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## **Exploring the Relationship Between Time-Series Data Collection and Duration of Treatment in a University Clinic: A Survival Analysis**

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To the Graduate Council:

I am submitting herewith a dissertation written by Justin D. Winkel entitled "Exploring the Relationship Between Time-Series Data Collection and Duration of Treatment in a University Clinic: A Survival Analysis." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

Michael R. Nash, Major Professor

We have read this dissertation and recommend its acceptance:

John W. Lounsbury, Lance T. Laurence, Vey Nordquist

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Major Professor

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and recommend its acceptance:

John W. Lounsbury

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Lance T. Laurence

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Vey Nordquist

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Acceptance for the Council:

Linda Painter  
Interim Dean of Graduate Studies

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(Original signatures are on file with official student records.)

EXPLORING THE RELATIONSHIP BETWEEN  
TIME-SERIES DATA COLLECTION AND DURATION OF TREATMENT  
IN A UNIVERSITY CLINIC: A SURVIVAL ANALYSIS

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

Justin D. Winkel

December 2006

## **DEDICATION**

This dissertation is dedicated to  
my parents and sister  
who have provided me with the foundation, support,  
and resources to be able to achieve my goals,  
and in memory of  
my grandfather, Donald E. Winkel,  
and my friend, Ms. Ciara McDermott,  
two people who taught me the value of relationships.

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I would also like to thank Dr. Kathryn White, Dr. Jeff Slavin, Dr. Jack Barlow, and Dr. William MacGillivray for their incredible supervision and academic guidance. I aspire to someday reach their level of clinical expertise and understanding of the human condition.

Finally, I would like to thank the staff of the University of Tennessee Psychology Department, especially Ms. Connie Ogle and Ms. Janet Carnes who have been patient with my lack of organization and have kept me on schedule.

## **ABSTRACT**

The aim of this study was to examine the relationship between participation in time-series research and the duration of psychotherapy. In previous research, 50 patients were accepted into the Time-Series Study at the University of Tennessee Psychological Clinic. Study participation included a significant degree of patient involvement, including repeated assessment of process and outcome variables totaling 120 items which patients were asked to complete twice a week. It was hypothesized that participation in this type of research may have resulted in shorter treatment duration due to increased subject burden, or may have motivated patients to stay in treatment, thus increasing treatment retention rates. Survival analysis was used to analyze the number of sessions attended by the time-series patients in contrast to two comparison groups, the first, a cohort of 116 patients who did not participate in the Time-Series Study, and the other, a group of 192 patients seeking treatment before the study began. Results indicated no evidence supporting the hypothesis that participation in time-series research resulted in shorter duration of treatment. However, the median number of sessions was higher for the patients who participated in the Time-Series Study, but not statistically different from the two comparison groups.



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## CHAPTER I

### INTRODUCTION

#### **Research, Assessment and Psychotherapy**

Scientists and practitioners are becoming more interested in *how* psychotherapeutic treatments work in addition to *if* they work, and because of this they are moving away from simple pre-post test designs of outcome (e.g. one measurement pre-treatment, one measurement post-treatment). In order to investigate therapeutic processes, researchers are using time-series and repeated measure research designs. Both methods employ repeated observations of one or more variables in order to study change over time. Time-series designs, however, are used to compile data *streams* (near continuous measurements) for one or more variables over time, and generally consist of more closely spaced data points than do repeated measures, thus providing greater resolution of the variables of interest. There are multiple advantages to utilizing a time-series design including the ability to rigorously examine treatment effects in an individual case (i.e., an N of 1 study), the ability to closely observe the ebb and flow of one or more dynamic variables, and the ability to examine relationships between dynamic variables over time. Furthermore, single subject research using a time-series design can easily and economically be conducted by private practice clinicians “in the trenches,” to closely monitor a patient’s symptoms and to determine the effectiveness of the treatment being administered. Looking towards the future, Hayes (1992) proposes that an increase in the

use of time-series studies by practicing clinicians, “could produce more research data and make consumption of clinical research more worthwhile for the practitioner” (p. 492).

A significant body of literature supports the possibility that the process of collecting psychotherapy process and outcome data may have a significant impact on treatment. Essentially, in order for the patient to report on their symptoms, they must monitor and reflect upon them. Emory (1985) states that, “Self-monitoring, one of the more useful therapeutic tools, provides a simple way for the patient to develop a sense of mastery over anxiety (p. 245). Some research and case studies suggest that the practice of self-monitoring smoking behavior changes the frequency and duration of smoking even when subjects are told not to change their smoking habits (McFall, 1970). Other research demonstrates how cognitive-behavioral and behavioral therapies that include having a patient monitor aspects of a particular symptom, are useful in treating such disorders as mania (Blue, 1978), obesity (Penick, Filion, Fox, & Stunkard, 1971) and have been shown to improve scores on attentional thinking and language tasks with schizophrenics (Meichenbaum and Cameron, 1973).

Other clinical researchers posit that assessment may help to extend the duration of treatment. Wolff (1967) noticed that patients who were given an MMPI at intake continued beyond the intake interview more often than patients who were not given the MMPI. Similarly, Dodd (1970) found that patients who completed an MMPI and the Institute of Living IQ scale remained in treatment significantly longer than patients who were given the assessments but failed to complete them. These results prompted Dodd to

state, “It would appear that psychological tests have not only a measuring function but also a filtering function and also may produce changes in attitudes (pg 83).”

Unfortunately, it is unclear what factors influenced some individuals to not complete the assessment battery in Dodd’s study. Nonetheless, Dodd’s statement introduces some interesting possibilities. If assessments do “weed out” individuals who are more likely to drop out of therapy, they may be useful tools to help clinicians to streamline services towards those patients who will continue treatment. On the other hand, if they change patients’ attitudes towards therapy thus making them more likely to be retained in treatment, some form of assessment should be incorporated into treatment regimens. The resulting increase in treatment duration may lead to greater clinical improvement in patients as suggested by Luborsky, Auerbach, Chandler, Cohen, & Bachrach (1971) and Pekarik (1986, 1992).

The possibility that assessment may discourage some patients suggests that there could be less fortuitous effects on the therapeutic dyad. It is conceivable that increased attrition may result from the use of repeated measurement and time-series designs. Reviews of the research (Baekeland & Lundwall, 1975; Garfield, 1994) investigating drop out and duration of treatment in psychotherapy suggest that between 30% and 60% of patients drop out of psychotherapy prematurely. In a meta-analysis of 125 studies, Wierzbicki and Pekarik (1993) found that 47% of patients terminate therapy prematurely. In addition, Garfield (1994) compiled a “representative” sample of 21 studies reporting data on the duration of psychotherapy (in a range of different clinical settings published between 1948 and 1989) and concluded that most patients present for approximately 6

sessions. Sue, McKinney & Allen (1976) reported that in a sample of 2551 cases drawn from a population of 13,450 cases at 17 different mental health clinics, over 40% of the patients failed to return for a first therapy session after intake. Finally, in her unpublished dissertation, Strassle (2001) collected data from a sample of psychotherapy patients at the University of Tennessee Psychological Clinic and found that 61% of the subjects attended 7 or fewer sessions. In light of these results, it appears that the early stages of psychotherapy are tenuous to begin with and that premature termination is common. As time-series research and repeated measures designs become standard procedures to investigate process and outcome in psychotherapy, it is expected that more effort will be required on the part of the subject to provide data on therapeutic constructs and symptoms, most likely, via self-report measures. It seems possible that these additional demands on the patient to intensively monitor and record symptoms during this sensitive period of psychotherapy may further exacerbate this preexisting tendency for early dropout. Hence, not only might repeated measurement of symptom status affect outcome, it is possible that intensive data collection itself could influence a time-series patient to terminate therapy earlier than they might otherwise. Collins and Graham (2002) urge researchers using longitudinal designs to consider exactly this point, and urge them to weigh the benefit of closely spaced observations with the possibility of increased negative attitudes or absenteeism in subjects. Although the findings of both Dodd (1970) and Wolff (1967) suggest that some type of assessment during the initial meetings may have a beneficial influence on duration of treatment, the impact of repeated assessment on the duration of psychotherapy has not been scientifically established. If time-series



designs are to be utilized by private practice clinicians, practitioners must be certain that the process of collecting time-series data does not detrimentally curtail the length of treatment thereby jeopardizing both the patient's therapy and the clinician's livelihood.

### **Referral, Attendance and Termination of Psychotherapy**

Most of the existing data regarding referral, attendance and termination of psychotherapy has been collected from community mental health clinics and hospitals rather than private practice settings. The research suggests that many therapies end due to unplanned terminations by the patient. Furthermore, not all patients who are referred to psychotherapy even begin treatment. Rosenthal and Frank (1958) report that 35 % of the patients in a hospital who were referred to psychotherapy never came for a first appointment.

Once engaged in psychotherapy, termination could happen for any number of reasons and could be instigated by factors related to both the therapist and/or the patient. Goin, Yamamoto and Silverman (1965) reported that 75 % of the patients at a psychiatric outpatient clinic terminated treatment without notifying their doctor. Rosenthal and Frank (1958) also reported that three out of every four patients dropped out of psychotherapy. Straker (1968) reported between 32 and 62 % drop out rate between the years 1960 and 1964 at a university hospital psychiatric clinic. Renk and Dinger (2002) found that in a sample of patients from a university psychological clinic 15.6 % of patients failed to come to a first session after intake, approximately 63.2 % prematurely terminated from psychotherapy due to dissatisfaction with services, difficulties unrelated

to treatment, or an unreported reason and 23% terminated treatment with mutual agreement between patient and therapist that the therapy should be terminated or due to the patient being satisfied with treatment gains. This body of research clearly establishes that dropout occurs frequently, but what is the relationship between premature termination and treatment outcome?

There is evidence suggesting that appropriate terminations and longer treatments are related to positive outcome, while early dropouts more often demonstrate less or no symptom improvement. Fiester, Mahrer, Giambra and Ormiston (1974) examined differences between patients that dropped out of treatment and non-dropouts and found that four times as many dropouts were judged by the therapist as definitely in need of further psychiatric care at the time of termination. Feister (1979) found a significant relationship between termination type (dropout vs. mutual agreement) such that patients who dropped out after four or more sessions reported themselves, and were judged by the therapist, as having made fewer gains towards treatment goals than patients who had terminated with the therapist's consent. Straker (1968) found that the remission rate for a sample 107 patients in an outpatient clinic was 47% at a two-year follow up, but improved to 60% when dropouts were excluded. In addition, only 63% of the dropouts in the 10-week treatment reported "improvement" while 100 % of the patients who completed the 10-week treatment reported "improvement." Using the Brief Symptom Inventory (BSI) to measure symptomatology, Pekarik (1992) found that adults who completed treatment did not differ significantly from patients who dropped out of treatment at a 4 month follow up. However, patients who dropped out early were

significantly more likely to have worse BSI scores than late dropouts, while late dropouts were significantly more likely to have improved scores after four months than were early drop outs. Similarly, therapist ratings of improvement demonstrated significant differences between completers and early dropouts with completers being more improved. Finally, Anderson and Lambert (2001) used survival analysis to determine the median number of sessions necessary for patients at a university clinic to achieve clinically significant change. The results indicated that 25% of their sample achieved clinically significant change after 5 sessions, 50% after 9 sessions and 75% after 17 sessions.

The research in this area seems to indicate that patients who mutually terminate psychotherapy, and patients who remain in treatment longer demonstrate more improvement than patients who drop out of treatment early. From this we can extrapolate that interventions that increase the duration of treatment or that boost the rate of mutual termination may be beneficial, while those that shorten the treatment by increasing early dropout may be considered unfavorable.

### **Variables Associated with Dropout and Duration of Psychotherapy**

A great deal of literature has focused on investigating variables that may be related to premature termination of different treatments including medical interventions, alcohol treatments, methadone treatment, and child, group and adult psychotherapies (See Baekeland & Lundwall, 1975; Garfield, 1994 for reviews). Researchers have investigated a large number of variables ranging from patient demographic variables,

clinical considerations, treatment settings, delivery systems, therapist characteristics and therapeutic variables, hoping to find significant correlations with duration of treatment. Many succeeded in this endeavor (See Baekeland & Lundwall, 1975; Garfield, 1994 for reviews). Unfortunately, there is often a lack of consistency between these studies (Baekeland & Lundwall, 1975; Garfield, 1994). Baekeland & Lundwall (1975) have suggested that many of these inconsistencies may be spurious results from random sampling error due to the sheer number of studies that have investigated this phenomenon.

Recognizing the need to consolidate the breadth of findings in this area of research, Wierzbicki and Pekarik (1993) conducted meta-analysis of 125 studies with data on treatment drop out or duration of psychotherapy. The study examined a total of 32 variables including demographic variables, psychological variables and therapist variables. Only three variables demonstrated significant effect sizes: Social Economic Status (SES) ( $ES = 0.37$ ), education ( $ES = 0.28$ ) and race ( $ES = 0.23$ ). Rosenthal and Frank (1958) found significant differences in both education and race in patients who attended six or more therapy sessions. Significantly fewer patients with 0-8 years of education attended six or more sessions when compared to individuals with 9 or more years of education. Caucasian patients were also more likely to attend six or more sessions than African American patients. In a recent comparison of treatment completers and dropouts in a randomized 12-week trial of Panic Control treatment, pharmacotherapy with imipramine or a placebo, or a combination of these treatments, Grilo et al. (1998) also found a significant difference in both education level and subject's income with

treatment completers having both higher education and higher household income. Other research (Kahn & Heiman, 1978; Sue et al., 1976) investigating patient race and duration of treatment also support the findings of Rosenthal and Frank (1958) suggesting that minorities are at more risk for early drop out.

### **Dropout in Research**

Although the relationship between data collection and attrition in research does not appear to be formally investigated, the literature suggests that the impact of attrition is well recognized by the research community. Collins and Graham (2002) caution researchers about the potential for increases in subject demands to promote negative attitudes in subjects. Kaplan and Atkins (1987) caution researchers to be wise to the possible occurrence of “selective attrition” in subjects who are not responding positively to the experimental treatment. When such subjects are dropped from analyses because of subsequent lack of adequate data, statistics measuring outcome may be inflated thus supporting treatment efficacy due to underrepresentation of subjects who dropout without positive treatment gains.

As is the case with other areas of longitudinal research, premature termination from treatment in psychotherapy process research introduces methodological problems with data analysis. Good research design dictates that construct measurement and subject retention rates be balanced to allow the maximum amount of relevant data be collected with minimal subject attrition. In most research, subjects would receive some form of incentive to remain in the experiment. However, this is unlikely to be a feasible option

for the private practice clinician. Furthermore, because subjects who leave treatment often withdraw from the research investigating the treatment as well, subjects who drop out of process research quickly may not generate enough data to allow scientists to make inferences. Therefore, the scientific community could be lacking information on the patients who are the hardest to treat.

### **Survival Analysis**

Survival analysis (SA) is a relatively new procedure for analyzing longitudinal data that involves the time to a specific event such as death, relapse or remission. SA provides information on when an event is most likely to happen in a certain population of individuals, as opposed to other more traditional techniques that merely detect if the event happens or not. In addition, survival analysis differs from other methods for analyzing lifetime data because it accounts for cases that still have not reached the critical event. In SA, these cases are called “censored cases” because they provide information on the subject up until the time that the data was collected, taking into consideration that the terminal event has not yet occurred. Willett and Singer (1993) explain how ignoring censored cases or simply assigning the last data point as the terminal event to fit more popular analyses can bias results.

For example, we may be interested in time-to-dropout in an experimental treatment with 10 subjects. At the time the study is completed there may still be 4 subjects in the treatment. If we want to know the mean length of treatment given that some individuals have not yet dropped out, traditional analyses force us to drop the cases

still in treatment (possibly causing a decrease in the mean) or count the time of data collection as their terminal event/drop out (also likely deflating the mean). The next few paragraphs will outline how SA adjusts for these problems.

Cornin and Malofeeva (2004) outline four strengths of SA over using regression or analysis of variance to analyze data on psychotherapy duration. They suggest that 1) categorization of dependent variables (e.g. drop out or continue) that could be represented longitudinally, “may distort or hide important relationships among variables (pg, 355).” (See Persons, Burns and Perloff (1988) for a perfect example of this dichotomization of a dependent variable.) 2) Predictor variables may not always be constant but may change over time as in the case of income or level of depression. These variables are treated as constants in regression and ANOVA, but SA can utilize this change in predictors over time. 3) As noted above, SA can use cases that have not yet reached the terminal event. 4) In studies examining the effect of a predictor on a specific outcome (e.g. drop out or continuing in treatment), traditional analyses sometimes group different outcomes in the same category. The authors note that “arbitrary-end” (such as patients who terminate with therapist agreement) or continuing cases may be grouped together thus making results somewhat misleading.

SA calculates a *survivor function* that can be used to compare groups using the Kaplan Meier method. The survivor function is the probability that a subject will not reach the terminal event versus time. In the beginning of the study the survivor function is 1.00 but drops toward zero as time progresses and cases reach the terminal event.

Because of censoring, the survivor function may not necessarily reach zero as some cases might never reach the terminal event.

The *hazard function* or the *hazard rate* is another important statistic generated by SA. Willett & Singer (1993) state that the hazard rate is “the cornerstone of survival analysis” (pg 954). For discrete intervals (e.g. week to week, as used in this study) the hazard function is actually a rate, with a high hazard function representing a high risk for the terminal event at that particular time, given that the case has not already reached that event. The hazard rate is related to the survival function and is calculated at each interval where a terminal event occurs using data from only the cases that have not yet reached the terminal event regardless of censoring. The cumulative hazard function  $H(t)$  is expressed as:

$$H(t) = -\ln S(t)$$

where  $S(t)$  is the survival function. Using a Cox Proportional Hazards Regression Model, the hazard rate can be predicted by “predictor variables” just as independent variables can be used to predict a dependent variable in a regression model.

To more clearly demonstrate how SA calculates a survivor function and makes use of censored data we will use a fictitious example related to psychotherapy duration. We will consider the data from 5 imaginary cases. One case (subject 3) is a censored case because they had not dropped out of treatment at the time the data was collected. Table A-1 displays this fictitious data.

The variable week is the number of weeks the patient was in treatment. The status variable denotes if the person reached the terminal event (dropped out =1 or is still



engaged in treatment = 0). Given this information, we can calculate the cumulative survival at each interval where an event occurs (see Table A-2).

The first drop out from therapy happened at 3 weeks. For subject 1, “prior number in remission” is 5 because no cases have dropped out prior to that event time. The “# remaining” is 4 because since subject 1 has relapsed at week 3. The probability of remaining in treatment for 3 weeks is  $4/5$  (the # remaining divided by the Prior number in Remission). The cumulative survival is the product of the previous survival probability and the current proportion in remission. For subject 1 there was no previous survival proportion. At 5 weeks, subject 2 dropped out of treatment. The prior number in remission is now 4 (because subject 1 had already dropped out) and the number remaining is now 3 (because at week 5 both subjects 1 and 2 have dropped out. The proportion in remission is now  $3/4$ . The cumulative survival probability is calculated by multiplying the previous cumulative survival proportion ( $4/5=0.80$ ) by the current proportion in remission ( $3/4$ ) yielding  $(0.8 \times (3/4)) = 0.6$ . The cumulative survival probability is not calculated for subject 3 because the case is censored. Subject 4 uses the cumulative survival probability generated at week 5 to calculate the cumulative survival probability at week 7 ( $0.6 \times (1/2) = 0.3$ ).

Although the cumulative survival probability is not calculated for censored cases such as subject 3, the case itself does provide information on persistence in treatment at week 6. The proportion in remission is still decreased at week 7 but the cumulative survival probability from the last uncensored event (week 5) is used to calculate the cumulative survival at week 7 (0.3). Thus the survival probability is increased (as

opposed to  $[(0.6 \times 2/3) \times 1/2] = 0.2$ ). Both the survival function and the hazard function can be plotted to better examine trends and critical periods over time. While the survival function typically takes a curved shape, the hazard rate is much more variable across time.

Despite the fact that SA is well suited to analyze data of duration and termination of psychological treatments, relatively few studies utilizing SA have been published in this area (Anderson and Lambert, 2001; Corning and Malofeeva, 2004; Magura, Nwakeze & Demsky, 1998; Monras and Gual, 2000).

There is one potential problem with using this type of analysis. Unfortunately, the computations required to compute a survival analysis often require a large number of subjects to reliably detect significant differences between groups. Singer and Willett (1991) calculated the number of individuals necessary to detect a range of effect sizes across a five intervals of “follow up” (i.e. the entire length of time the subject can possibly be observed). In experimental designs, the standardized length “follow-up” period (F) is determined by the equation:

$$F=T/A$$

where T = total length of follow up (here, in weeks/number of sessions) and  $A=(\text{median}_1 + \text{median}_2)/2$ .

The calculations by Singer and Willett (1991) indicate that when using the Kaplan Meier method, in order to establish that a group “survives” twice as long as another group an N of approximately 80 is needed assuming a two tailed test at the .05 level, power of

0.80 and a standardized follow up period of 2.5. Much larger N sizes are required to detect smaller effect sizes while maintaining power of 0.80.

**An Example of the Implementation of a Time-Series Research Design:  
The Time-Series Study (TSS) at the University of Tennessee Psychological Clinic:**

**Moore (2003)**

In March 2002, the University of Tennessee Psychological clinic began to implement a time-series research design in order to measure psychotherapy process and outcome. During the two-year period from March 2002 through March 2004, some patients seeking psychotherapy from the University of Tennessee Psychological Clinic were screened for eligibility for a fifteen-week TSS. Patients were excluded from participating if there was (1) evidence of an organic disorder; (2) evidence of a current manic episode; (3) current suicidality; (4) current psychosis; (5) age less than 18 years old; or (6) any evidence of a condition requiring immediate hospitalization.

On intake or shortly thereafter, some patients were asked if they would be willing to participate in psychotherapy research. Patients were not denied services if they refused to participate in the study and they were informed that they could discontinue their participation at anytime without penalty. Those who agreed to participate were given several packets of questionnaires to fill out twice a week at specified intervals. Patients were notified that they would receive phone call reminders from a research assistant on the days when the packets should be filled out.

Participation in the study was thus fairly labor intensive for subjects beginning immediately after intake. Subjects were asked to fill out packets of assessments twice a week during the three-week latency period between intake and their first therapy appointment and for at least 12 weeks during their time in psychotherapy at the UT Clinic (one packet before their therapy session administered at the clinic and one four days after their session). The packets themselves consisted of four questionnaires (the Beck Depression Inventory (BDI-II) (Beck, Steer, & Brown, 1996), the Beck Anxiety Inventory (BAI) (Beck & Steer, 1993), the Outcome Questionnaire (OQ-45.2) (Lambert & Burlingame, 1996) and a modified version of the Combined Alliance Short Form – Patient Version 3 (CAS3) (Hatcher & Barends, 1996). Combined these assessments totaled 120 questions and generally took subjects between 15 and 25 minutes to fill out. Patients were asked to come to therapy sessions 15-20 minutes early to allow them time to fill out the assessment battery. On the days when the patient was not seen at the clinic, participants were contacted via telephone by a research assistant who reminded them the day before or on the day the assessments were to be done to ensure that the packets were completed at the designated intervals. Subjects were informed that their therapist would not see their responses to the assessments during the course of therapy to allow the subject to be honest when completing alliance measures. Thus, the patients filled out these packets believing that it had no bearing on the course of therapy. Participants were given no compensation for filling out the packets.

In the early stages of the study, many of the student therapists verbalized concern that the addition of these self-report measures may affect some element of the therapeutic

relationship. It appeared that some expected that the addition of these measures may influence a patient to drop out of treatment earlier, or may promote resentment or resistance in the patient. Unfortunately, the literature on research methodology provided little information to contradict or confirm these hypotheses.

### **The Current Study**

The current study attempts to address the concerns of the student clinicians, and endeavors to provide the research community with some information about the relationship between research methodology and aspects of psychotherapy. More specifically, this study examines the duration of treatment and features of termination in three cohorts of psychotherapy patients from the University of Tennessee Psychological Clinic. First, the time-series group (TS) is the cohort of subjects who were involved in the Time-Series Study (TSS) from March 2002 through March 2004. The second cohort, the no time-series group (NTS), consists of patients who sought treatment at the UT psychological clinic during the same two-year time period but did not participate in the TSS. Some of these patients were not asked to be in the study, and others may have been asked but refused to be in the study. There are no surviving documents recording the reason why NTS subjects did not participate. The third group, is a pre-time-series group (PTS) and consists of patients who presented to the clinic from March 2000 to February 2002, before the TSS began.

As stated above, subjects in the TSS were allowed to stop the assessment process after the twelfth week of treatment though some continued to fill out the questionnaires

even after that time. Keeping in mind that many patients tend to drop out of psychotherapy after approximately six sessions (Garfield, 1994), data from a local sample of patients from this clinic closely replicating this finding (Strassle, 2001) and data suggesting that approximately 50% of patients may need to attend at least 9 sessions of psychotherapy in order to achieve clinically significant change, we posited that this twelve week period of repeated assessment occurred at a critical stage of the therapy. If the data collection process had a positive or detrimental influence on psychotherapy duration, it seems likely that it would have the greatest impact during the early, alliance-building stage of psychotherapy. Potential differences in the frequency and rate of dropout/termination in the three groups may be observable by examining the survival and hazard functions from SA in conjunction with the results of other, more conventional, analyses.

### **Objectives and Hypotheses for the Current Study**

The purpose of this study is to address questions about the potential relationship between time-series research participation, duration of treatment and termination of psychotherapy:

(1) Is there evidence to suggest that inclusion in TSS may impact the frequency of first-session dropout (i.e., Do patients begin therapy after intake?)? Is the prediction of first-session dropout significantly enhanced by adding a variable representing inclusion in the TSS to a regression model including the already established predictors of dropout (i.e. SES, education and race)?

(2) Is there evidence to suggest that inclusion in the TSS may have had an influence on the duration of psychotherapy? Was the overall duration of treatment (in number of sessions) for the subjects in the TSS significantly different from those of the two comparison groups (NTS and PTS)? Were there significant differences across the three groups in the frequency of patients who dropped out of therapy before 12 sessions?

(3) Is there evidence to suggest that inclusion in the TSS may have influenced how therapy was terminated? Do the three groups demonstrate significant differences in the way the therapy was terminated (mutually planned, unplanned/premature, continuing)?

(4) Is there evidence to suggest that inclusion in the TSS may have influenced clinical change? Do the three groups differ in terms of their change in GAF score by termination?

As time-series studies continue to become a bona fide and respected method of conducting psychotherapy research, scientists and practitioners will need to understand the impact of data collection on the therapy itself. This study endeavors to inform researchers and clinicians about possible salubrious or detrimental relationships between rigorous data collection and psychotherapeutic treatment. In addition, this study examines these data via conventional analyses, enhanced by using SA to maintain the richness of the data.

## **CHAPTER II**

### **METHOD**

#### **Design**

This study utilized a quasi-experimental design with two additional intact samples used as comparison groups. As Shadish, Cook & Campbell (2002) point out, quasi-experimental designs are subject to numerous limitations that require specific consideration to make reliable inferences from the data. Although the lack of randomization to treatment groups limits our ability to suggest causal relationships between time-series inclusion and duration of treatment, the limited literature in this area and possible generalizations to other longitudinal research of psychotherapy using volunteers makes this investigation a worthwhile endeavor. In addition, this study attempts to compensate for lack of random assignment by using more than one comparison group.

#### **Participants**

The data from 878 separate service contacts were coded over the period from 3/1/00 to 3/31/2004. Fourteen (2%) of these cases were identified as return consumers. Only two cases were identified as possibly missing due to non-sequential file numbering. It is unclear if these file numbers were actually assigned to any patient at the clinic.



During this four-year period, there were 652 adult cases and 236 child cases seen at the clinic. In regard to the adult cases, 288 (44%) were identified as individual psychotherapy cases, 248 (38%) were identified as psychological evaluation cases, 80 (12%) were identified as utilizing both individual psychotherapy and psychological evaluation services and 36 (6%) were identified as seeking couples psychotherapy.

The data from the adult cases receiving either psychotherapy only or the combined psychotherapy and psychological evaluation were extracted for analysis of the duration of therapeutic treatment. All cases were screened according to the inclusion/exclusion criteria for the original TSS. Due to the exclusion criteria of the Time-series study, four (2%) cases were identified on intake as presenting with a psychotic disorder and were excluded from further analysis. Six (3%) cases were excluded because they were referred out to another service agency promptly after intake. One case was excluded due to missing psychotherapy duration data. The remaining cohort of 358 cases included 140 (39%) males and 218 (61%) females. It was a predominantly Caucasian sample (n=329, 92%) with only 12 (3%) African American, 6 (2%) Hispanic, 3 (1%) Asian, and 2 (<1%) individuals were of mixed or other ethnicity. Only 6 (2%) cases were missing data for ethnicity.

192 cases presented to the UT Psychological clinic between 3/1/00 and 2/28/02 and 166 cases presented during the following two years between 3/1/02 and 2/28/04. Of the 166 cases, 50 (30%) were identified as time-series cases. Data describing the demographic and clinical characteristics for each of the groups is presented in Tables A-3 and A-4.

## **Setting**

The University of Tennessee Psychological Clinic is situated in Knoxville Tennessee and provides services to both students at the university and to members of the general community. It is a fee-for-service clinic with a sliding scale fee schedule based on household income. Private insurance is not accepted. The clinic is staffed by second through fifth year doctoral students in an American Psychological Association approved Clinical Psychology program. The students are supervised by licensed clinical psychologists who primarily utilize psychodynamic, cognitive behavioral, behavioral and integrative/eclectic approaches. Only psychotherapeutic services and psychological evaluations are provided by the facility; no medications are dispensed via the clinic.

## **Procedures**

Data was collected through archival review of the records from all patients seeking psychotherapy at the UT Psychological Clinic from March 2000 to March 2004. All psychotherapy cases were reviewed and coded by the primary investigator, a graduate student in the Department of Psychology. Demographic data was collected from the demographics sheet that is completed by patients at the time of their intake appointment. Additional data was gathered from the intake form generated by the clinician during the intake interview. Information regarding reasons for termination was taken from the termination summary and/or case notes when available. Data related to fees for services and duration of treatment was also collected via the clinic ledger. Clinical data from the SCL 90 and the MMPI 2 was also available for most of the patients.

The final psychotherapy session was used as the date of termination for cases that were no longer in treatment. The reason for the termination from the termination summary, which was written by the therapist once the treatment had concluded, was also collected. Terminations were coded as either a mutually-planned termination or an unplanned termination. A mutually-planned termination was defined as a termination that resulted when the patient attended a final session on a date *previously* set by both patient and therapist during the course of the therapy because some level of satisfactory improvement in the patient's functioning or symptomatology was achieved. Because this is a university clinic, terminations that resulted from the therapist leaving were also classified as mutually terminated *if* the therapist's departure has been discussed in the treatment *and* if the patient shows up for the final scheduled session. This type of termination was included here as a mutual termination because most patients that clearly need psychiatric services at the time of the therapist's departure (and express being open to being transferred) are usually transferred to another therapist. Thus, terminations that were scheduled due to the departure of the therapists might be better categorized as mutual because it is likely that either enough treatment gains had been made to warrant not transferring the patient or that the patient may be satisfied with the progress they have made thus far. We defined an unplanned termination as any other reason why a patient may choose, or may not be able, to continue psychotherapy.

Any sessions completed by active cases after 10/31/02 for the PTS group and after 10/31/04 for the NTS and TS groups were not considered in order to maintain a stable time frame across cases. Cases that have not been terminated were coded as

“active” and were treated as censored cases by SA. Despite clear differences in the nature of these types of termination, a mutually-planned termination does not necessarily mean that the treatment was successful in meeting all the treatment goals. Likewise, it is important to recognize that an early, unplanned termination does not necessarily mean that the treatment was a failure. In order to better quantify clinical change over the course of the treatment, the Axis V Global Assessment of Functioning (GAF) score from both the intake and Termination Summary was also collected.

Sixty one (17% percent) of the cases were randomly selected to be coded by a second graduate student rater to determine reliability of measurement. Only the following variables were tested for reliability due to the nature of their coding: suicidal ideation at time of intake, type of therapy administered, reason for termination, how the patient terminated, and duration of treatment from case note review. Rater agreement was calculated using Cohen’s Kappa for categorical variables and Intraclass Correlation Coefficients for continuous variables (see Tables A-5 & A-6). Interrater reliability was established for each of the variables.

The data for duration of treatment that was collected from case notes and from the clinic ledger were compared. Examination of these data suggested that the duration of treatment from the case notes was likely to underestimate the true duration of treatment. This underestimation is likely due to missing case notes. Thus the data from the clinic ledger were subject to analysis. In the rare instances (N=5) where the data from the ledger was not available, the duration of treatment from the case notes was used to replace the missing values.

## **Statistical Power**

Once the data had been collected, we found that 50 subjects were in the TS group, 116 were in the NTS and 192 were in the PTS group. A power analysis was computed to determine the effect size that would be reliably detectable with the smallest of the available sample sizes (i.e., the NTS and TS groups). The null hypothesis will be rejected if the event rate for the NTS group is 0.50 vs. 0.74 in the TS group. This is the equivalent of the TS group being 2.81 times more likely to drop out than the NTS group.

Given the estimates published by Singer and Willett (1991), SA will allow us to detect an effect of 2.0 with approximately 80 subjects (assuming equal sample sizes). A treatment effect size of 2.0 would mean that one group attended twice as many sessions as the other. Again, the power analysis was computed for the comparisons using the smaller sample sizes (i.e., the TS and NTS groups). The analysis indicated that this design had sufficient power (0.80) to detect a difference in the hazard rates of 0.116 vs. 0.070, with a 2-tailed alpha. This would be the equivalent of a four-session difference between groups. In other words, 80% of studies would be expected to yield a significant effect, and reject the null hypothesis that the hazard ratio is 1.0 given these parameters. Unfortunately, due to the presence of missing values, some analyses may still lack sufficient power to detect effect sizes below 2.0 using SA. The detection of a four to six session decrease in session duration is likely to have a significant negative impact on a private practitioner's time and income. Given the results of Anderson and Lambert (2001), a four to six session increase in duration might allow more patients to achieve clinically significant change.

To compensate for this, we used Analysis of Covariance (ANCOVA) procedures to detect group differences. In order to use ANCOVA to analyze these data, the last session before the established data collection date must be specified as the final “termination” session. As stated earlier, the results from the ANCOVA may be somewhat biased due the necessity to establish a proxy termination date for the continuing cases.

A secondary power analysis was computed to determine the sensitivity of the ANCOVA procedure given the expected data parameters. Given the TS group sample size of 50, the test had significant power (0.80) to detect a medium effect size of 0.25. Unfortunately, given the restricted N sizes of the available data, smaller effects may not be detectable. Again, these power estimates are somewhat liberal and the presence of missing data may decrease power in some analyses.

### **Data Analysis**

The present study combines survival analyses with additional, supplemental conventional statistical analyses to investigate the possible relationship between inclusion in a study utilizing intensive, self-report questionnaire, data collection and duration of treatment in a population of patients seeking psychotherapy at a university psychological clinic. Preliminary analyses were conducted in order to determine if the data met the required assumptions for each test. Violations of these assumptions and data transformations are reported in the results section.

A series of Chi Square, ANOVA procedures were performed on a number of demographic and clinical variables to highlight any prior statistically significant differences prior to the core analyses.

The first research questions regarding dropout after intake are answered using a combination of Chi Square analyses and logistic regression. A Chi Square was performed to determine if there were significant differences in the frequency of first session no shows across the three groups (TS, NTS, PTS). Next, logistic regression models were used to predict first-session dropout and continuation in treatment after intake. The dependent variable “*continue after intake*” was dichotomized as 0 = No and 1 = Yes. The independent variables included 1) *education*, 2) *occupational status* as coded by the Hollingshead Four Factor Index of Social Status (Hollingshead, 1976), 3) *race*, and 4) “*time-series participation*” (0 = No and 1 = Yes). *Yearly income* was not included as a predictor variable due to the frequency of missing data (n=72, 20% of sample) and some concerns regarding the validity of patients report. Model 1, a three variable model (*education + occupational status + race + constant = “continue after intake”*) was tested first followed by Model 2, using all four variables (*education + occupational status + race + “time-series participation” + constant = “continue after intake”*). In order to maintain the integrity of the variable for “*time-series participation*” as a dichotomous variable representing yes or no, separate analyses were conducted for the TS and NTS groups and the TS and PTS groups.

Analysis of the duration of treatment utilized several statistical methods to analyze the data, namely, the Cox Proportional Hazards Regression Model (a form of

SA), Chi Square and ANCOVA. Only those patients who presented for at least one therapy session were included in the analysis. Using the Cox Proportional Hazards Regression Model, the dependent variable is the cumulative hazard function. The predictor variables will again include 1) *education*, 2) *occupational status*, 3) *race*, and 4) “*time-series participation*” (0 = No and 1 = Yes). Model 1 was tested first followed by Model 2 using all four variables to determine which best predicts the hazard rate. Once again, data from the TS and NTS groups were compared followed by a separate comparison of the TS and PTS group. Due to a potential lack of statistical power, we also employed ANCOVA to detect significant differences in mean duration to supplement the SA. *Education*, *occupational status*, and *race* will be used as covariates in the analyses. We calculated a cutoff to dichotomize duration of therapy as less than 12 sessions or continuance beyond 12 sessions. A Chi Square was computed to determine if the three groups differ in regard to frequency of dropout before 12 sessions or continuance beyond 12 sessions.

Finally, a Chi Square analysis was performed to detect significant differences in the frequency of active cases, mutually planned and unplanned terminations (overall) in each of the three groups. Although an ANCOVA is the ideal test to detect significant differences in GAF scores at termination between the TS, NTS and PTS groups, the data violated the assumption for homogeneity of regression. Thus, GAF change was computed (GAF at termination – GAF at intake) and was analyzed with ANOVA.



## CHAPTER III

### RESULTS

#### Group Comparisons of Demographic and Clinical Characteristics

The demographic characteristics and clinical presentation of the cases at the time of intake were examined to determine if there were significant differences between the TS, NTS and PTS groups that may need to be controlled for in later analyses. Chi Square analyses were computed for categorical variables. A 1 X 3 ANOVA was conducted for the normally distributed continuous variables. Data for the variable “fee at first session” was determined to have a non-normal distribution and was thus analyzed using a Kruskal-Wallis nonparametric test.

Chi Square analyses detected no statistically significant differences between the PTS, NTS and TS groups for sex  $\chi^2 (2, N= 358) = 1.05, p = 0.59$ , marital status  $\chi^2 (8, N= 357) = 7.32, p = 0.50$ , employment status  $\chi^2 (4, N= 353) = 1.78, p = 0.78$ , current student status  $\chi^2 (4, N= 345) = 6.80, p = .15$ , current/expected legal involvement  $\chi^2 (2, N= 348) = 0.33, p = .85$ , number of reported medical problems  $\chi^2 (6, N= 354) = 8.40, p = 0.21$ , current alcohol use  $\chi^2 (2, N= 350) = 1.62, p = 0.45$ , current drug use  $\chi^2 (2, N= 349) = 0.29, p = 0.86$ , or current suicidal ideation  $\chi^2 (2, N= 356) = 4.17, p = 0.12$ . Due to the lack of ethnic variance treated at the clinic, the categories for ethnicity were collapsed to 0 = Caucasian and 1= Minority. When collapsed, the Chi Square for ethnicity was not significant  $\chi^2 (2, N= 358) = 0.18, p = 0.92$ .

In respect to diagnostic variables at the time of intake, there appeared to be no significant differences in the distribution of patients diagnosed at time of intake with a mood disorder,  $\chi^2 (2, N= 337) = 5.70, p = 0.06$ , an anxiety disorder,  $\chi^2 (2, N= 337) = 1.75, p = 0.42$ , or another Axis I disorder,  $\chi^2 (2, N= 337) = 1.52, p = 0.47$ . A Chi Square was not computed for Axis II diagnostic categories because most of the cases received a diagnosis of “799.9 Diagnosis Deferred on Axis II” on intake.

Examination of the 1 X 3 ANOVAs indicated no significant differences in mean age,  $F [2,357] = 0.88, p = 0.41$ , education  $F [2,349] = 2.04, p = 0.13$  for therapist rated estimation of the patient’s motivation for change at the time of intake  $F [2,327] = 1.13, p = 0.32$  or for the Global Assessment of Functioning (GAF) score  $F [2,305] = 0.05, p = 0.95$  on intake. The groups also did not demonstrate statistically significant differences on the patient’s Global Severity Index (GSI)  $F [2,329] = 0.78, p = 0.46$  on the SCL-90 or on the Ego Strength  $F [2,195] = 1.42, p = 0.24$ , or Negative Treatment Indicator  $F [2,195] = 1.61, p = 0.20$ , scales on the MMPI II. There also appeared to be no significant differences in the fee that was set for the first session of therapy  $\chi^2 (2, N= 322) = 3.20, p = 0.20$  (see Table A-7).

However, a statistically significant difference between the groups was detected in respect to one variable. As mentioned earlier, some patients received only psychotherapy while other received a combination of therapy and psychological evaluation. A Chi Square analysis indicated that patients in the TS and PTS groups were referred for both psychotherapy and psychological evaluation more frequently than the NTS group  $\chi^2 (2, N= 358) = 10.50, p < 0.01$ .

### **Analysis of Data Related to Return After Intake**

We first wished to examine if there were differences between the three groups in regards to the patient's attendance of a first session after the initial intake interview. A Chi Square analysis indicated no significant differences in the frequency of patients who began therapy after intake between the three groups,  $\chi^2 (2, N= 358) = 0.24, p = .89$ .

Table A-8 displays the frequencies of these data.

Next, Model 1 and Model 2 were tested using forced entry logistic regressions. The TS and NTS groups were examined first, followed by the analysis of the TS and PTS groups. (N sizes were adjusted due to the presence of missing values in the predictor variables.) Model 1 including only the three demographic variables was not significantly reliable  $\chi^2 (12, N= 146) = 20.34, p = 0.06$ . This model accounted for between 13 and 20 % of the variance in continuation status, with 94.8% of the continuers successfully predicted. However only 22.6% of the dropouts were successfully predicted. Overall, 79.5% of the predictions were accurate in this model. When "*time-series participation*" was added to in Model 2, this model was also non-significant and there was no significant improvement in predictive power  $\chi^2 (13, N= 146) = 20.43, p = 0.09$ . Model 2 was also estimated to account for between 13 and 20% of the variance in continuation status. As with Model 1, 94.8% of the continuers were successfully predicted, but only 29% of the dropouts were correctly classified. Despite the addition of the fourth variable, Model 2 performed only slightly better than Model 1 with 80.8% of the overall predictions being correctly classified. Table A-9 displays frequencies of the categorical variables, the

coefficients, Wald statistic, the odds ratio and the probability values for each of the predictor variables and levels of the categorical predictor variables in these two models.

Using the cohort of the PTS and TS groups, Model 1,  $\chi^2 (12, N= 220) = 17.87, p = 0.12$  and Model 2,  $\chi^2 (13, N= 220) = 17.91, p = 0.16$  were both unreliable predictors of return. The results of these analyses are summarized in Table A-10.

In a supplemental analysis, each of the four variables were tested individually to determine if any were significant predictors of return after intake. A model using only the variable “*time-series participation*” (Model 3) proved to be a poor predictor of return after intake for both combinations of groupings; TS & NTS  $\chi^2 (1, N= 147) = 0.10, p = .75$ , TS and PTS  $\chi^2 (1, N= 225) = 0.02, p = 0.90$ . Of the other variables, only *occupational status* was a reliable predictor  $\chi^2 (10, N= 154) = 21.41, p = 0.02$  for the NTS and TS cohort. This one variable model accounted for between 13 and 19.9% of the variance in continuation status.

A power analysis was computed to determine the sample sizes that would be needed for “*time-series participation*” to be a significant predictor of beginning therapy after the initial intake interview. Using the parameters generated from the model using only “*time-series participation*”, over 61,000 subjects would be needed in the TS/NTS sample, and over 74,000 subjects would be needed in the TS/PTS sample to make these effect sizes significant.

### **Survival Analysis of Data Related to Duration of Psychotherapy**

A series of preliminary Kaplan Meier SA procedures were performed to identify the number of sessions for 75%, 50% and 25% of the patients for each of the three groups. These data are displayed in Table A-11. These procedures also generated plots of cumulative survival and cumulative hazard for each of the three groups (see Figures B-1 and B-2).

To investigate the presence of significant differences in the hazard rates (i.e., the rates of dropout) between the three groups a series of Cox Proportional Hazards Regression Model SA was performed using the same predictor models used in the logistic regressions. Again, to simplify the interpretation of the results the analyses were conducted separately for the TS and NTS groups and the for the TS and PTS groups. Because we are now interested in predicting the hazard rate of psychotherapy, cases that did not return after intake were excluded from these analyses.

Model 1 was significantly reliable  $\chi^2 (12, N= 114) = 21.45, p = 0.04$  in predicting the hazard rate using the NTS and TS cohort. When “time-series participation” was added in Model 2, it remained significant  $\chi^2 (13, N= 114) = 24.03, p = 0.03$ . However, the variable “*time-series participation*” was not a statistically significant predictor of the hazard rate in either model. *Race* was a significant predictor in both models, while *education* was significant only in Model 1. In the combined TS and PTS cohort, neither Model 1  $\chi^2 (12, N= 179) = 16.31, p = 0.18$ , nor Model 2  $\chi^2 (13, N= 179) = 17.03, p = 0.20$  were significantly reliable. Tables A-12 and A-13 display the frequencies of the categorical variables, the coefficients, Wald statistic, the odds ratio and the probability

values for each of the predictor variables and levels of the categorical predictor variables in these two models.

Once again, we tested a model (Model 3) using “*time-series participation*” as the only predictor variable. The model was not a significantly reliable predictor of the hazard rate using either cohort; TS/NTS  $\chi^2 (1, N= 130) = 0.49, p = 0.48$ ; TS/PTS  $\chi^2 (1, N= 194) = 0.93, p = 0.33$ .

A power analysis was computed to determine the sample sizes that would be needed for “*time-series participation*” to be a significant predictor of hazard. Using the parameters generated from Kaplan Meier procedures, approximately 202 subjects (47 more subjects in the TS group) would be needed in the TS/NTS sample, and approximately 352 subjects (158 more subjects in the TS group) would be needed in the TS/PTS sample to make these effect sizes significant.

To supplement the SA, a series of ANCOVAs were conducted using education, occupational status and race as covariates. Group status was designated as the independent variable and duration of treatment was the dependent variable. Due to its non-normal distribution, the duration of treatment data was log transformed prior to analysis. As mentioned above, ANCOVA procedures do not adjust for cases that continued in psychotherapy (i.e., did not drop out or have a planned termination) beyond the cutoff for data collection. The total number of sessions at the time of the data collection cutoff was used as the length of treatment. Thus, the calculated mean will be an underestimate of the true mean of the sample. These procedures indicated no statistically significant differences between the three groups  $F [2,256] = 1.02, p = 0.36$ .

Table A-14 displays the group means and log transformed group means used in these analyses.

Next, a Chi Square was performed to determine if there were significant differences between the three groups in regard to the number of subjects who dropped out before 12 sessions. There were no statistically significant differences between the three groups in regard to the frequency of cases that dropped out before 12 sessions  $\chi^2 (2, N=286) = 2.70, p = 0.26$  (see Table A-15). Figures B-3 and B-4 present the cumulative survival and cumulative hazard plots for the first 12 sessions.

Finally, because the earlier Chi Square analyses indicated that the NTS group had significantly fewer patients that received the combination of psychotherapy and psychological evaluation services, an additional series of Cox Proportional Hazard Regression Models was performed. In these analyses, a variable indicating that the patient was referred for an evaluation (*eval*; 0=No, 1=Yes) was designated as a predictor of the hazard rate. The one predictor model was not significant for the TS/NTS cohort  $\chi^2 (1, N= 130) = 1.72, p = 0.19$ , but was a significant predictor of hazard for the TS/PTS cohort  $\chi^2 (1, N= 194) = 11.06, p = 0.001$  ( $B = -0.30$ ,  $Wald=10.75$ ,  $df = 1$ ,  $odds\ ratio = 0.74, p=0.001$ ). These results suggest that for the TS/PTS cohort, patients who were referred for both psychotherapy and the evaluation were more likely to stay in treatment than those patients who only were provided psychotherapeutic services. Cox Proportional Hazards Regression Models using a conditional backwards method were then performed for both the TS/NTS and the TS/PTS cohorts. The “*eval*” variable was added to the other four predictor variables in Model 2 (*education, occupational status,*

*race* and “*time-series participation*”). In both cohorts, “*time-series participation*” was determined to be an insignificant predictor of hazard, and was dropped from the models.

### **Analyses of Data Related to the Type of Termination**

It was hypothesized that inclusion in time-series research may be related to the probability of dropping out of psychotherapy. Once again, only the cases that attended at least one psychotherapy session were included in these analyses. A Chi Square indicated no significant differences in the frequency of dropouts, planned terminations or active cases across the three groups  $\chi^2 (4, N= 285) = 0.67, p = 0.96$  (see Table A-16).

### **Analyses of Data Related to Clinical Improvement**

Finally, it seemed possible that there may be a relationship between time-series participation and clinical improvement at the time of termination as measured by change in GAF. First, the data were examined to determine if all assumptions were met to analyze the data using ANCOVA. These preliminary analyses revealed that the assumption for homogeneity of regression was violated. Thus, the ANCOVA procedure was not used for this analysis due to inflation of Type II error when the assumption is violated. Instead of controlling for GAF score at the time of intake, we calculated GAF change (GAF at termination minus GAF at intake). A one-way ANOVA of this GAF change variable demonstrated no significant differences between the three groups,  $F [2,99] = 0.048, p = 0.95$ . Means and standard deviations are presented in Table A-17.



## **CHAPTER IV**

### **DISCUSSION**

The present study endeavored to examine the possible relationship between collecting time-series data for research purposes and the length of treatment in three groups of patients at a university based psychological clinic. When implementation of a time-series study was first proposed to student therapists at the University of Tennessee Psychological Clinic, there was some reluctance on the part of the therapists to have their patients participate due to concerns that it would be too much of a bother for the patient. The question, “How is participation in this study going to affect my patient’s attendance in therapy?” was asked by many of the student therapists. The assumption was that it should have no effect on the rate of dropout, but little research addressing this question could be found in the literature. It is expected that some private practice clinicians “in the trenches” may have the same hesitation about beginning time-series research with their patients. As the scientific community continues to support time-series research conducted by private practitioners, it seems necessary to determine if there is a relationship between time-series data collection and duration of treatment. This study was a first step in providing such information to therapists to ease (or confirm) their assumptions about the impact of this type and amount of research participation.

Due to the fact that subject randomization was not possible, numerous variables were analyzed to determine if there were statistically significant differences between the

groups. Although many of these variables are unlikely to be related to the duration of treatment, these procedures were conducted to get a sense of how similar the groups are. However, it is important to remember that a lack of statistically significant differences is not equivalent to having subjects randomly assigned to groups. Statistically non-significant group differences may still have exerted some influence, and these results should be interpreted with consideration to this caveat. These comparisons indicated that in most respects the NTS, PTS and TS groups were not statistically different with one critical exception. The frequency of patients referred for both psychotherapy and a psychological evaluation in the TS and PTS groups appeared to be significantly higher than in the NTS cohort. This finding adds a potential twist to the interpretation of the latter analyses. Although psychological testing and data collection for time-series research are not necessarily equivalent, both involve additional effort on behalf of the patient. The presence of this difference is a potentially critical confound and its possible influence will be addressed when relevant to the interpretation of the core analyses. Alternatively, this significant finding could be due to the fact that 21 group comparisons were conducted in order to identify potential confounds. Under normal circumstances, the p-values for each test would be adjusted using a Bonferroni Correction. In our case, we wanted to be sensitive to any preexisting group differences, and thus this correction was not applied.

The two models used to predict patient dropout after intake proved to be unreliable. However, the p-values of these models were approaching significance, and the limitations of the sample sizes available may have contributed to the non-significant

results. The construct of interest however, participation in time-series research, was clearly an insignificant predictor in these models. If there truly is a relationship between time-series participation and dropout after intake, the supplementary power analyses suggest that the private practitioner would be unlikely to have contact with enough patients to notice any difference.

Although occupational status as coded by the Hollingshead did demonstrate some predictive power in regard to continuation after intake, no clear patterns emerged based on the levels of the categorical variable. In regard to continuation after intake, the presence of the significant group differences (in the frequency of referral for therapy plus evaluation) is unlikely to have had much of an influence on these results. The frequencies of dropout after intake for the three groups (19.3% = PTS, 21.6% = NTS, and 20.0% = TS) are similar but universally higher than those reported Renk & Dinger, (2002) at another university clinic (15.6%).

As seen in Figures B-1 and B-2, the cumulative survival and cumulative hazard plots appear to be very similar for the three groups. However, examination of the survival quartiles, begins to paint a different picture (see Table A-11). Although statistically insignificant according to both the ANCOVA and Cox Proportional Hazard Regression procedures, the median number of sessions for the time-series group is universally higher than that of the other groups at every quartile. It is possible that the small sample size of the TS group may not provide us with enough power to detect this level of effect and thus we may be making a type II error. However, at present it is just as likely that these minute differences are driven by factors other than participation in

time-series research. The limitations of quasi-experiments come into consideration here. The slight elevations could be due to other considerations such as sampling bias. It is possible that some patients were selected to be time-series subjects because they exhibited characteristics of a “good patient” at the time of intake. It is also possible that the therapists, who were not blind to the patient’s participation in the study, made some concessions or treated the patient differently than their ordinary client. Furthermore, the presence of significant group differences in the frequency of referral for therapy and evaluation should also be considered as a potential confound. If the patient received a therapeutic assessment, the experience may have heightened their expectations about therapy, leading to longer survival times. However, if this were the only main effect we would expect the PTS group to have longer survival than the NTS group as well (because both the TS and PTS groups received approximately the same frequency of evaluations). Because this is not the case, there is likely to be a hidden interaction effect that causing the significant differences.

In regard to the other predictors of psychotherapy hazard, the results here are consistent with the sporadic significant relationships described in the literature (Garfield, 1994). More specifically, race and education demonstrated some significant predictive capacity in the TS/NTS cohort. However, this relationship was not evident in the analysis of the TS and PTS groups. Furthermore, both minority status and lower levels of education were related to higher rates of hazard as supported in the literature (Garfield, 1994; Kahn & Heiman, 1978; Rosenthal & Frank, 1958; Sue et al., 1976; Wierzbicki and Pekarik, 1993). The reasons for these inconsistent relationships are unclear. It is likely

that the significant relationship in the TS/NTS groups may be a spurious result of the lack of racial diversity in the sample. Essentially, this relationship is based on the treatment duration of only 5 minority patients. The fact that the relationship between education and hazard is significant in the TS/NTS group but not for the TS/PTS group is enigmatic, and may be a result of more subtle, preexisting group differences.

The analyses provided no evidence that time-series participation has an influence on the frequency of premature termination or mutual termination across the groups. Likewise, analysis of patients change in GAF scores did not support the hypothesis that time-series participation may influence the effectiveness of psychotherapy. This finding is not surprising considering the fact that subjects were told that the time-series self-reports were not going to be seen by their therapist and were not going to be incorporated into their treatment. If the therapist and patient spent some time to discuss what the patient had endorsed on the self-reports in the session, we might expect more of a relationship between time-series participation and change in GAF score.

At this point, it seems that the concerns of the student clinicians can be dismissed. Time-series does not appear to be related to the patient's initiation of therapy, the duration of treatment or to an increased likelihood to terminate treatment prematurely. Furthermore, there is minor evidence suggesting that if a relationship between time-series participation and duration of treatment does exist, it may actually serve to lengthen the number of sessions that the patient stays in treatment. It is likely that participation in this type of research accounts for only a very small portion of the variance in duration of treatment. As suggested by Piper et al. (1999), the more relationally based features of

psychotherapy, such as therapeutic alliance, may be the elements that influence the patient to drop out or remain in the therapeutic relationship.

Although these results may generalize to other populations and settings, several details must be considered. First, the subjects were a convenient sample that may not accurately represent individuals seeking psychotherapy services from other clinics, or the patients that are seen by private practitioners. Second, the time-series study scrutinized here, utilized a twice-a-week assessment schedule and consisted of a total of 120 self-report items. It seems very unlikely that decreasing the frequency of assessment or the number of items will have any impact on psychotherapy retention or termination. However, more intense assessment, including very closely spaced repeated measures or more lengthy questionnaires, might indeed impact treatment duration. Until this topic can be scrutinized with more rigor, it might be useful to use the level of subject participation (i.e., 120 items twice-a-week) in this study as a preliminary benchmark. Assessment schedules that fall below this level of subject involvement are probably unlikely to significantly impact treatment in small samples of patients.

If private practice clinicians do wish to utilize this research design, they may want to hand-tailor studies for each individual based on their initial assessment of the patients capacities rather than using a standardized procedure as in this study. Some individuals may not have the cognitive abilities, motivation or frustration tolerance to be able to complete long and involved self-report forms. These limitations may be important factors when designing an N of 1 study that will monitor the patient over a sustained period of time. Obviously, all patients should be informed that completion of the

measures is voluntary and that if they decide to stop, they may nonetheless remain in therapy. With some patients, increasing research demands may only push the research subject to terminate the research, but not psychotherapy. The subject's option to discontinue psychotherapy process research may be sufficient to protect the therapeutic relationship.

Although the distinction between research participation and treatment may be necessary for some patients, participation and compliance may be enhanced by fully integrating the assessments into the treatment. By explaining to the patient that their diligence with the self-report is an important part of their treatment and by giving them feedback to summarize the data over the course of the treatment, the patient may not even acknowledge that the self-report schedule is an additional burden. Although speculative, it seems possible that even if completing time-series assessments does have some small, negative influence on therapy, it may be negated by the benefit of the therapist's ability to monitor alliance and relational variables (that may account for more of the variance in duration of treatment) and make adjustments to the treatment based on this information. Additionally, although the results here demonstrate no clear effect for a somewhat laborious participation, the clinician should attempt to keep the measurements pithy and closely related to the constructs of interest.

### **Limitations of the Current Study**

The current study had several limitations that should be taken into consideration when interpreting these data. Most importantly, the study is quasi-experimental due to

the fact that it was not feasible to randomly assign subjects to treatment groups. With this type of research design, there is the potential for hidden significant differences between the PTS, NTS and TS groups that may have influenced the results of this study. Unfortunately, quasi-experiments can only yield minimal support for a causal relationship due to the lack of random assignment. Although care was taken to collect data on features of the groups that were the most likely to be influential to the duration of psychotherapy, it is possible that some constructs were not measured, coded or controlled for in the statistical analysis. Thus, the NTS and PTS groups are not pure control groups, but merely comparison groups. The NTS group is potentially a mixture of patients who were not asked to be in the study, and those who refused to participate in the time-series study. For example, the participants in the time-series study were volunteers and it could not be determined from the case review how many of the NTS group might have been subjects who rejected inclusion in the time-series study. This information was never coded, and thus it is possible that patients who refused would be better classified as a fourth group. Additionally, the PTS group is not a perfect control group as it is confounded by time. Though these factors potentially compromise the findings of the study, it is unlikely that they would have pushed the results of these analyses towards statistical significance. Future research may be able to improve upon this problem by randomly assigning subjects to treatment groups.

Another limitation of the study was the small sample sizes that were available for analysis. Unfortunately, the group of interest, the TS group, was the smallest of the three groups. With the given sample sizes, the study lacked significant statistical power to



detect small to medium effects. The inclusion of more subjects could prove to be more revealing. Currently, it is unlikely that many other large samples of time-series subjects exist. However, as these designs continue to gain scientific credibility and exposure, larger samples may become available for analysis.

The sample itself also turned out to be rather homogeneous in regards to several variables, including race. Although there may be some relationship between psychotherapy duration and different racial background, these data did not provide enough diversity to allow us to look at each race separately.

A final limitation lies in the fact that these data were collected from case reviews. Often the patients provided their own demographic data on the intake forms. Unfortunately, there were frequent omissions, an obvious concern in this study. In addition, the clinicians themselves also omitted critical data relevant to diagnosis, type of treatment utilized, and made errors of omission when recording treatment sessions in the patient's record. Although it was the only variable related to psychotherapy outcome that was readily available, there are some problems with using arbitrary metrics such as the GAF scores to measure outcome (Kazdin, 2006). Specifically, GAF scores and GAF change may not account for any significant change in the patient's symptoms or behavior. Furthermore, GAF scores at the time of intake and termination were often not coded by the same therapist. Hence, this variable may be unreliable, and/or could be an invalid estimator of the patient's clinical change. While this study attempted to gather its information from multiple sources in the patient's record and from the clinic's financial records to compensate for these problems, in some instances missing data decreased the

statistical power of the study and may have skewed the results. This is particularly true of the results of the analyses utilizing patient demographics as covariates. Future studies that utilize complete demographics information may find different results.

## **Conclusion**

It was my hope to blend aspects of both science and clinical practice in this dissertation. Although the results of this study are non-significant, I feel that this area of research is important to help scientists and clinicians practice competent research design. My conclusions can only be tentative given the limitations of the study. For now, it appears that a considerable amount of data collection can be gleaned from the psychotherapy patient without clearly affecting the duration of the therapeutic treatment. However, the results of the study are probably best used as a guide to inform future research rather than an argument that data collection has no impact on the duration of treatment. It is an obvious truism that each patient comes to psychotherapy with their own individual differences that may make them more or less susceptible to a range of potential outside influences. Reflecting on this idea, it became clear to me that there is another hidden strength of time-series research. Essentially, an N of 1 time-series design are much more flexible than research designs using group comparisons and can be specifically crafted to meet the clinical needs of the clinician and the individual characteristics of the patient. Extensions of this area of research may help scientists and practitioners to carefully construct time-series cases studies that are rigorous, informative and minimally burdensome to the patient.

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## **APPENDICES**

## **APPENDIX A: TABLES**

**Table A-1**

**Duration of Therapy Data for Five Fictitious Subjects**

Subject	Week	Status
1	3	1
2	5	1
3	6	0
4	7	1
5	12	1

**Table A-2**

**Calculations of Cumulative Survival in Psychotherapy  
for Five Fictitious Subjects**

Subject	Week	Status	Prior number in Remission	# Remaining	Proportion in Remission	Cumulative Survival
1	3	1	5	4	4/5	4/5=0.80
2	5	1	4	3	3/4	0.8 x (3/4)=0.6
3	6	0	3	2	(N/A)	
4	7	1	2	1	1/2	0.6 x (1/2)=0.3
5	12	1	1	-	-	-

**Table A-3**

**Demographic Characteristics of Three Groups of Patients  
Seeking Psychotherapy at a University Clinic**

Variable	Group						
	PTS		NTS		TS		Total
	N	Percent	N	Percent	N	Percent	N
Sex:							
Male	74	38.5%	49	42.2%	17	34.0%	140
Female	118	61.5%	67	57.8%	33	66.0%	218
Race:							
Caucasian	175	92.6%	108	94.7%	46	93.9%	329
African Am	8	4.2%	2	1.8%	2	4.1%	12
Hispanic	3	1.6%	2	1.8%	1	2.0%	6
Asian	3	1.6%	0	0%	0	0%	3
Other	0	0%	2	1.8%	0	0%	2
Marital Status:							
Single	101	52.9%	61	52.6%	32	64.0%	194
Married	32	16.8%	22	19.0%	7	14.0%	61
Divorced	34	17.8%	22	19.0%	7	14.0%	63
Separated	20	10.5%	6	5.2%	4	8.0%	30
Widowed	4	2.1%	5	4.3%	0	0.0%	9
Education:							
Grammar	2	1.1%	0	0.0%	0	0.0%	2
Some HS	15	7.9%	7	6.3%	0	0.0%	22
HS Grad/GED	54	28.6%	32	28.8%	15	30.0%	101
AA/Some College	63	33.3%	46	41.4%	17	34.0%	126
BA/BS or Equiv	40	21.2%	45	13.5%	12	24.0%	67
Some Grad School	13	6.9%	9	8.1%	3	6.0%	25
MA/MS or Equiv	1	0.5%	0	0.00%	1	2.0%	2
Ph.D./MD or Equiv	1	0.5%	2	1.8%	2	4.0%	5
Current Employment:							
Full	65	34.0%	35	31.0%	18	36.7%	118
Part	53	27.7%	29	25.7%	15	30.6%	97
Not Employed	73	38.2%	49	43.4%	16	32.7%	138
Current Student:							
Full	63	34.2%	30	26.8%	14	28.6%	107
Part	5	2.7%	5	4.5%	5	10.2%	15
No	116	63.0%	77	68.8%	30	61.2%	223
Current/Expected Legal involvement:							
Yes	34	18.0%	20	18.0%	7	14.6%	61
No	155	82.0%	91	82.0%	41	85.4%	287

**Table A-4**  
**Clinical Characteristics of Three Groups of Patients**  
**Seeking Psychotherapy at a University Clinic**

Variable	Group						
	PTS		NTS		TS		Total
	N	Percent	N	Percent	N	Percent	N
Current Alcohol Use:							
Yes	28	15.0%	14	12.2%	4	8.3%	46
No	159	85.0%	101	87.8%	44	91.7%	304
Current Drug Use:							
Yes	19	10.2%	14	12.2%	5	10.4%	38
No	167	89.8%	101	87.8%	43	89.6%	311
Current Suicidal Ideation:							
Yes	33	17.3%	21	18.1%	3	6.1%	57
No	158	82.7%	95	81.9%	46	93.9%	299
Number of Medical Problems Reported:							
None	122	64.9%	84	72.4%	34	68.0%	240
One	34	18.1%	20	17.2%	5	10.0%	59
Two	19	10.1%	7	6.0%	9	18.0%	35
Three or More	13	6.9%	5	4.3%	2	4.0%	20
Type of Therapy							
Psychodynamic	114	82.0%	57	75.0%	27	84.4%	198
CBT/DBT	4	2.9%	2	2.6%	0	0.0%	6
Behavioral	1	0.7%	0	0.0%	0	0.0%	1
Integrative	17	12.2%	15	19.7%	5	15.6%	37
Other	3	2.2%	2	2.6%	0	0.0%	5
Services Provided							
Therapy Only	139	72.4%	102	87.9%	37	74.0%	278
Therapy + Eval	53	27.6%	14	12.1%	13	26.0%	80
Diagnosed with Mood Disorder on Intake							
Yes	76	42.0%	61	56.5%	23	47.9%	160
No	105	58.0%	41	43.5%	25	52.1%	177
Diagnosed with Anxiety Disorder on Intake							
Yes	40	22.1%	17	15.7%	10	20.8%	67
No	141	77.9%	91	84.3%	38	79.2%	270
Diagnosed with Other Disorder on Intake							
Yes	68	37.6%	33	30.6%	16	33.3%	117
No	113	62.4%	75	69.4%	32	66.7%	220
Diagnosed with Personality Disorder on Intake							
Yes	35	19.8%	17	15.9%	7	15.2%	59
No	36	20.3%	28	26.2%	4	8.7%	68
Deferred	106	59.9%	62	57.9%	35	76.1%	203

**Table A-5**

**Interrater Reliability Statistics:  
Cohen's Kappa Statistics for Categorical Variables**

Categorical Variables	Kappa	ASE	T-Value	P-Value
Suicidal Ideation	0.74	0.09	6.62	0.00
Type of therapy	0.72	0.08	7.58	0.00
Termination Type (Premature, Planned, Active)	0.80	0.11	6.22	0.00

**Table A-6**

**Interrater Reliability Statistics:  
Interclass Correlation Coefficients for Continuous Variables**

Continuous Variables	Intraclass Correlation Coefficient <sup>a</sup>	F	DF	P-Value
Duration of Treatment By Cut Off	0.99	3166.25	60,60	0.00

<sup>a</sup>Using absolute agreement definition

**Table A-7**  
**Means and Standard Deviations of Demographic and Clinical Variables**  
**for Three Groups of Patients at a University Clinic**

Variable	PTS		NTS		TS	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Age	29.52	(9.09)	30.14	(10.45)	30.43	(8.75)
Therapist's Estimate of Client's Motivation for Change	2.43	(0.71)	2.22	(0.72)	2.20	(0.61)
GAF at Intake	56.60	(10.42)	57.73	(11.38)	58.60	(9.81)
GSI	60.16	(13.97)	57.78	(11.06)	55.70	(12.38)
ES	37.40	(12.89)	39.24	(11.27)	41.57	(14.93)
TRT	63.11	(13.94)	59.90	(13.98)	57.13	(12.64)
Established Fee Per Session	16.55	(8.78)	16.84	(9.98)	19.17	(13.14)

**Table A-8**  
**Frequency (Percent) of First Session Dropout and Continuation in Treatment**  
**After Intake in Three Groups of Patients at a University Clinic**

Status	Group					
	PTS		NTS		TS	
	N	Percent	N	Percent	N	Percent
Dropout After Intake	37	19.3%	25	21.6%	10	20.0%
Continue After Intake	155	80.7%	91	78.4%	40	80.0%
Total	192	100.0%	116	100.0%	50	100.0%

**Table A-9**  
**Results of Logistic Regression Predicting Return After Intake For TS/NTS Groups**

Predictor Variable	Freq	$\beta$	Wald	Odds Ratio Exp ( $\beta$ )	P Value
<b>Model 1</b>					
Education		-0.19	0.01	0.98	0.93
Occupational Status					
Overall		-	13.87		0.18
<b>Disabled/Unemployed</b>	<b>22†</b>				
Menial Service	3	20.08	0.00	0.00	0.99
Unskilled	30	0.33	0.23	1.38	0.63
Semiskilled	8	-1.63	3.38	0.20	0.07
Skilled Manual	8	-1.12	1.66	0.33	0.20
Clerical/Sales	11	1.19	1.06	3.30	0.30
Technicians	19	0.39	0.26	1.47	0.61
Managers	19	1.79	2.43	5.99	0.12
Lesser Professionals	2	20.84	0.00	0.00	0.99
Major Professionals	3	-0.37	0.07	0.69	0.79
Students	21	0.85	1.12	2.35	0.29
Race					
<b>Caucasian</b>	<b>138†</b>				
Minority	8	-1.21	2.09	0.30	0.15
<b>Model 2</b>					
Education		-0.03	0.02	0.97	0.90
Occupational Status					
Overall		-	13.70		0.19
<b>Disabled/Unemployed</b>	<b>22†</b>				
Menial Service	3	20.07	0.00	0.00	0.99
Unskilled	30	0.31	0.22	1.37	0.64
Semiskilled	8	-1.61	3.30	0.20	0.07
Skilled Manual	8	-1.14	1.71	0.32	0.19
Clerical/Sales	11	1.18	1.03	3.25	0.31
Technicians	19	0.35	0.21	1.42	0.65
Managers	19	1.77	2.37	5.88	0.12
Lesser Professionals	2	20.89	0.00	0.00	0.99
Major Professionals	3	-0.36	0.07	0.70	0.80
Students	21	0.86	1.13	2.36	0.29
Race					
<b>Caucasian</b>	<b>138†</b>				
Minority	8	-1.22	2.12	0.30	0.15
Time-series Participation					
<b>NTS</b>	<b>76†</b>				
TS	38	0.15	0.10	1.16	0.76
<b>Model 3</b>					
Time-series Participation					
<b>NTS</b>	<b>116†</b>				
TS	20	0.09	0.05	1.10	0.82

†Reference Category



**Table A-10**  
**Results of Logistic Regression Predicting Return After Intake For TS/PTS Groups**

Predictor Variable	Freq	$\beta$	Wald	Odds Ratio Exp ( $\beta$ )	P Value
<b>Model 1</b>					
Education		-0.01	0.00	0.99	0.95
Occupational Status					
Overall		-	8.88		0.54
<b>Disabled/Unemployed</b>	<b>31†</b>				
Menial Service	2	-0.62	0.18	0.54	0.67
Unskilled	35	1.79	6.30	5.97	0.01
Semiskilled	11	0.94	1.15	2.55	0.28
Skilled Manual	21	1.23	2.83	3.43	0.09
Clerical/Sales	16	20.63	0.00	0.00	0.99
Technicians	35	0.68	1.28	1.97	0.26
Managers	30	1.02	2.57	2.78	0.11
Lesser Professionals	5	0.90	0.55	2.45	0.46
Major Professionals	3	20.62	0.00	0.00	0.99
Students	31	0.88	2.09	2.40	0.15
Race					
<b>Caucasian</b>	<b>204†</b>				
Minority	16	-0.50	0.62	0.60	0.43
<b>Model 2</b>					
Education		-0.01	0.00	0.99	0.97
Occupational Status					
Overall		-	8.86		0.55
<b>Disabled/Unemployed</b>	<b>31†</b>				
Menial Service	2	-0.59	0.16	0.56	0.69
Unskilled	35	1.80	6.34	6.03	0.01
Semiskilled	11	0.93	1.12	2.53	0.29
Skilled Manual	21	1.23	2.81	3.41	0.09
Clerical/Sales	16	20.64	0.00	0.00	0.99
Technicians	35	0.68	1.29	1.98	0.26
Managers	30	1.03	2.58	2.79	0.11
Lesser Professionals	5	0.87	0.52	2.39	0.47
Major Professionals	3	20.62	0.00	0.00	0.99
Students	31	0.87	2.06	2.39	0.15
Race					
<b>Caucasian</b>	<b>204†</b>				
Minority	16	-0.50	0.62	0.61	0.43
Time-series Participation					
<b>PTS</b>	<b>172†</b>				
TS	48	0.10	0.05	1.11	0.82
<b>Model 3</b>					
Time-series Participation					
<b>PTS</b>	<b>192†</b>				
TS	50	0.05	0.01	1.05	0.91

†Reference Category

**Table A-11**

**Number of Sessions Attended by 75%, 50% and 25% of the Clients  
at a University Psychological Clinic**

Group	Percentiles			Range	
	75%	50%	25%	Min	Max
Including First Session					
Dropouts					
NTS	1	6	22	0	115
PTS	1	5	22	0	211
TS	2	8	34	0	77
Excluding First Session					
Dropouts					
NTS	3	8	46	1	115
PTS	3	9	39	1	211
TS	7	13	60	1	77

**Table A-12**  
**Results of Cox Proportional Hazards Regression Models Predicting Hazard**  
**for Duration of Treatment for TS and NTS Groups**

Predictor Variable	Freq	$\beta$	Wald	Odds Ratio Exp ( $\beta$ )	P Value
<b>Model 1</b>					
Education		-0.23	3.95	0.80	0.05
Occupational Status					
Overall		-	12.04		0.28
<b>Disabled/Unemployed</b>	<b>16†</b>				
Menial Service	3	0.01	0.00	1.01	0.99
Unskilled	23	0.61	2.83	1.85	0.09
Semiskilled	3	-11.86	0.00	0.00	0.96
Skilled Manual	4	0.96	2.76	2.62	0.10
Clerical/Sales	10	0.40	0.68	1.49	0.41
Technicians	15	0.36	0.76	1.44	0.39
Managers	18	0.96	6.00	2.60	0.01
Lesser Professionals	2	-0.58	0.26	0.56	0.61
Major Professionals	2	0.99	1.57	2.70	0.21
Students	18	-0.12	0.08	0.89	0.78
Race					
<b>Caucasian</b>	<b>109†</b>				
Minority	5	1.12	4.48	3.07	0.03
<b>Model 2</b>					
Education		-0.21	3.29	0.81	0.07
Occupational Status					
Overall		-	13.25		0.21
<b>Disabled/Unemployed</b>	<b>16†</b>				
Menial Service	3	-0.02	0.00	0.98	0.98
Unskilled	23	0.68	3.44	1.98	0.06
Semiskilled	3	-11.82	0.00	0.00	0.96
Skilled Manual	4	1.06	3.27	2.87	0.07
Clerical/Sales	10	0.57	1.33	1.77	0.25
Technicians	15	0.44	1.10	1.55	0.30
Managers	18	1.01	6.64	2.75	0.01
Lesser Professionals	2	-0.77	0.46	0.46	0.50
Major Professionals	2	1.06	1.82	2.89	0.18
Students	18	-0.09	0.05	0.91	0.82
Race					
<b>Caucasian</b>	<b>109†</b>				
Minority	5	1.23	5.25	3.43	0.02
Time-series Participation					
<b>NTS</b>	<b>76†</b>				
TS	38	-0.36	2.22	0.70	0.14
<b>Model 3</b>					
Time-series Participation					
<b>NTS</b>	<b>91†</b>				
TS	39	-0.15	0.49	0.86	0.49

†Reference Category; Note: First session drop-outs not included.

**Table A-13**  
**Results of Cox Proportional Hazard Regression Models Predicting Hazard**  
**for Duration of Treatment For TS and PTS Groups**

Predictor Variable	Freq	$\beta$	Wald	Odds Ratio Exp ( $\beta$ )	P Value
<b>Model 1</b>					
Education		-0.04	0.14	0.96	0.71
Occupational Status					
Overall		-	9.60		0.48
<b>Disabled/Unemployed</b>	<b>20†</b>				
Menial Service	1	1.13	1.19	3.10	0.28
Unskilled	31	0.17	0.30	1.19	0.59
Semiskilled	9	0.37	0.72	1.45	0.40
Skilled Manual	18	0.13	0.15	1.14	0.70
Clerical/Sales	16	-0.52	1.57	0.59	0.21
Technicians	27	-0.47	1.46	0.63	0.23
Managers	25	-0.35	0.97	0.70	0.32
Lesser Professionals	4	0.43	0.56	1.54	0.46
Major Professionals	3	-0.26	0.13	0.77	0.72
Students	25	-0.17	0.26	0.84	0.61
Race					
<b>Caucasian</b>	<b>167†</b>				
Minority	12	0.38	1.33	1.46	0.25
<b>Model 2</b>					
Education		-0.03	0.07	0.97	0.79
Occupational Status					
Overall			-	9.81	0.46
<b>Disabled/Unemployed</b>	<b>20†</b>				
Menial Service	1	1.13	1.49	3.60	0.22
Unskilled	31	0.18	0.33	1.20	0.56
Semiskilled	9	0.38	0.75	1.46	0.39
Skilled Manual	18	0.11	0.09	1.11	0.76
Clerical/Sales	16	-0.51	1.50	0.60	0.22
Technicians	27	-0.49	1.57	0.62	0.21
Managers	25	-0.37	1.08	0.69	0.30
Lesser Professionals	4	0.38	0.42	1.46	0.52
Major Professionals	3	-0.29	0.16	0.75	0.69
Students	25	-0.18	0.28	0.83	0.60
Race					
<b>Caucasian</b>	<b>167†</b>				
Minority	12	0.36	1.19	1.43	0.28
Time-series Participation					
<b>TS</b>	<b>38†</b>				
PTS	141	0.22	0.73	1.20	0.39
<b>Model 3</b>					
Time-series Participation					
<b>TS</b>	<b>39†</b>				
PTS	155	0.20	0.93	1.22	0.34

†Reference Category; Note: First session drop-outs not included.

**Table A-14**

**Group Means and Log Transformed Means for Duration of Treatment  
for Three Groups of Clients Receiving Psychotherapy at a University Clinic**

Group	N	Mean	(SD)	Log Transformed Mean	(SD)
PTS	52	21.14	(30.26)	2.17	(1.34)
NTS	35	20.32	(28.84)	2.17	(1.37)
TS	13	22.88	(22.00)	2.57	(1.18)

Note: First session drop-outs not included

**Table A-15**

**Frequencies of Dropout Before and Continuation Beyond 12 Sessions  
for Three Groups of Clients Receiving Psychotherapy at a University Clinic**

Status	Group					
	PTS		NTS		TS	
	N	Percent	N	Percent	N	Percent
Dropout Before 12 Sessions	87	56.1%	57	62.9%	19	47.5%
Continue Beyond 12 Sessions	68	43.9%	34	37.4%	21	52.5%
Total	155	100.0%	91	100.0%	40	100.0%

Note: First session drop-outs not included.

**Table A-16****Frequencies of Dropout, Planned Termination and Continuing/Censored Cases  
for Three Groups of Patients Receiving Psychotherapy at a University Clinic**

Status	Group					
	PTS		NTS		TS	
	N	Percent	N	Percent	N	Percent
Dropout	99	63.9%	54	59.3%	24	61.5%
Planned Termination	25	16.1%	17	18.7%	6	15.4%
Continued/Censored	31	20.0%	20	22.0%	9	23.1%

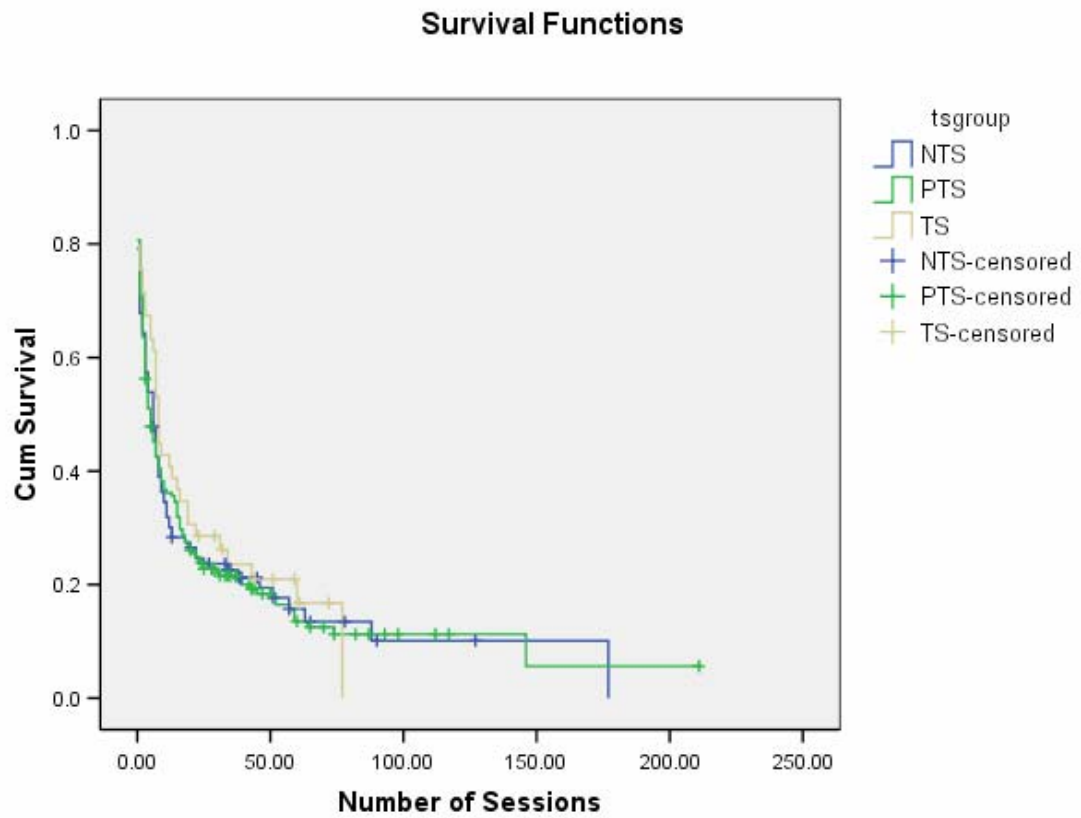
Note: First session drop-outs are not included.

**Table A-17****Mean Change in Global Assessment of Functioning Score  
for Three Groups of Clients Receiving Psychotherapy at a University Clinic**

Group	N	Mean	(SD)
PTS	52	3.44	(8.90)
NTS	35	3.91	(10.29)
TS	13	4.38	(17.44)

Note: First session drop-outs and active cases not included.

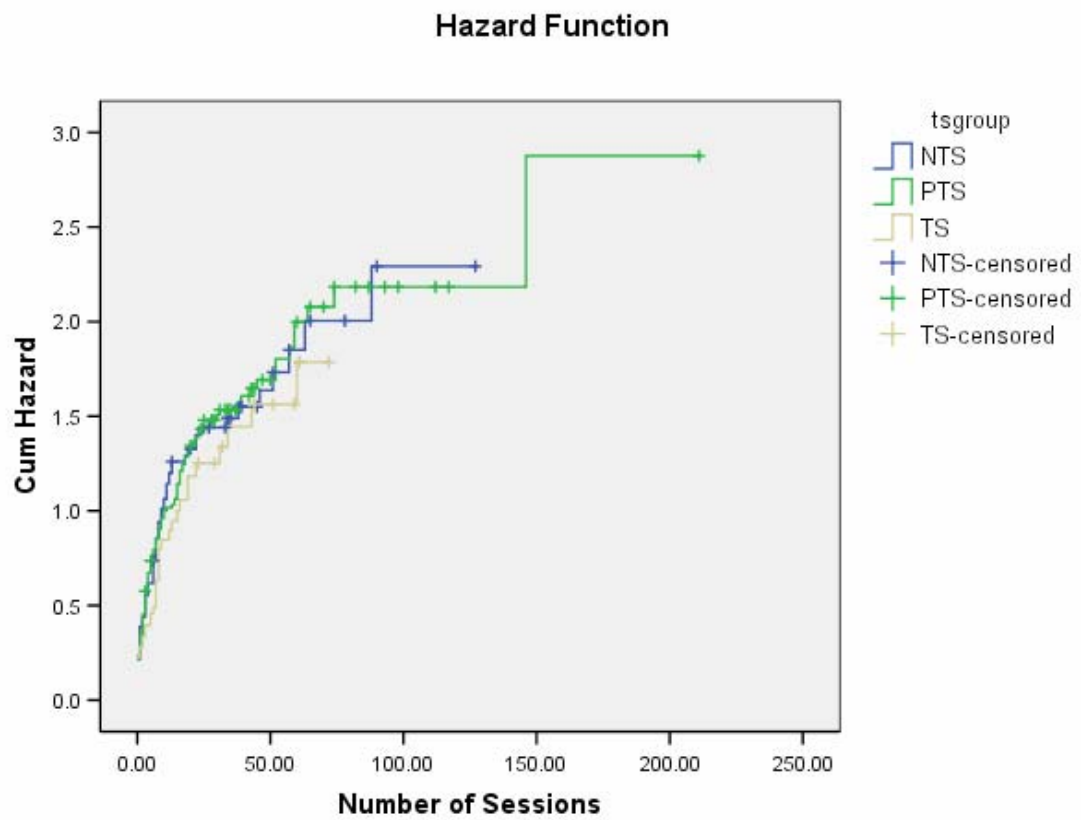
## **APPENDIX B: FIGURES**



**Figure 1**

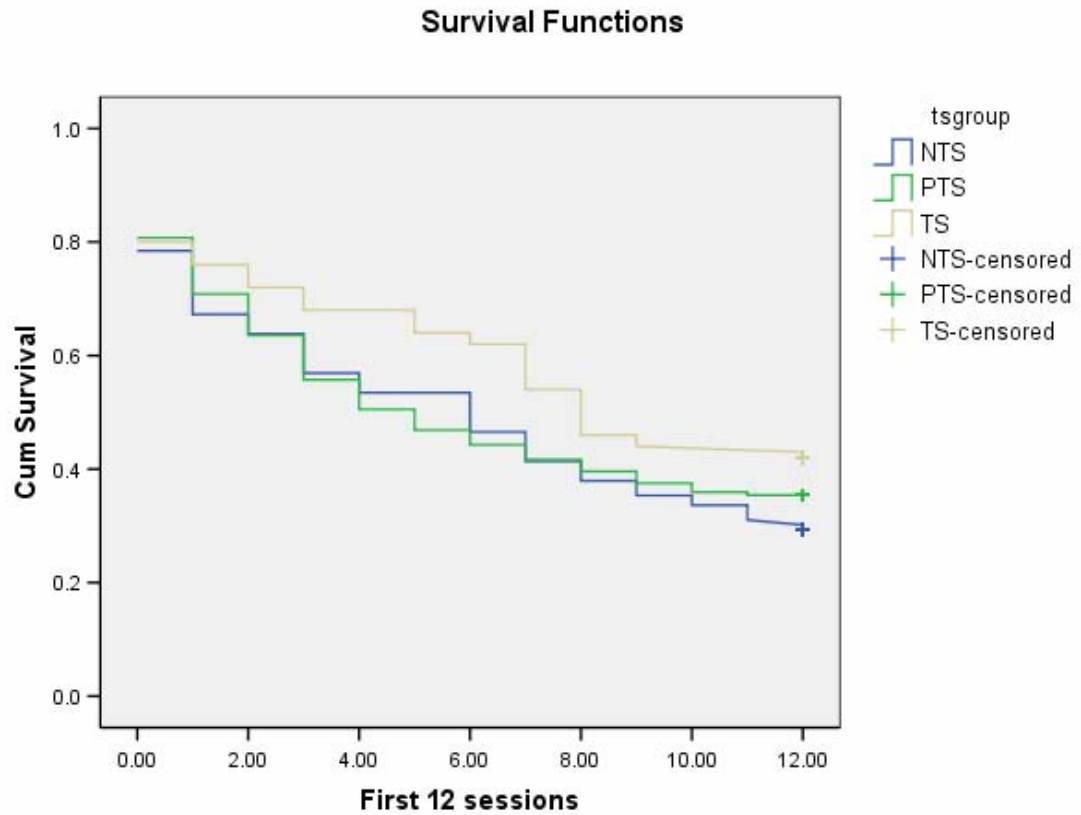
Cumulative Survival of Psychotherapy Duration for Three Groups of Clients  
Seeking Psychotherapy at a University Clinic





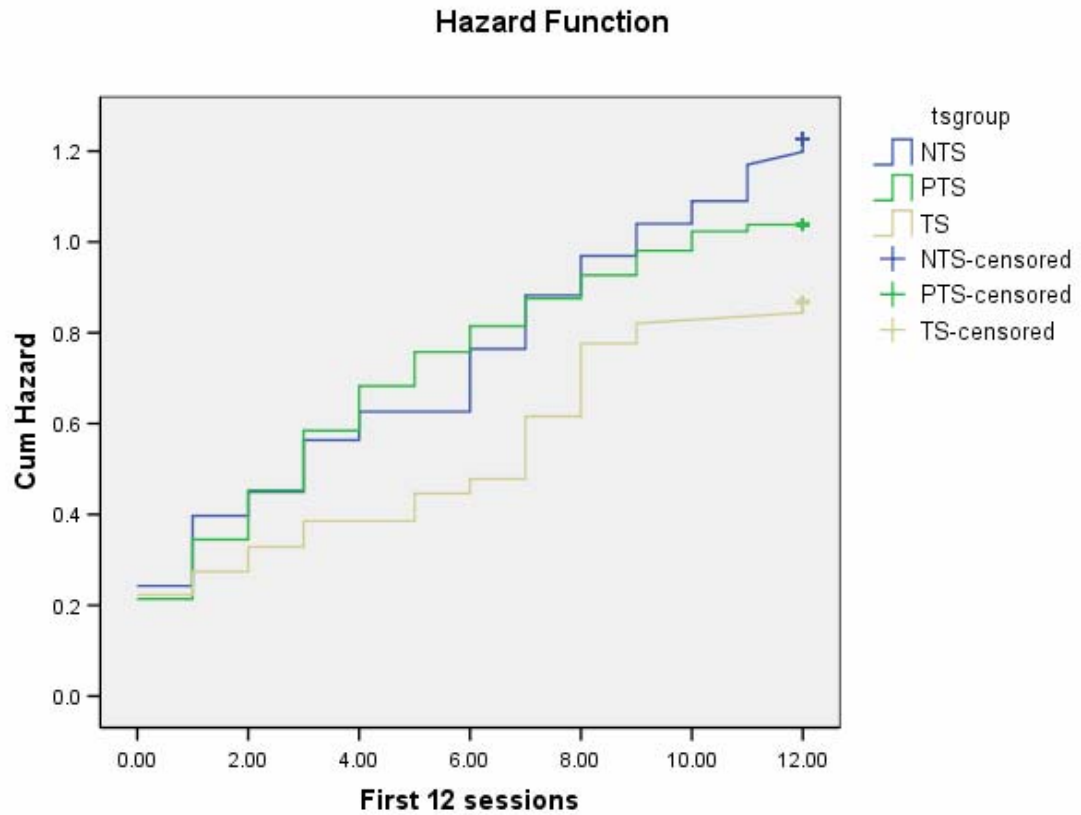
**Figure 2**

Cumulative Hazard of Duration of Treatment for Three Groups of Clients Seeking Psychotherapy at a University Clinic



**Figure 3**

Cumulative Survival of Psychotherapy Duration  
Over the Course of the First Twelve Sessions for Three Groups of Clients  
Seeking Psychotherapy at a University Clinic



**Figure 4**  
Cumulative Hazard of Psychotherapy Duration  
Over the Course of the First Twelve Sessions for Three Groups of Clients  
Seeking Psychotherapy at a University Clinic

## **VITA**

Justin David Winkel was born in Meriden, Connecticut on August 2, 1974. He received his Bachelor of Arts in Psychology from the University of Connecticut in 1996. After graduation, he spent three years as a research assistant affiliated with Yale University. In 2000, he began his graduate studies in Clinical Psychology at the University of Tennessee, Knoxville. He completed his internship in Clinical Psychology at the Institute of Living in Hartford, Connecticut in August 2006.