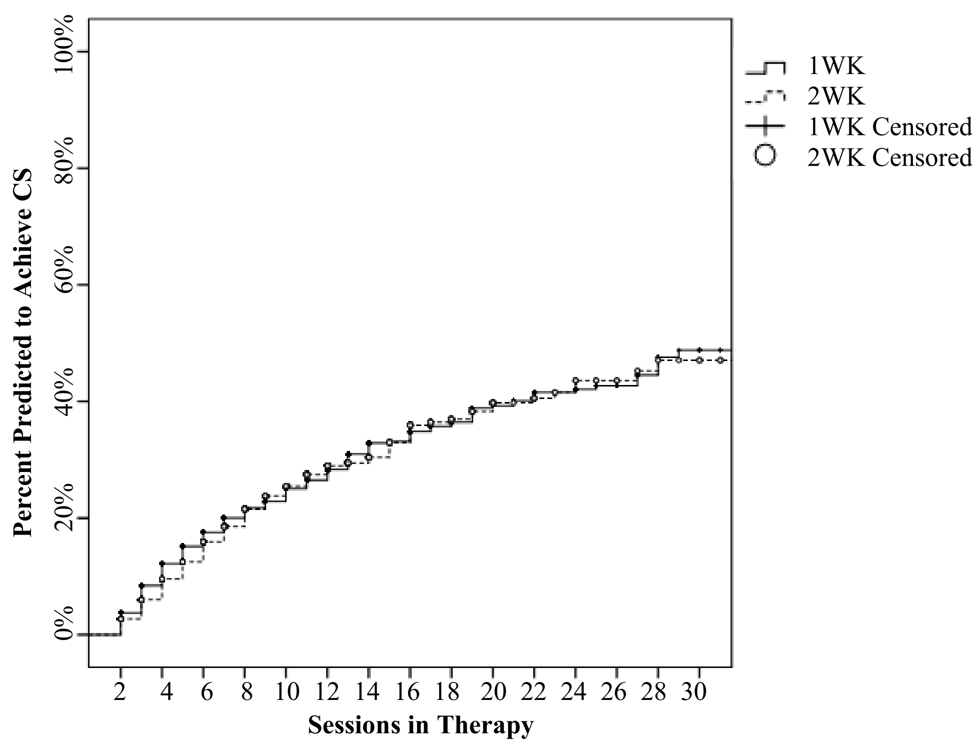


Figure 3. Survival Analyses Predicting Clinically Significant Change (CS) for Matched Quarters at Month 3, by Weeks and by Sessions. Censored cases indicate where individuals left the predictive model without having achieved the target criteria (in this case, CS).

As was expected, initial severity and total dose yielded significant effects on recovery curves. Higher initial severity was associated with steeper recovery trajectories. A significant negative interaction was found between total dose of therapy and days, garnering support for the GEL model and indicating that individuals who attend more sessions of therapy tended to have a shallower recovery slope, while those who attended fewer had a steeper slope.

Including session frequency improved the model substantially (a decrease of 83495 in AIC and of 83497 in BIC). Session frequency had significant effects on recovery curves (as seen in the slope estimate for session frequency). Interestingly (and counter-intuitively, based on previous analyses) session frequency showed a negative interaction with days, indicating slightly higher rates of change for individuals who attend therapy less frequently. Figure 4 illuminates the nature of this interaction by extrapolating slopes at specific time points in therapy. These graphs are therefore illustrative in nature and do not represent true trajectories for individuals. As can be seen, the differences in slope are larger earlier in therapy and become more similar later in therapy. This may be explained by a practical evaluation of how session frequency interacts with days in therapy. For example, at week 4, individuals who are scheduled more frequently than once a week may have several data points contributing to the estimation; those scheduled once a week would have 5 data points (with the intake session at week 0 and the fifth session at week 4); those scheduled once every two weeks would have 3 points; and those scheduled less frequently would have only 2 data points. It follows, then, that estimations of the even earlier effects of session frequency would necessarily be based on individuals receiving more frequent treatment than once a week, and not on individuals receiving less frequent therapy. In other words, there is no slope for someone being seen once every two weeks until week 2. Examining only slopes (and ignoring differences in intercept) at later points in each

Table 8

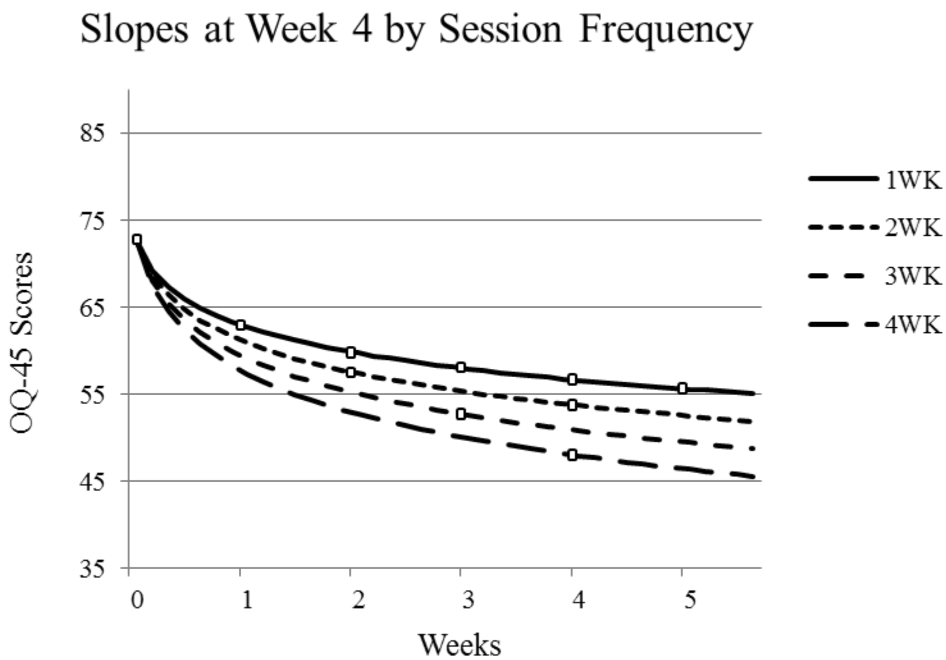
Multi-level Model Predicting the Effects of Session Frequency on Change Trajectories by Days

	Fixed Effects			
	Intercept		Slope (Days)	
	Est.	*SE*	Est.	*SE*
Intercept	72.49**	.41	-3.86**	.11
Initial Severity	1.10**	.01	-.13**	.00
Total Dose	.39	.30	1.13**	.10
Mean Frequency	3.93**	.37	-.55**	.08
Frequency SD	-.12	.33	.17*	.01
Weeks From Last	.61*	.23	-.13*	.05
	Random Effects			
	Variance Estimates		Covariances	
Residual	135.44		Intercept x sessions	-44.23
Intercept	134.03			
Slope	23.96			
Therapist Effects	5.65			

Note. * $p < .05$. ** $p < .001$. Est. = the model estimate for each parameter. *SE* = the standard error of the estimate. Initial Severity is operationalized as the first OQ-45 score recorded; Total Dose is the total number of sessions attended; Mean Frequency is the cumulative mean of session frequency at any given point in time; Frequency SD is the cumulative standard deviation of session frequency; Weeks From Last is the independent number of weeks from one session to the next.

graph reveals similar rates of change across different frequencies and likely better reflect trajectories for those scheduled less frequently than multiple times a week.

Standard deviation of session frequency and weeks from the last session both showed significant effects, though they contributed less to the model fit (a change of 71 in both AIC and



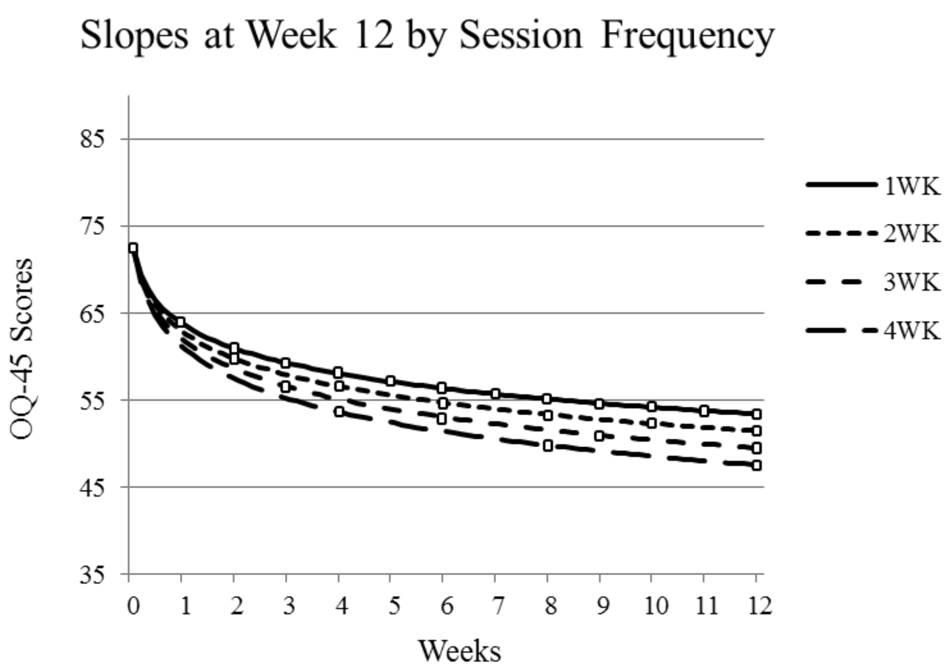


Figure 4. Illustration of the Interaction Effects of Session Frequency on Recovery Trajectories When Using Weeks as Time in Multi-level Models. Slopes represented are not predicted trajectories for patients at each week, but rather represent an extrapolation of the slopes at weeks 4 and weeks 12 over time. These plots demonstrate, primarily, the weakening of the effect of session frequency by weeks in therapy as therapy progresses. White boxes on each of the slopes represent a session of therapy.

BIC when all variables were added). Standard deviation of session frequency indicated slightly shallower recovery curves for those who attend therapy less regularly. Weeks from the last session paralleled session frequency, indicating that longer periods between sessions are related to faster recovery curves (particularly early in therapy). The attended/Scheduled ratio was not significant, and was therefore removed from the model.

Results utilizing Month 1, Month 2, and Month 3 session frequency generally paralleled the frequency effects described in the model above, with the exception of significant effects in all three models for the attended/scheduled ratio, where higher ratios were associated with faster recovery. When AIC and BIC were compared for all models, including the model for the entire course of therapy described above, the Month 1 model appeared to be the best fit for the data. Effect sizes were calculated for the fixed effect of session frequency in each model (Month 1, d = .03; Month 2, d = .03; Month 3, d = .06; Entire course of therapy, d = .05), and show increasingly stronger predictive effects as the period of time used expanded.

By sessions in therapy. Table 9 presents the final model estimating fixed and random effects based on sessions in therapy. The intercept estimate indicates an average initial OQ-45 score of 78.67. Initial severity and total dose of therapy showed results similar to those found in the days model.

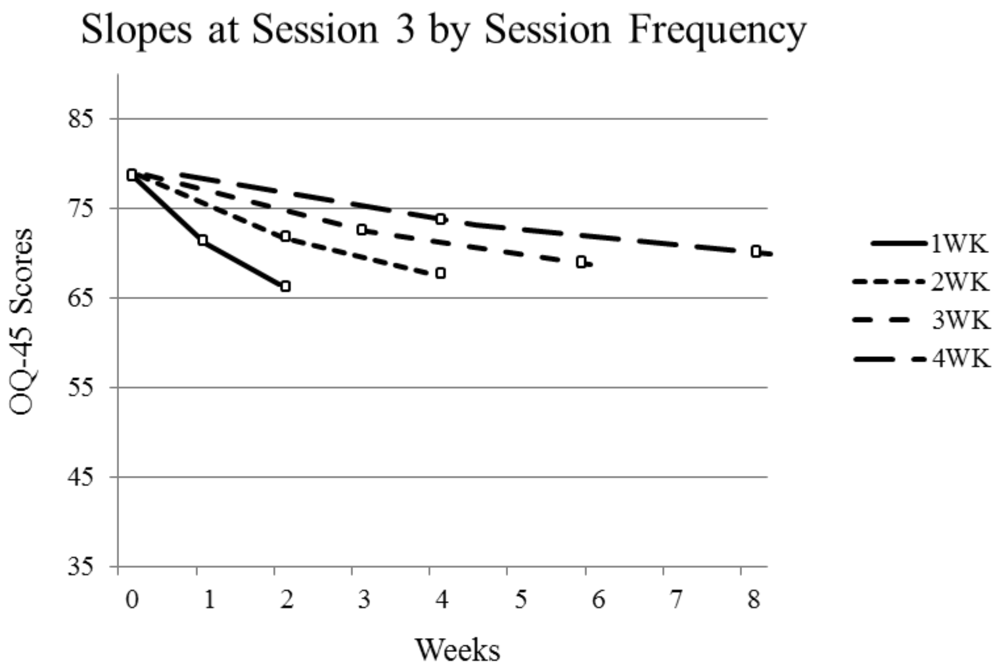
As with the days model, including session frequency in the model improved the model fit (a decrease of 82041 in AIC and BIC). Session frequency had significant effects on recovery curves in the opposite direction of the days model, indicating slower rates of recovery for those scheduled less frequently. Figure 5 illustrates the isolated effects of this interaction (when all other variables are equal to 0 or the grand mean). At session 3, slopes for different session frequencies were similar, with those scheduled more frequently showing faster rates of recovery.

Table 9

Multi-level Model Predicting the Effects of Session Frequency on Change Trajectories by Sessions

	Fixed Effects			
	Intercept		Slope (Sessions)	
	Est.	*SE*	Est.	*SE*
Intercept	78.67**	1.24	-12.03**	.91
Initial Severity	.98**	.01	-.24**	.01
Total Dose	.27	.22	3.36**	.19
Mean Frequency	-1.32**	.15	1.73**	.14
Frequency SD	.36	.14	-.31**	.08
Weeks From Last	.40*	.09	-.28**	.04
Attended/Scheduled	-3.24*	1.21	1.97*	.88
	Random Effects			
	Variance Estimates		Covariances	
Residual	132.17		Intercept x sessions	-46.52
Intercept	80.57			
Slope	81.84			
Therapist Effects	4.98			

Note. * $p < .05$. ** $p < .001$. Est. = the model estimate for each parameter. *SE* = the standard error of the estimate. Initial Severity is operationalized as the first OQ-45 score recorded; Total Dose is the total number of sessions attended; Mean Frequency is the cumulative mean of session frequency at any given point in time; Frequency SD is the cumulative standard deviation of session frequency; Weeks From Last is the independent number of weeks from one session to the next; Attended/Scheduled is the ratio of attended sessions to scheduled sessions.



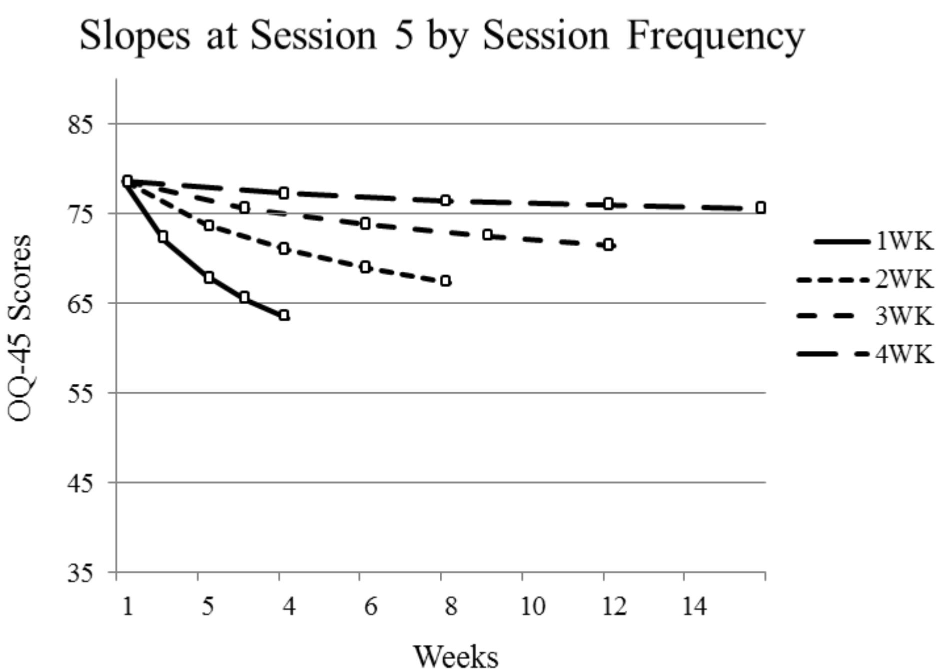


Figure 5. Illustration of the Interaction Effects of Session Frequency on Recovery Trajectories When Using Sessions as Time in Multi-level Models. Slopes represented are not predicted trajectories for patients at each week, but rather represent an extrapolation of the slopes at sessions 3, 5, and 7 over time. These plots demonstrate, primarily, the strengthening of the effect of session frequency by sessions in therapy as therapy progresses. White boxes on each of the slopes represent a session of therapy.

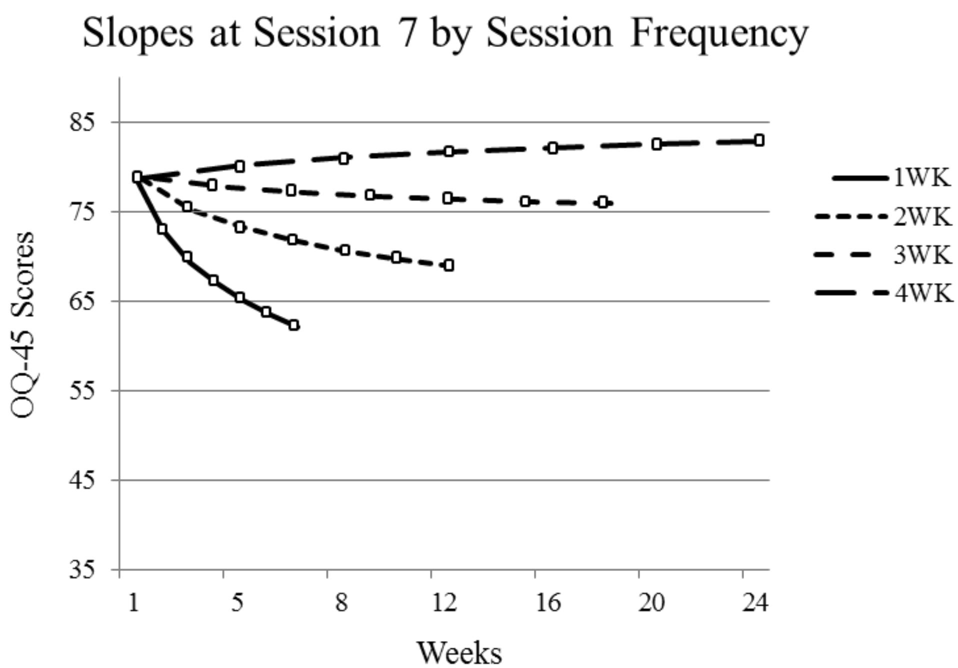


Figure 5 (continued). Illustration of the Interaction Effects of Session Frequency on Recovery Trajectories When Using Sessions as Time in Multi-level Models. Slopes represented are not predicted trajectories for patients at each week, but rather represent an extrapolation of the slopes at sessions 3, 5, and 7 over time. These plots demonstrate, primarily, the strengthening of the effect of session frequency by sessions in therapy as therapy progresses. White boxes on each of the slopes represent a session of therapy.

As the number of sessions increases, the slopes become increasingly different, with those scheduled less frequently recovering more slowly. This effect continues to escalate over time, predicting deterioration curves for those scheduled less frequently when the mean number of sessions (6 to 7) is met.

Standard deviation of session frequency, weeks from the last session, and the attended/scheduled ratio all showed significant effects, though they again only made minor contributions to the model fit (a change of 80 in both AIC and BIC when all variables were added). In contrast to the days model, higher standard deviations of session frequency were associated with slightly steeper recovery curves. Weeks-between paralleled the weeks model, indicating an association between longer periods between each session and steeper recovery curves. High attended/scheduled ratio was significantly associated with shallower recovery curves.

As with the days model, Month 1, Month 2, and Month 3 analyses were similar to the frequency effects in the above model. The attended/scheduled ratio, however, was not significant in any of the models. AIC and BIC indicated that the Month 1 model was a better fit for the data than all other models. Effect sizes were calculated for the fixed effect of session frequency in each model (Month 1, $d = .03$; Month 2, $d = .05$; Month 3, $d = .07$; Entire course of therapy, $d = .09$), and show increasingly stronger predictive effects as the period of time expanded. An illustrative table of all significant results (including analyses of amount of recovery and speed of recovery) can be found in Figures 6, 7, and 8.

Discussion

Recent discussions have emphasized the importance of reducing the burden of mental illness and the implications of better implementing empirically supported treatments (Chorpita et al., 2011; Kazdin & Blase, 2011). As the bulk of empirically supported treatments have either explicitly or implicitly employed structured session frequencies (usually once a week or more frequently), shifting from this practice may affect the efficacy of the treatment. Although pragmatic shifts in organizations often seem “necessary,” it is important to examine the effects of new practices on psychotherapy outcome. This study attempted to examine the effects of different scheduling practices on psychotherapy change trajectories in a routine-care clinic delivering a variety of evidence-based treatments to a heterogeneous sample of clients.

Concerning the amount of change over the entire course of therapy, a trend was found favoring the 1WK group. The mean amount of change over the entire course of therapy, when

	t-test	ANC	χ^2 CS	χ^2 RC	χ^2 DET	MLM	SUR	
Entire Course								
Continuous Data						†		*W*
						*		*S*
1WK vs. 2WK Groups								
M Group 1	*	*	*	*	*	*	*	*W*
								S
M Group 2	*	*				*	*	*W*
								S
M Group 3	*				*		*	*W*
							†	*S*
P Group 1	*		*	*	*	*	*	*W*
								S
P Group 2	*			*				*W*
								S
P Group 3								*W*
							†	*S*
Quarters					*	*	*	*W*
							*	*S*
Month 1								
Continuous Data						†		*W*
						*		*S*
1WK vs. 2WK Groups								
M Group 1	*			*			*	*W*
								S
M Group 2							*	*W*
								S
M Group 3	*	*	*	*		*	*	*W*
								S
P Group 1	*			*			*	*W*
								S
P Group 2								*W*
								S
P Group 3								*W*
								S
Quarters	*	*	*	*	*	*	*	*W*
								S

Figure 6. Illustrative Summary of All Significant Results, Entire course and Month 1. * = significant results favoring 1WK groups or more frequent therapy. When considering deterioration (DET), an asterisk indicates significantly less deterioration in the 1WK group. † = significant results favoring 2WK groups or less frequent therapy. ANC = ANCOVA, CS = clinically significant change, RC = reliable change, DET = reliable deterioration, MLM = multi-level modeling, SUR = survival analysis, *W* = weeks used as the time variable, *S* = sessions used as the time variable. Each cell indicates an analysis that was run.

	t-test	ANC	χ^2 CS	χ^2 RC	χ^2 DET	MLM	SUR	
Month 2								
All Data						†		*W*
						*		*S*
1WK vs. 2WK Groups								
M Group 1	*	*	*	*	*		*	*W*
								S
M Group 2	*						*	*W*
						*	†	*S*
M Group 3	*		*	*	*	*	*	*W*
								S
P Group 1	*	*		*	*		*	*W*
								S
P Group 2	*	*		*				*W*
								S
P Group 3				*				*W*
								S
Quarters	*	*	*	*	*	*	*	*W*
								S
Month 3								
All Data						†		*W*
						*		*S*
1WK vs. 2WK Groups								
M Group 1	*	*	*	*	*		*	*W*
								S
M Group 2	*	*				*	*	*W*
								S
M Group 3	*	*	*	*	*	*	*	*W*
								S
P Group 1	*	*	*	*	*	*	*	*W*
								S
P Group 2								*W*
							†	*S*
P Group 3	*			*				*W*
								S
Quarters	*	*	*	*	*	*	*	*W*
							*	*S*

Figure 7. Illustrative Summary of All Significant Results, Months 2 and 3. * = significant results favoring 1WK groups or more frequent therapy. When considering deterioration (DET), an asterisk indicates significantly less deterioration in the 1WK group. † = significant results favoring 2WK groups or less frequent therapy. ANC = ANCOVA, CS = clinically significant change, RC = reliable change, DET = reliable deterioration, MLM = multi-level modeling, SUR = survival analysis, *W* = weeks used as the time variable, *S* = sessions used as the time variable. Each cell indicates an analysis that was run.

		Analyses						
		t-test	ANC	χ^2 CS	χ^2 RC	χ^2 DET	MLM	SUR
Entire Course								
1WK vs. 2WK Groups								
M Group 1	*W*						*	
	S							
M Group 2	*W*						*	
	S							
M Group 3	*W*						*	
	S							
P Group 1	*W*						*	
	S							
P Group 2	*W*							
	S							
P Group 3	*W*							
	S							
Quarters	*W*		*			*	*	*
	S						*	*
Month 1 Quarters	*W*	*	*	*	*		*	*
	S							†
Month 2 Quarters	*W*	*	*	*	*	*	*	*
	S							
Month 3 Quarters	*W*	*	*				*	*
	S							*

Figure 8. Illustrative Summary of All Significant Results for Matched Datasets. * = significant results favoring 1WK groups or more frequent therapy. When considering deterioration (DET), an asterisk indicates significantly less deterioration in the 1WK group. † = significant results favoring 2WK groups or less frequent therapy. ANC = ANCOVA, CS = clinically significant change, RC = reliable change, DET = reliable deterioration, MLM = multi-level modeling, SUR = survival analysis, *W* = weeks used as the time variable, *S* = sessions used as the time variable. Each cell indicates an analysis that was run.

controlling for important covariates, showed slightly more change for the 1WK group. When using datasets matched on initial severity, where the mean number of sessions attended was nearly identical, proportions of CS and RC were significantly higher for those scheduled once a week. For example, looking across the entire course of therapy, 51% of clients who had weekly psychotherapy were either recovered or improved while those receiving therapy every other week had 37.3% meeting these criteria. When proportions of clients who deteriorated in therapy were compared, the 2WK group tended to have significantly higher levels of deterioration (e.g., 7.5 % versus 2.1 %). These findings suggest that those scheduled once a week tend to recover at higher rates, and deteriorate less, than those scheduled once every two weeks.

Concerning the speed of change over the course of therapy, findings again favored the 1WK group over time. When examining sessions, however, the 1WK and 2WK groups appeared equivalent, suggesting that the effect of a session may remain the same for both scheduling practices. These findings were consistent with survival analyses that examined the time to CS and RC, where clinically significant change was predicted to occur faster for those scheduled more frequently, but there was generally no significant difference between the session by session "dose."

It is important to note that the exploratory nature of this study included several group selection methods and several critical time periods where patterns emerged. It appears that P Groups 2 and P Groups 3 generally had results that were consistent with each other, but divergent from all other selection methods. These samples selected students based on at least 75% or 65% of their sessions being scheduled approximately 1WK or 2WKs (P Groups 2 and P Groups 3, respectively). It is possible that these selection methods were too broad to detect clear differences between groups. Differences also emerged when considering time periods. In general, results were strongest in Month 3 and over the entire course of therapy, intermediate in Month 2, and weakest in Month 1. This is consistent with what might be expected, where the first month of therapy may be less representative of an entire course of therapy than broader time periods.

When considering the effect of session frequency as a continuous, time varying parameter for all subjects, the inclusion of session frequency in the model significantly improved model fit. The model based on days indicated a slight advantage for those scheduled less frequently, particularly towards the beginning of therapy. This may be consistent with earlier research that indicated increased session frequency at the beginning of therapy was associated with poorer outcomes (Kraft, Puschner, & Kordy, 2006). The model based on sessions, however, showed a strong effect that increased as the number of sessions increased, and indicated that those who were scheduled more frequently tended to recover more quickly. The regularity of sessions, the number of weeks from one session to the next, and the attended/scheduled ratio were also found to be significant predictors, but did not substantially improve model fit.

Although effect sizes were small for session frequency, small effects can significantly impact large populations over extended periods of time. This is true when considering widespread practices of psychotherapy delivery. It appears that the consideration for session frequency may be whether a clinic is able to see more patients less frequently (and thus possibly reduce wait-list length and suffering of untreated individuals) or see fewer patients more frequently (and thus shorten suffering for those being seen, but leave waitlisted patients untreated). A cost-benefit analysis of the results of each of these approaches is needed to adequately answer the question of the financial effects of these practices; there are significant individual and societal costs, however, associated with prolonging negative mental health states. Poor mental health has been associated with decreased household income (Kessler et al., 2008; Sareen, Afifi, McMilan,& Asmundson, 2011), decreased productivity and increased health care costs (Goetzel, Ozminkowski, Sederer, & Mark, 2002; Trotter, et al., 2010) and increased mortality (Eaton, et al., 2008). The Global Disability Index, a measure of overall burden of illness that can be applied across diagnoses, ranked moderate depression as equivalent with multiple sclerosis or deafness, and severe depression as identical to blindness (Eaton, et al., 2008). If attenuating session frequency decreases amount and speed of recovery, it also accentuates the burden of illness, including the personal suffering of those seeking psychotherapy.

There were several limitations to the current study, including a lack of diagnostic information for patients, which did not allow an investigation of differences in scheduling patterns for differing problems. It is possible that certain diagnostic categories are associated with success at different frequencies. The nature of archival data also created difficulties in isolating the effects of session frequency. Although efforts were made to adequately control these difficulties through data sampling techniques and statistical controls, an experimental design would be able to more accurately isolate these effects. Generalizability to populations outside of university counseling centers may also be of concern, as the majority of students seeking therapy were young and White. Further research is needed with other populations and in other settings to confirm these effects.

Despite these limitations, this study replicated the effects found by previous session frequency studies, as well as contributed several important factors. First, this study used measurements at each session in order to predict outcome trajectories. Second, session frequency was defined as a time varying variable (i.e., cumulative average frequency) rather than a fixed variable (i.e., final average frequency), more accurately representing session frequency at each point of measurement. Third, this study moved beyond statistical significance and offered a thorough examination of the clinical significance of session frequency. Fourth, the study was designed to be clinically accessible by comparing simple scheduling practices of once a week versus once every two weeks, allowing for a useful heuristic regarding real-world scheduling practices.

Evidence from past literature and the current study indicate that session frequency appears to affect both the amount of recovery and the speed of recovery in psychological treatment. It remains unclear, organizationally and communally, if slow recovery for many is better than faster recovery for fewer. Better outcomes for an individual client, however, appear to be associated with higher session frequency.

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