

PREDICTORS OF SECONDARY TRAUMATIC STRESS AMONG CLINICAL SOCIAL
WORKERS:

A FOCUS ON THE IMPACT OF THE SUPERVISORY RELATIONSHIP

by

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(Under the Direction of Pengsheng Ji)

ABSTRACT

This survey-based study of masters-level clinical social workers examines predictors of secondary traumatic stress, with a focus on the effects of the clinical supervisory relationship. In order to obtain a best predictive subset of variables from a larger set of candidate variables, this study employed rigorous variable selection methods. The results suggest that low salaries, large caseload sizes, anxiety, and high-quality supervisory relationships may be salient factors that impact the onset of secondary trauma among social workers particularly working with traumatized client populations. Specifically, positively-rated supervisory relationships predicted a substantial decrease in the degree to which a social worker possessed secondary trauma symptoms. The quality of the supervisory relationship may be an important aspect in reducing the prevalence of secondary trauma among social workers and mental health counselors. Practice implications and future research are discussed.

INDEX WORDS: secondary traumatic stress, compassion fatigue, supervisory relationship, clinical social work, trauma exposure

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CHAPTER 1

INTRODUCTION

Commonly thought of as a problem that mainly occurs in soldiers who experience traumatic events during military combat, posttraumatic stress disorder (PTSD) is prevalent among many groups of adults and children, including those who live in poor communities with high levels of neighborhood violence and crime, and those who have experienced interpersonal violence such as physical or sexual abuse. Moreover, PTSD is found among people who experience trauma due to natural and man-made disasters. In many circumstances, trauma happens repeatedly over months or years, leaving a person to cope with the after-effects such as extreme anxiety/panic, feeling unsafe during most times of the day and night, struggling with chronic insomnia, and repeatedly re-experiencing memories of the trauma.

Many people who struggle with PTSD seek formal help from a trained mental health counselor, such as a clinical social worker. As a result, the social work profession has sought to develop effective psychotherapeutic treatments to help people experiencing symptoms of PTSD. However, in the past twenty years research findings have accumulated suggesting that mental health professionals - social workers in particular - may develop secondary or vicarious trauma symptoms as a result of working with, or exposure to, traumatized client populations. For example, social workers report experiencing secondary trauma symptoms that are similar to PTSD symptoms, including (a) feeling emotionally numb, (b) reliving the trauma experiences of their clients, (c) developing panic-like symptoms when thinking about their clients outside of

work, (d) having disturbing dreams about their clients' trauma experiences, and (e) experiencing increased irritability; all of which parallel PTSD symptoms.

Referred to as secondary traumatic stress (STS) in this article, this phenomena has become a growing concern in the counseling and social work fields since the early 1990s (Bride, Radey, & Figley, 2007; Jacobson, 2012; Kintzle, Yarvis, & Bride, 2013; McCann & Pearlman, 1990). Although many research studies have examined prevalence rates, few studies have investigated protective factors, such as the clinical supervisory relationship, which may be buffer the social work from the onset of secondary trauma. The handful of findings reported suggests that job-related factors are associated with secondary trauma among helping professionals. Studies have found secondary trauma to be negatively related to job satisfaction and coworker support, and positively related to job turnover (Bride & Kintzle, 2011; Bride, Jones, Macmaster, 2007). Moreover, the onset of secondary trauma among trauma-based therapists has been found to be positively related to work-related stressors in addition to the effects of exposure to client trauma (Devilley, Wright, & Varker, 2009). However, research is needed in order to further investigate those protective factors specific to the onset of STS among social workers in particular. The current study examines the relationship between the supervisory relationship and STS among clinical social workers exposed to traumatized client populations.

Literature review

Secondary traumatic stress

Concerns regarding secondary traumatic stress and vicarious trauma began to consistently appear in counseling and social work literature during the last decades of the 20th century. Initially, McCann and Pearlman's (1990) work in the early 1990s suggested that mental health counselors were developing vicarious trauma symptoms from working with traumatized clients

(Pearlman & Mac Ian, 1995). Notably, these authors' findings suggested that counselors who possessed a personal trauma history were more vulnerable to developing vicarious trauma compared to their non-personal trauma counterparts, and was later supported by several studies (Bride et al., 2007).

During the same time period, Figley (1995) contributed to this emerging literature base by labeling the problem "secondary traumatic stress disorder." Building on Figley's work, Bride, Robinson, Yegidis, and Figley (2004) developed an STS self-report scale to measure clinician-reported trauma symptoms designed to mirror the PTSD symptom clusters of the Diagnostic and Statistical Manual of Mental Disorders (DSM; American Psychiatric Association, 2000; 2013). Subsequent studies have found the prevalence of STS among social workers, substance abuse counselors, child welfare workers, and emergency healthcare workers to be approximately twice to four times the national prevalence rate (Bride, 2007; Bride & Kintzle, 2011). Moreover, evidence suggests that job satisfaction substantially mediates the relationship between STS and job turnover (Bride & Kintzle, 2011; Bride, Hatcher, & Humble, 2009). Likewise, Devilly et al. (2009) found a relationship between STS and burnout among mental health professionals; the authors also reported that both variables were related to work-place factors other than client trauma exposure (e.g., duration of career, work setting, organizational structure, and frequency of supervisory contact). Although evidence suggesting a causal relationship has consistently been found between exposure to traumatized clients and clinician STS, Devilly et al.'s (2009) findings support emerging suspicions that a number of secondary variables may impact the onset of secondary trauma (Baird & Kracen, 2006).

The clinical supervisory relationship

A primary assumption in the social work profession relates the characteristics of a high quality supervisory relationship to similar characteristics found in a effective psychotherapy client-therapist relationship (e.g., the psychologist Carl Rogers's genuineness, acceptance, and empathic understanding are typically included primary characteristics; Hill, 2007; Kadushin & Harkness, 2002; Rogers, 1957). As early as the 1960s, researchers acknowledged that a didactic, or instruction-based, supervision may also be important in effective clinical supervision, focusing on clinical concepts. Early attempts to disentangle the extent to which a didactic versus experiential supervisory style is primarily effective in clinical supervision found that a didactic approach was important, but was not sufficient unless provided within a strong facilitative relationship (Carkhuff & Truax, 1965; Truax, 1970). As a result of their research on the didactic/experiential dichotomy in clinical supervision, Carkhuff and Truax (1965) stated the following: "the therapist supervisor brings to bear his knowledge of therapy accumulated from his own experience and the experiences and work of others *in the context of a therapeutic relationship* which provides for the trainee the conditions... of empathy, warmth, and transparency" (p. 242).

Since this early research, the above qualities, or supervisor-provided facilitative conditions of empathy, warmth, and transparency, have generally been assumed to positively facilitate the supervisee's clinical learning, the supervisee's ability to perform his or her job well, and feel efficacious as a counselor; and, as a result, provide effective clinical services to his or her clients. In recent years, these assumptions have been reconfirmed by research: the supervisory relationship impacts clinical supervisees' job-related and client-related experiences (Kadushin & Harkness, 2002).

Secondary trauma and the supervisory relationship

Currently, few studies have assessed the impact of the supervisory relationship upon secondary trauma. However, the few research findings are promising. Among mental health professionals and trainees, research investigating the relationship between the quality of clinical supervision and supervisees' ratings of satisfaction with supervision suggests the importance of a supervisor being perceived as possessing the following characteristics: (a) supportive, (b) nonjudgmental, (c) validating, (d) empathic, and (e) normalizing of the supervisees' experiences (Gray, Ladany, Walker, & Ancis, 2001). Furthermore, increased satisfaction with supervision has been found associated with increased work satisfaction, and negatively related to work-related stress (Sternier, 2009). Studies have also reported the damaging effects upon supervisees resulting from counterproductive and unethical supervision (Barnett, Erickson Cornish, Goodyear, & Lichtenberg, 2007). In contrast, the evidence suggests that clinical supervision possessing the characteristics listed above is positively related supervisees' clinical skills, and as a result has been found related to successful client outcome (Bambling, King, Raue, Schweitzer, & Lambert, 2006).

While the majority of research has reported positive relationships between the quality of the supervisory relationship and variables such as supervisee job satisfaction, retention, and clinical effectiveness, only a handful of studies have investigated the impact of the supervisory relationship on supervisee develop of secondary trauma. Overall, the findings are both equivocal and sparse. Among these few studies, Williams, Helm, and Clemens (2012) found no relationship between a measure of the supervisory working alliance and secondary trauma among a sample of mental health counselors; Wood (2011) also reported similar findings. However, Toren (2008) reported a significant negative relationship between the supervisory working alliance and secondary trauma among counselors-in-training, and Slattery and Goodman (2009)

found that the supervisory relationship attenuated domestic violence advocates' development of trauma symptoms.

Taken as a whole, the findings are encouraging: a clinical supervisory relationship when perceived as helpful and supportive tends to be associated with healthier supervisee functioning and job satisfaction in general. However, further research is needed in order to better understand the complex relationship between clinical supervision and secondary trauma.

Purpose of the study

The purpose of this study is to obtain an optimal set of explanatory variables that predict secondary traumatic stress among masters-level clinical social workers, with a particular focus on the effects of the quality of the supervisory relationship. This set of variables will be obtained from a larger candidate set of variables using variable selection statistical procedures. The primary hypothesis guiding this study is that a negative relationship exists between the clinical supervisory relationship and secondary trauma. That is, the better the quality of the supervisory relationship, as rated by clinical social workers, the less the social workers would report symptoms of secondary trauma.

CHAPTER 2

METHODS

Data was collected using a study design consisting of a state-wide mail-based survey of randomly selected clinical social workers in the Southeast United States conducted in October 2013.

Participants

Human subjects

Approval from the university Institution Review Board was obtained prior to beginning the study. In order to achieve confidentiality, each respondent was assigned a number that provided a link to the respondents mailing address. When the data collection time frame expired (i.e., approximately six weeks), the document containing the link between a respondent's number and his or her identifying information was destroyed.

In addition, informed consent was obtained by providing a cover sheet in the mailed survey packet with a description of the study, a consent script, and contact information regarding further questions.

Recruitment

As Figure 2.1 illustrates, the sample was selected from a sampling frame of social workers who had obtained their intermediate social work license (i.e., Licensed Master's Social Work [LMSW]) in the previous four years. By law the state in which this study was conducted requires that a clinical social worker possessing an LMSW receive a minimum of three years of clinical supervision training prior to becoming a Licensed Clinical Social Worker (LCSW). The

LCSW is the highest clinically-based license that can be obtained in social work, and is typically required by employers; therefore, clinical social workers are highly motivated to obtain their LCSW. This particular sampling frame of social workers (i.e., those possessing the mid-level LMSW license) was chosen in order to increase the likelihood that a sample would be obtained of practicing social workers receiving ongoing weekly or biweekly supervision. The rationale for this decision was based on speaking with multiple licensed social worker supervisors. These supervisors concurred that once a clinical social worker has obtained his or her LCSW license the likelihood of continuing to receive frequent and ongoing clinical supervisor decreases (i.e., LCSW's are no longer required by law to receive supervision, though ethical guidelines encourage life-long supervision for practicing social workers). Since a primary focus of this study was to investigate the impact of the supervisory relationship upon the development of secondary traumatic stress, the decision was made to narrow the sampling frame to practicing LMSW social workers who were most likely to be receiving weekly or biweekly supervision.

Therefore, the sampling frame was obtained by requesting from the state's board of registration a mailing list of social workers who possessed their LMSW.

Randomization

Due to low responses rates for surveys focusing on this population, as well as cost restrictions, the initial mailing sample was chosen to be 500 participants. Previous secondary traumatic stress studies that conducted mail-based surveys of helping professions (i.e., social workers, substance abuse counselors, and nurses) have reported response rates between 20% and 50%, though these response rates tend toward 20%-30% (Bride, Hatcher, & Humble, 2009). Therefore, a mailing sample of 500 was expected to yield a minimum of 100 respondents and a maximum of 250 respondents, a 20% to 50% response rate respectively.

As Figure 2.1 indicates, 1,423 participants were screened for this study. Subsequently, a simple random sample of 500 participants was obtained. The response rate for this study was 24.8%, or 124 respondents. After removing unusable questionnaires, the overall sample size was reduced to 108, a final response rate of 21.6%. While low, this response rate fell within the bounds of what is typical for this type of mail-based survey study that seeks information related to secondary trauma. The 16 unusable questionnaires were removed due to over half the survey failing to be filled out or respondents returning the survey not filled out with a note explaining why. The reasons for not filling out the survey were generally due to time constraints.

Procedures

Using survey design guidelines suggested by Dillman, Smyth, and Christian (2009), a survey packet was mailed to the sample of 500 clinical social workers with a requested completion date three weeks in the future. A week later, a respectful and appreciative letter was mailed to all who had not responded, reminding the participants of the completion date. Moreover, when the completion deadline arrived, a third reminder letter was mailed to all who had not responded, requesting completion of the packet at a date one week in the future. Finally, a thank you letter was sent to all respondents upon completion of the study.

Measures

The study survey asked social workers to provide demographic information (i.e., age, race/ethnicity, income, education), information related to professional characteristics (i.e., years of experience, weekly works hours spent working in various social work settings and performing various tasks), past personal trauma, depression, and anxiety history, and extent of client caseload that was traumatized. In addition, the survey asked social workers information related to their clinical supervision (i.e., supervisor gender, frequency of supervision, duration of current

supervision, and satisfaction with supervision). The survey also asked the social workers to complete the Secondary Traumatic Stress Scale and the Supervisory Relationship Inventory.

Of the 34 variables measured in this study 20 were continuous and 14 were categorical variables. Secondary traumatic stress (STS) and the supervisory relationship were measured using multi-item, self-report instruments both of which utilized Likert scaling. These two latter variables were generated by aggregating the 17-item and 40-item instruments, respectively. Table 2.1 provides a list of all candidate variables measured in the current study after certain variables were removed due to being highly collinear; the multicollinearity procedure is described in the Statistical Methods section below.

Response variable

The response variable is the level of secondary traumatic stress reported by the respondents on a 17-item instrument. The Secondary Traumatic Stress Scale (Bride et al., 2004) measures the frequency of intrusion, avoidance, and arousal symptoms associated with STS as a result of working with traumatized clients in the past week. To meet diagnostic criteria each item must be rated 3 or higher on a 5-point Likert scale ranging from *never* (1) to *very often* (5). A total STS score is found by aggregating the 17 items. The Secondary Traumatic Stress Scale was chosen over other scales due to its congruence with the diagnostic criteria of PTSD. Moreover, the Secondary Traumatic Stress Scale has demonstrated strong convergent, discriminant, and internal validity (Bride et al., 2004; Ting et al., 2005). In addition, past studies have reported the Cronbach's alpha coefficient of reliability in order to assess internal consistency of the Secondary Traumatic Stress Scale, $\alpha = .93$ (Bride et al., 2004), $\alpha = .94$ (Ting et al., 2005), $\alpha = .86$ (Choi, 2011), and $\alpha = .95$ (Kintzle et al., 2013). Although Cronbach's alpha has been shown to be biased unless certain model assumptions are met (Dunn, Baguley, &

Brunsdon, 2014), the Cronbach's alpha for this study will be reported in order to provide a comparison to previous studies, all of which reported Cronbach's alpha only. The Cronbach's alpha for the Secondary Traumatic Stress Scale in this study was found to be comparable to past studies, $\alpha = .92$.

Explanatory variables

Exposure to traumatized clients. The primary explanatory variable in this study is the level of client trauma exposure experienced by respondents surveyed in this study. According to Bride and colleagues (Bride, 2001; Bride et al., 2004) client exposure precedes in time the occurrence of STS. Although this study is cross-sectional, assessing the relationship between exposure to client trauma and level of STS is important to the theoretical underpinnings of this study. Exposure to client trauma is operationalized by assessing the number of traumatized clients on a social worker's caseload as well as the degree to which the respondent reports his or her caseload as being traumatized on a 5-point Likert scale ranging from *not at all* (1) to *very severely* (5). In addition, a dichotomous variable was created from measures of weekly work hours with various types of clients, indicating whether a respondent's clinical work was primarily with traumatized clients.

The supervisory relationship. Another primary variable in this study is the quality of the supervisory relationship provided by the respondent's supervisor, as rated by the respondent. A good supervisory relationship is hypothesized to be one that promotes a facilitative relationship for a supervisee. This relationship is considered to positively facilitate a supervisee's ability to perform his or her job well, feel efficacious as a counselor and, as a result, provide quality clinical services to his or her clients. The measure of a supervisory relationship is operationalized as a mean score obtained from the 40-item Supervisor Relationship Inventory

(Schacht et al., 1988). The Supervisor Relationship Inventory was chosen over other therapeutic alliance/relationship instruments due to the strong theoretical link with the psychologist Carl Rogers's proposed therapeutic conditions, and due to research that consistently suggests that facilitative qualities similar to Rogers's therapeutic conditions are important in supervision.

The Supervisor Relationship Inventory is composed of five subscales, measuring the relationship constructs of Empathy, Regard, Unconditionality, Congruence, and Willingness-to-be-Known. Conceptually, Empathy refers to the extent of one person's immediate awareness of another; Regard refers to affective aspects of an interpersonal relationship (e.g., liking versus disliking); Unconditionality refers to the variability of a person's affective response to another; and Congruence refers to the consistency of a person's experience, awareness of experience, and his or her overt communication with another. Four of the five subscales, save for Willingness-to-be-Known, are based on Rogers's (1957) theorized therapist-provided facilitative conditions. Moreover, the Supervisor Relationship Inventory is a modified version of the original 92-item instrument created by Barrett-Lennard (1962) to assess client-reported therapist effectiveness. Each item of the Supervisory Relationship Inventory is rated on a 6-point Likert scale ranging from *I strongly feel it is not true* (1) to *I strongly feel it is true* (6), with some items of the scale requiring reverse-coding so that a 6 indicates "most helpful" and a 1 indicates "least helpful" across all items. The Supervisory Relationship Inventory has been found to possess strong convergent, discriminant, and internal validity. Cronbach's alpha coefficient has been reported by past studies using this instrument, $\alpha = .95$ (Dalton, 1983), $\alpha = .92$, (Schacht et al., 1988), and $\alpha = .93$ (Culbreth & Borders, 1999). The Cronbach's alpha for the Supervisory Relationship Inventory in this study was found to be comparable to past studies, $\alpha = .96$. The Supervisory

Relationship Inventory is provided as part of the overall survey used in this study, located in Table A.1 in the Appendix.

Demographic and control explanatory variables. Based on previous research (i.e., Bride & Kintzle, 2011; Schacht et al., 1989), the following demographic and control variables were obtained in the survey: social worker age, gender, race/ethnicity, personal income, experience (number of years working in social work profession), caseload size by age, extent that the respondents' client caseloads are traumatized, and respondent personal anxiety and trauma history. Additional variables obtained in the survey include, the length of time at current job, work in a community setting, work in the mental health field, and indicators of work primarily involving direct client contact, traumatized client contact, clients with developmental trauma (i.e., childhood physical/sexual trauma), or clients with episodic trauma (event-based trauma as an adult). Supervision variables included: the gender of the clinical supervisor, the frequency of supervision, length of time with current supervisor, extent of past supervision, and satisfaction with current supervision.

Missing data

Among the 108 respondents in the final dataset, the percent of missing data was low within the two psychometric instruments as well as in the dataset. Within the Secondary Traumatic Stress Scale the percent of missing data was 0%. Within the Supervisory Relationship Instrument, five items possessed missing data; one item was left blank twice (i.e., less than 2% missing), while four items were left blank once (i.e., less than 1% missing). There was no particular pattern found for this missing data. Across the full dataset four variables possessed missing data, Personal Income was left blank twice (i.e., less than 2%), while Age, Household

Income, and Frequency of Supervision were left blank once (i.e., less than 1%) for a total percent missing of 4.4%. In addition, no missing data pattern was found to be present.

Due to the extremely low percent of missing data, item-mean substitution was performed. Item-mean substitution replaces a missing cell with the mean value for the variable across all observations. This procedure is considered appropriate for dealing with missing data when the percent of missing data is very low and distributed randomly (Hawthorne, Hawthorne, & Elliott, 2005; Roth, Switzer, & Switzer, 1999).

Statistical methods

Data preparation and analyses of sample characteristics was performed using SAS software, version 9.4 (SAS Institute, Cary NC). Multicollinearity diagnostics, bivariate correlations, variable selection procedures, and model selection/diagnostics were performed using the statistical software R 3.2.3, including the additional packages: “perturb,” “cars,” “boot,” “glmnet,” and “leaps” (Canty & Ripley, 2014; Fox & Weisberg, 2011; Friedman, Hastie, & Tibshirani, 2010; Hendrickx, 2012; Lumley, 2009; R Core Team, 2014).

Multicollinearity diagnostics

Prior to analysis, the data used in this study were assessed for problems of multicollinearity. Initially, the Pearson bivariate correlation matrix was examined. Among the 34 independent variables, 11 bivariate correlations were found to be greater than $r = .5$ with 2 variables possessing correlations greater than $r = .75$. In addition, among the continuous and binary independent variables the largest variance inflation factor was high, $VIF = 7.88$. Despite, the condition number of the dataset being low, $\kappa = 10.80$, multicollinearity diagnostics were employed.

Using methods for detecting and removing multicollinearity outlined by Belsley, Kuh, & Welsch (2005) and Friendly & Kwan (2009), a number of variables were removed from the dataset in a stepwise removal procedure using variance inflation factors and principle component analysis diagnostics. First, the data was centered and scaled to unit standard deviation and then underwent singular value decomposition in order to obtain the singular values and eigenvectors of the correlation matrix. Variance inflation factors were obtained for each variable, providing an index for the extent that each independent variable's variance was explained by all other independent variables; variables with factors greater than 5 indicate that 80% or more of the variable's variance (i.e., information) is explained by all other variables. Next, using the singular values and eigenvectors of the correlation matrix, the condition indices were calculated for each principle component as, $\kappa_i = \frac{\sigma_{max}}{\sigma_i}$, where the denominator indicates the i^{th} singular value.

The proportion of variance that each variable contributed to each principle component was calculated as well, using the equation, $p_{jk} = \frac{V_{jk}^2}{VIF_j \lambda_k}$, where V^2 is the j, k^{th} value of the eigenvector matrix, VIF_j is the variance inflation factor for the j^{th} variable, and λ_k is the condition index corresponding to the k^{th} principle component of the dataset (Friendly & Kwan, 2009). Table 2.2 displays the final results of this analysis. The process of variable removal will be described below. Moreover, the stepwise results, referenced below, are provided in the Appendix as Tables A.2.0 to A.2.6.

Table A.2.0 provides the variance inflation factors and percentage of variance (i.e., proportion times 100) that each variable contributed to the principle components possessing condition indices larger than 10 (e.g., condition indices larger than 30 are considered problematic and numbers larger than 100 are considered potentially disastrous for linear regression). Cells

containing dots indicate that the percent variance was less than 40% which was chosen as the cutoff for non-problematic variance loading (Friendly & Kwan, 2009).

As Table A.2.0 indicates, the categorical variable labeled as “hincome_c” (i.e., respondent-reported Household Income) possessed the largest mean variance inflation factor across categories, $\overline{VIF} = 8.4$, and the fourth-highest generalized inflation factor, $VIF_{gen} = 5.12$ (Fox & Monette, 1992). This variable was chosen for removal first due to its heavy variance loading on the principle component with the highest condition number - which was shared with the Personal Income variable as well (i.e., “pincome_c”) - suggesting that Household Income was collinear with Personal Income. Personal Income is a more theoretically important demographic variable in this study; therefore Household Income was chosen for removal. Table A.2.1 confirms the collinearity. The variance inflation factors for Personal Income dropped substantially, as did the generalized variance inflation factor as well. In addition, the largest condition index of the dataset dropped below 10. In other words, Household Income was not contributing novel information to this dataset that could not be explained from Personal Income.

The above steps were repeated, whereby after a variable was removed from the dataset due to a lack of explanatory value, the multicollinearity statistics were recalculated for the reduced dataset and displayed in a subsequent table in the Appendix. Following the removal of Household Income, the four client caseload size-by-age variables were chosen for removal. Although these four variables did not individually possess high variance inflation factors, they were suspected to be the cause of the high variance inflation factor possessed by the overall caseload size variable (i.e., “csldfrq”). These four variables were highly sparse as well, each possessing a large number of zeros. Table A.2.2 displays the results after the four caseload-by-

age variables were removed. The removal of these variables substantially reduced the variance inflation factor for the caseload size variable.

The procedure, as described above, continued until all variables in the reduced dataset possessed a variance inflation factor less than 3.0. During this process, as few theoretically important variables were removed as possible. In addition, if two or more variables possessed equally problematic collinearity statistics the variable with the smallest bivariate correlation with the dependent variable was chosen for removal. Only one categorical variable was removed, Household Income, due to its collinearity with Personal Income.

Table 2.2 displays the collinearity statistics for the final set of variables after the above procedure was completed. The final dataset contained 24 variables. Among the 21 continuous or binary variables, the variance inflation factors ranged from 1.30 to 2.55. The final condition number of the dataset was small, $\kappa = \frac{\sigma_{max}}{\sigma_{min}} = 5.12$. In addition, the distribution of bivariate correlations among independent variables was found to have shrunk considerably. Figure 2.2 displays overlaid histograms of the correlations among independent variables before and after the multicollinearity procedures above.

Model selection procedures

The primary focus of this study is to obtain a “best” fitting model, or subset of variables, which predicts STS among clinical social workers receiving consistent supervision as described earlier. Of the methods for variable selection, best subset selection and elastic net constrained optimization were utilized. While a best subset selection algorithm is feasible with the number of variables in the final dataset, in recent years best subset selection has been shown to be non-optimal in differentiating true effects from effects due to error (Ji & Jin, 2012). Best subsets were obtained using the branch-and-bound algorithm in order to compare and contrast results

against the elastic net method. The elastic net comprises a variable selection method that utilizes aspects of both ridge regression and the least absolute shrinkage and selection operator (LASSO) method (Zou & Hastie, 2005). Moreover, the elastic net has been shown to be a stable estimator for correlated datasets (Shen, Han, & Braverman, 2016). Therefore, the elastic net method may be a strong candidate for use with human-subjects survey data due to its robustness against collinearity, and was chosen for this study.

Choosing “best” subsets. Best subsets will be assessed using the Akaike and Bayesian Information Criteria (i.e., AIC and BIC, respectively) as well as cross-validated mean-squared error (cvMSE) in the case of the elastic net procedure. The minimum of each criterion is considered to be a best-model candidate.

Elastic net tuning parameter. Prior to performing the elastic net procedure, an optimal alpha value was found for the elastic net by iteratively cross-validating elastic net models with alpha values ranging from .1 to .9, using the same vector of randomly selected 10-fold cross-validation observation identifiers. After one iteration, an optimal alpha value corresponding to the minimum mean-squared error was obtained. However, due to the randomness of the 10-fold cross-validation vector this iterative process was repeated twenty times and a final optimal value of alpha was found by averaging the subsequent twenty alpha values obtained. In this way, the elastic net could be optimally “tuned” to this particular dataset.

“Always included” variables. For the best subset and elastic net variable selection procedures, five variables, four categorical and one continuous, were chosen to be “always included” in all model subsets. These particular variables, gender, race/ethnicity, income, supervision frequency, and caseload trauma, were chosen due to theoretical considerations. The first three variables, gender, race/ethnicity, and income, were chosen due to their demographic

importance. Studies examining secondary traumatic stress frequently fit regression models starting first with these demographic variables (e.g., Bride & Kintzle, 2011). Since this study examines the association between secondary trauma and the supervisory relationship, supervision frequency was chosen to be in all models in order to obtain subsets of variables most predictive of secondary traumatic stress after controlling for frequency of supervision. Finally, the extent that respondents' caseloads were reported to be traumatized (i.e., caseload trauma) was chosen to always be included due to the theoretical framework of secondary trauma. Secondary trauma is hypothesized to occur as a result of working with traumatized client populations.

Table 2.1. *Final set of candidate explanatory variables*

Demographics

Gender (0-1) †
Race (1-3) †
Income, personal (1-4) †
Age (years)

Clinical Experience, Workload, Work Setting, Type of Work

Social work experience (years)
Length of time at current job (years)
Weekly work hours
Work in community setting (0-1) †
Work in mental health field (0-1) †
Work primarily involves direct client contact (0-1) †
Caseload size

Extent of Client Trauma, Type of Client Trauma

Extent client caseload traumatized (1 to 5)*
Work primarily involves direct traumatized client contact (0-1) †
Works primarily with clients with developmental trauma (0-1) †
Works primarily with clients with episodic trauma (0-1) †

Respondent Experience of Anxiety and Trauma

Extent of own anxiety (1 to 5)*
Report of own trauma experience, past year (0-1) †
Report of own trauma experience, lifetime (0-1) †

Clinical supervision

Gender of clinical supervisor
Frequency of supervision(1-3) †
Current supervision (years)
Previous supervision (years)
Satisfaction with current supervision (1 to 5)*
Supervisory relationship rating of current supervisor (1 to 5)*

* Indicates Likert scale range; † Indicates categorical variable

Table 2.2. *Multicollinearity statistics of final dataset*

	r_{DV}	VIF
Gender	.12	1.3
Race/ethnicity (African American)		1.7
Race/ethnicity (Other)		1.3
Personal income (\$35k - \$45k)		2.9
Personal income (\$45k - \$55k)		2.9
Personal income \$55k or more		2.1
Supervisor gender (Female)	.18	1.5
Supervision frequency (Every Other Week)		1.7
Supervision frequency (Once a Month)		1.7
Own trauma (Past-year)	.11	1.4
Own trauma (Life-time)	-.03	1.6
Age	-.06	2.5
Social work experience	-.1	2.1
Length of time at current job	-.07	1.9
Weekly work hours	.08	1.5
Caseload size	.10	1.4
Extent client caseload traumatized	.23	1.7
Extent of own anxiety	.4	1.7
Current supervision	-.13	1.8
Previous supervision	-.21	2.1
Satisfaction with current supervision	-.2	1.7
Supervisory relationship rating of current supervisor	-.25	1.9
Work in community setting	.02	1.5
Work in mental health field	.09	1.6
Work primarily involves direct client contact	.06	1.8
Work primarily involves direct traumatized client contact	.17	1.8
Works primarily with clients with developmental trauma	.09	1.6
Works primarily with clients with episodic trauma	.05	1.3

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

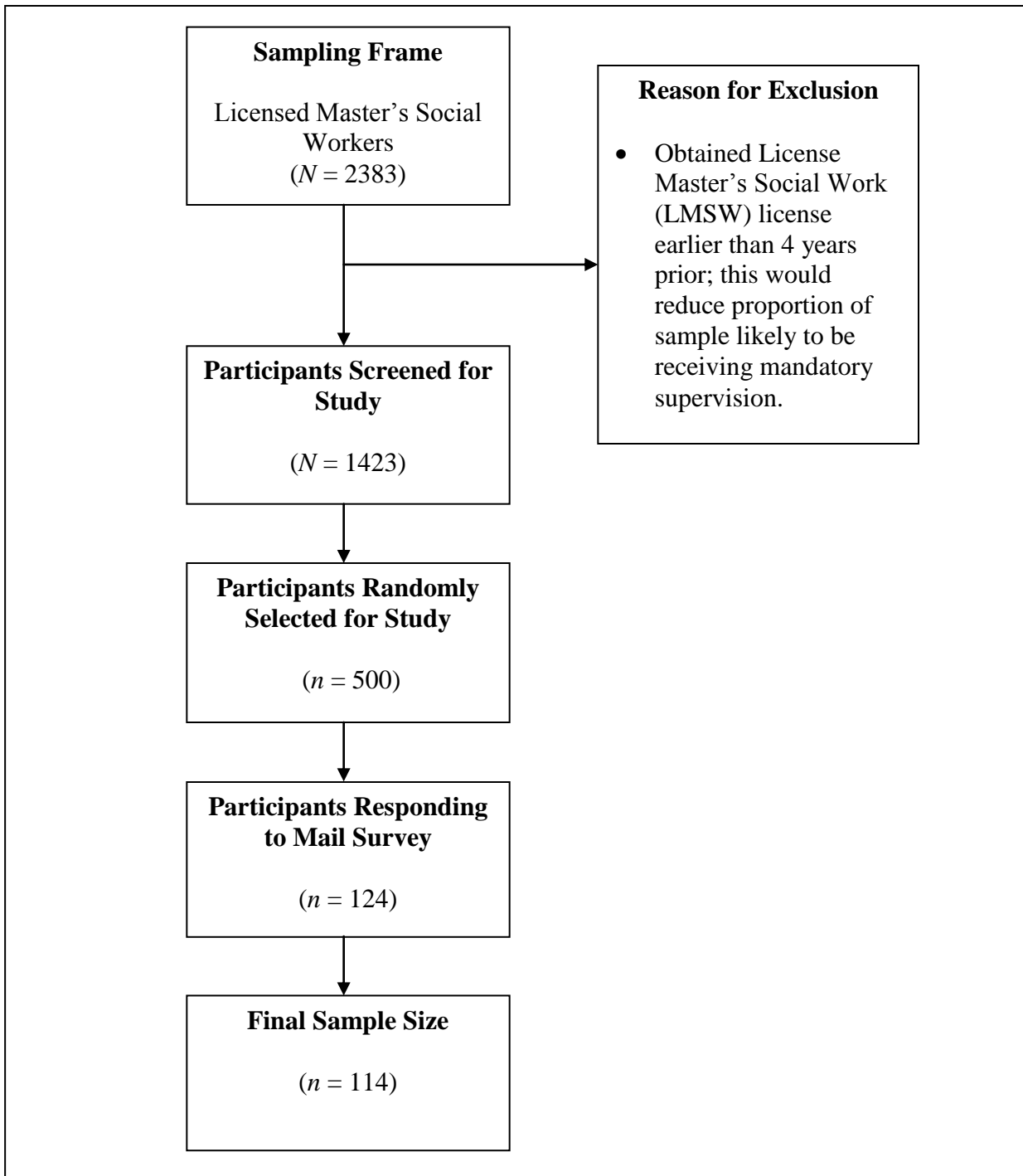


Figure 2.1. Participant selection flow diagram.

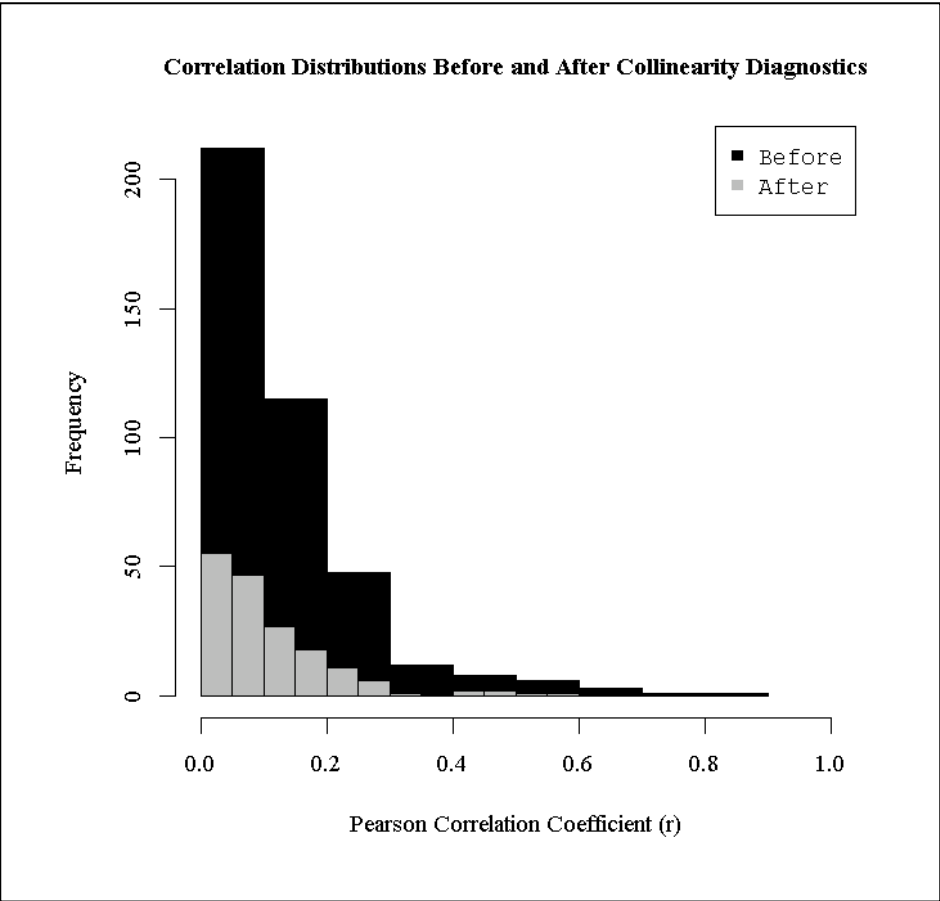


Figure 2.2. Distributions of correlation coefficients among independent variables before and after multicollinearity diagnostics

CHAPTER 3

RESULTS

Table 3.1 displays descriptive statistics for demographic and other key variables in the current study. In brief, nearly 92% of the respondents in the study were female with a mean age of approximately 36 years, $M = 35.53$, $SD = 10.27$; 69% were White and 24% were African American; the majority of respondents earned between \$35,000 and \$45,000 per year; the mean amount of social work experience reported was approximately 7 years, $M = 6.82$, $SD = 6.66$; and the average number of hours respondents reported working per week was about 40, $M = 40.32$, $SD = 8.34$. Approximately 77% of respondents reported receiving weekly or biweekly clinical supervision. The average respondent's client caseload size was about 23 clients, $M = 22.67$, $SD = 18.62$, with the mean extent of caseload trauma falling between *moderately* and *severely* on a 5-point Likert scale, $M = 3.31$, $SD = .96$. In addition, 71% of respondents reported a personal lifetime traumatic experience(s).

Overall, respondents endorsed modest levels of secondary traumatic stress (STS) symptoms, $M = 33.07$, $SD = 10.80$. An STS symptom was considered to be endorsed if a respondent indicated that the symptom was experienced "occasionally", "often," or "very often" (Kintzle, Yarvis, & Bride, 2013). In particular, the most frequently reported symptoms were (1) thinking about working with clients when not intending to, 60.53%, (2) being easily annoyed, 42.11%, (3) having trouble sleeping, 40.35%, (4) having trouble concentrating, 39.47%, (5) wanting to avoid working with some clients, 37.72%, and (6) feeling emotionally numb, 35.96%. The symptoms least reported were (1) disturbing dreams about work with clients, 14.91%, (2)

reliving trauma(s) experienced by clients, 15.79%, and (3) noticing gaps in memory about client sessions, 16.67%. These figures are slightly higher than previously reported symptom frequencies (Kintzle, Yarvis, & Bride, 2013).

The average Supervisory Relationship rating indicated a slightly general positive supervisory relationship among respondents, $M = 4.70$, $SD = .80$. This mean rating indicates for positively-worded questions about the supervisory relationship the respondent reported, “I feel it is probably true, more true than untrue,” and for negatively-worded questions the respondent reported, “I feel it is probably untrue, more untrue than true.” Previous studies report similar mean ratings for the supervisor relationship. In particular, a similar mean rating of 4 of 6 in previous studies was found among supervisors that had also been rated as “most helpful” by their supervisees (Culbreth et al., 1999; Schacht et al., 1989).

Model selection

Results from the elastic net model selection and the best subsets model selection are reported below. The final results for the elastic net are reported in Tables 3.2.1 and 3.2.2, and the final results of the best subsets are reported in Tables 3.3.1 and 3.3.2. The initial results, prior to regression diagnostics being performed, are reported in the Appendix as Tables A.3.1 to A.3.4.

Elastic net subsets

Table A.3.1 displays the initial results of the elastic net procedure. An alpha tuning parameter was first obtained using the methods described earlier, $\alpha = .61$. Three criteria are displayed in Table A.3.1 indicating candidates for the “best” model according to the minimum AIC, BIC, and cvMSE statistics. Each “best” model was a subset of the next largest, which allowed model reduction to be performed. Model 21, with 16 variables, possessed the best cross-

validated mean-squared error, $cvMSE = 101.18$; Model 14, with 12 variables, possessed the best AIC value, $AIC = 796.86$; and Model 5 possessed the best BIC value, $BIC = 837.86$. An F -test for model reduction was conducted to compare Model 21 to Model 14, with a null hypothesis that the additional variables contained in Model 21 were equal to zero. The F -test was nonsignificant, and therefore, the AIC model was chosen, $F(4,87) = .74, p = .57$. Next, the AIC Model 14 was tested against the BIC Model 5. This F -test was significant, indicating that Model 14 should not be reduced to Model 5, $F(5,91) = 2.93, p = .02$. Therefore, Model 14 was the final model chosen by the elastic net method. The 12 variables in the final model are displayed in Table A.3.2 in the Appendix along with the elastic net regression coefficients and the comparable ordinary least squares (OLS) coefficients including OLS standard errors, t -values, and p -values. Overall, the elastic net and OLS coefficients matched exactly in sign, and were very similar in magnitude.

Regression diagnostics. Once the final model was selected (i.e., AIC Model 14), the model was assessed for normality and constant variance of the residuals. In addition, the model was examined for potential influential observations as well as observations contributing leverage to the model fit. Figure 3.1.1 displays a scatterplot of the standardized residuals versus the fitted values, a theoretical versus sample quantile (Q-Q) plot of the standardized residuals, and a histogram of the standardized residuals; potential outliers are indicated in the first two plots. Overall, the residual plot appears randomly distributed with no distinct pattern, suggesting that the constant variance of errors assumption was met in this model. In addition, the residuals appear to be approximately normally distributed as indicated by the Q-Q plot, and supported by the “mound-shaped” distribution of the residual histogram. However, observation 33 possessed

a large standardized residual distance from zero, suggesting that this observation may be an outlier in the dataset, $\hat{\varepsilon} = 3.50$.

Figure 3.1.2 displays a Cook's Distance influence plot and a leverage plot of hat-values, with potential outliers indicated. Two cutoff scores were considered for the influence plot. The first was calculated as a 95% F -distribution value with degrees of freedom equaling, respectively, the number of parameters in the model including the intercept term, and the number of observations minus the number of parameters including the intercept term, $F(17, 91, \alpha = .05) = 1.10$. Similarly, the second cutoff score for influence statistics is frequently suggested to be 1.0 (Chatterjee & Hadi, 2006).

As Figure 3.1.2 suggests, observation 108 possessed the largest influence statistic, $D_{max} = .27$. In addition, observation 33 is also shown in the influence plot. Despite observation 33's large residual found earlier, it may not be contributing substantial problems to the model fit as suggested by its relatively small influence. However, observation 108 - although it possesses an influence value well below the cutoffs listed above - is quite far from the rest of the observations, suggesting that observation 108 may be an outlier. This suspicion is confirmed by the leverage plot in Figure 3.1.2. The cutoff score for leverage statistics is suggested to be twice the average of the hat values or two times the model parameters - including the intercept - divided by the number of observations, in this case, $2\bar{h} = .31$ (Chatterjee & Hadi, 2006). As Figure 3.1.2 indicates, observation 108 stands out as possessing a substantially large leverage value, $h_{108} = .63$. In conclusion, observation 108, as well as observation 33, may be potentially problematic outliers in this model.

In order to assess the problematic effects of observation 33 and 108, the full elastic net procedure was separately performed, as described earlier, with the respective observations

removed from the dataset. The results with observation 33 removed were nearly the same as the initial elastic net model. The fit of the model was not improved as indicated by no change in either the R^2 or cross-validated mean-squared error values. In addition, the regression coefficients remained stable.

However, when the elastic net procedure was performed with observation 108 removed, the model fit became slightly better while the best model - again, AIC - was found to be slightly more parsimonious, with one less variable than the initial elastic net selection. Therefore, observation 108 was permanently removed from the dataset, with the final model selection criteria displayed in Table 3.2.1. In addition, Table 3.2.2 displays the final set of 11 variables selected using the elastic net procedure. The variables were: Gender, Race/ethnicity, Personal income, Supervision frequency, Caseload size, Supervisor gender, Extent client caseload traumatized, Extent of own anxiety, Supervisory relationship rating of current supervisor, Work in community setting, Work primarily involves direct traumatized client contact.

Best subsets

Table A.3.3 displays the initial results of the best subsets branch-and-bound algorithm. Model 5 with 10 variables and Model 2 with 7 variables possessed the minimum criteria, $AIC = 7.23$, and $BIC = 13.64$, respectively. Model 2 is a subset of Model 4, and can be tested for further reduction. An F -test for model reduction was performed in the same way described in the elastic net results. The F -test was significant, and therefore the larger AIC Model 4 was chosen, $F(3,93) = 3.66$, $p = .02$. The 10 variables in the final model are displayed in Table A.3.4 in the Appendix including the ordinary least squares (OLS) coefficients including standard errors, t -values, and p -values. The initial best subsets model was similar to the original elastic net model save for 2 variables, Caseload size and Previous supervision experience.

Regression diagnostics. Regression diagnostics were carried out in a similar fashion as described in the elastic net section. As Figure 3.2.1 indicates, the residual and Q-Q plots were similar to the elastic net plots, indicating that observation 33 possessed a residual greater than 3 standard deviations. The influence and leverage plots displayed in Figure 3.2.2 were similar to the elastic net plots as well, indicating that observation 108 possessed relatively large influence and 4 times the average leverage value.

Similar to the elastic net diagnostics, observations 33 and 108 were each removed and the best subsets procedure was performed without the respective observation. Again, removal of observation 33 did not demonstrate added positive effects to the best subsets model. However, similar to the elastic net procedure, when the best subsets procedure was performed with observation 108, a better model fit was found. In contrast to the elastic net procedure, which became more parsimonious, the best model for the best subsets procedure - again, AIC - was found to include an additional variable, Caseload size. However, due to the better model fit as evidenced by an improved R^2 , observation 108 was permanently removed for the best subsets procedure as well.

Comparing Table 3.2.2 and Table 3.3.2, the final model selected by the best subsets procedure was identical to the final model selected by the elastic net procedure.

Regression coefficients

As Table 3.2.2 indicates, the elastic net coefficient estimates and the OLS estimates are similar in magnitude, with identical signs. Of initial interest is the sign of each variable's coefficient, indicating whether the variable positively or negatively impacts STS. As can be seen from Table 3.2.2, after controlling for the effects of demographic and supervision characteristics, increased personal anxiety and working primarily in direct contact with traumatized clients both

positively impacted the incidence of Secondary Traumatic Stress in respondents; larger caseload sizes also appears have impacted the incidence of STS as well. In contrast, working in a community setting - as opposed to private practice - was more likely to reduce STS. Likewise, a more positive supervisory relationship appears to be predictive of lower STS scores.

Turning to statistical inference, many of the variables appear to have significantly impacted the incidence of Secondary Traumatic Stress. The OLS estimates and significance probability values will be reported using $\alpha = .05$ significance cutoff. In the particular sample obtained for this study, female respondents and respondents possessing female supervisors both significantly predicted an increase in STS, $t = 3.26, p < .01$, and $t = 2.45, p = .02$, respectively; 92% of respondents were female, and 84% of respondents reported having female supervisors. Compared to respondents reporting personal incomes of \$35,000 or less, respondents reporting incomes between \$35,000 and \$45,000 per year possessed significantly lower STS scores, $t = -2.24, p = .03$. In addition, client caseload size was significant, $t = 2.30, p = .02$, as well as respondents extent of experiencing anxiety, $t = 2.76, p = .01$. Finally, the supervisory relationship was highly significant, $t = -3.87, p < .001$.

Table 3.1. *Descriptive statistics for demographic and other key variables*

	%	or <i>M</i> (<i>SD</i>)	95% CI	Range (Median)
Gender (%)				
Male		8.33	-	-
Female		91.67	-	-
Race/ethnicity (%)				
White		68.52	-	-
African American		24.07	-	-
Other		7.41	-	-
Income, personal (%)				
\$35,000 or less		19.44	-	-
\$35,000 - \$45,000		36.11	-	-
\$45,000 - \$55,000		27.78	-	-
\$55,000 or more		16.67	-	-
Personal trauma, lifetime (%)				
No		28.70	-	-
Yes		71.30	-	-
Frequency of clinical supervision (%)				
Weekly		43.52	-	-
Every other week		33.33	-	-
Once a month		23.15	-	-
Work primarily involves direct traumatized client contact (%)				
No		70.37	-	-
Yes		29.63	-	-
Age (years)		35.53 (10.27)	33.57, 37.49	25 - 65 (32)
Social work experience (years)		6.82 (6.66)	5.55, 8.09	0 - 35 (4.92)
Work hours (weekly)		40.32 (8.34)	38.73, 41.92	8 - 65 (40)
Caseload size		22.67 (18.62)	19.11, 26.21	0 - 115 (18)
Caseload trauma		3.31 (.96)	3.12, 3.49	1 - 5 (3)
Secondary traumatic stress		33.07 (10.80)	31.01, 35.13	17 - 78 (32)
Supervisory relationship		4.70 (.80)	4.54, 4.85	2.41 - 5.98 (4.8)

N = 108

Table 3.2.1 *Elastic net selection, final results showing fit and selection statistics*

Model ($\alpha = .82$)	Variables	Model <i>df</i>	Error <i>df</i>	R^2	<i>AIC</i>	<i>BIC</i>	<i>cvMSE</i>	Minima
1	5	9	97	.13	817.71	847.11	123.58	
2	7	11	95	.32	795.71	830.45	123.39	
3	7	11	95	.32	795.71	830.45	122.53	
4	7	11	95	.32	795.71	830.45	120.31	
5	8	12	94	.36	791.02	828.44	117.58	<i>BIC</i>
6	9	13	93	.38	788.71	828.80	114.82	
7	9	13	93	.38	788.71	828.80	111.91	
8	9	13	93	.38	788.71	828.80	109.50	
9	9	13	93	.38	788.71	828.80	107.40	
10	10	14	92	.40	787.37	830.14	105.44	
11	10	14	92	.40	787.37	830.14	103.5	
12	10	14	92	.40	787.37	830.14	101.84	
13	10	14	92	.40	787.37	830.14	100.56	
14	11	15	91	.42	785.63	831.07	99.61	<i>AIC</i>
15	11	15	91	.42	785.63	831.07	98.81	
16	12	16	90	.43	786.57	834.68	98.09	
17	12	16	90	.43	786.57	834.68	97.55	
18	13	17	89	.43	787.82	838.60	96.99	
19	13	17	89	.43	787.82	838.60	96.59	
20	14	18	88	.44	789.17	842.63	96.55	<i>cvMSE</i>
21	14	18	88	.44	789.17	842.63	96.78	
22	14	18	88	.44	789.17	842.63	97.11	

Table 3.2.2. *Elastic net and ordinary least squares statistics, final results*

	Elastic Net Estimates	OLS Estimates	<i>SE</i>	<i>t</i>	<i>p</i>
Intercept	27.504	29.150	7.92	3.681	<.001
Gender (Female)	8.865	10.607	3.258	3.256	.002
Race/ethnicity (African American)	-2.906	-3.52	2.273	-1.549	.125
Race/ethnicity (Other)	.122	.892	3.502	.255	.8
Personal income (\$35k - \$45k)	-5.216	-5.925	2.645	-2.24	.027
Personal income (\$45k - \$55k)	-4.551	-4.146	2.826	-1.467	.146
Personal income \$55k or more	-4.015	-3.496	2.996	-1.167	.246
Supervisor gender (Female)	2.824	6.176	2.525	2.446	.016
Supervision frequency (Every Other Week)	2.727	3.588	2.20	1.631	.106
Supervision frequency (Once a Month)	3.549	4.095	2.383	1.718	.089
Caseload size	.075	.127	.055	2.295	.024
Extent client caseload traumatized	1.764	1.643	.993	1.654	.102
Extent of own anxiety	1.9	2.742	.995	2.756	.007
Supervisory relationship rating of current supervisor	-3.169	-4.884	1.263	-3.867	<.001
Work in community setting	-.103	-3.52	1.957	-1.799	.075
Work primarily involves direct traumatized client contact	1.134	3.537	2.035	1.738	.086

OLS=ordinary least squares

Table 3.3.1. *Best subsets results, final results showing model fit and selection criteria*

Model	Variables	Model <i>df</i>	Error <i>df</i>	R^2	<i>AIC</i>	<i>BIC</i>	Minima
1	6	10	96	0.25	20.98	21.2	
2	7	11	95	0.32	12.82	15.09	
3	8	12	94	0.36	9.01	13.08	<i>BIC</i>
4	9	13	93	0.38	7.46	13.44	
5	10	14	92	0.41	6.61	14.53	
6	11	15	91	0.42	5.93	15.71	<i>AIC</i>
7	12	16	90	0.43	7.13	19.32	
8	13	17	89	0.43	8.57	23.24	
9	14	18	88	0.44	10.09	27.26	
10	15	19	87	0.44	11.74	31.47	

df = degrees of freedom; *AIC* = Akaike's Information Criterion; *BIC* = Bayesian Information Criterion

Table 3.3.2. *Best subsets final results showing ordinary least squares statistics*

	OLS Estimates	SE	t	p
Intercept	29.150	7.92	3.681	<.001
Gender (Female)	10.607	3.258	3.256	.002
Race/ethnicity (African American)	-3.52	2.273	-1.549	.125
Race/ethnicity (Other)	.892	3.502	.255	.8
Personal income (\$35k - \$45k)	-5.925	2.645	-2.24	.027
Personal income (\$45k - \$55k)	-4.146	2.826	-1.467	.146
Personal income \$55k or more	-3.496	2.996	-1.167	.246
Supervision frequency (Every Other Week)	3.588	2.2	1.631	.106
Supervision frequency (Once a Month)	4.095	2.383	1.718	.089
Extent client caseload traumatized	1.643	.993	1.654	.102
Supervisor gender (Female)	6.176	2.525	2.446	.016
Caseload size	.127	.055	2.295	.024
Extent of own anxiety	2.742	.995	2.756	.007
Supervisory relationship rating of current supervisor	-4.884	1.263	-3.867	<.001
Work in community setting	-3.52	1.957	-1.799	.075
Work primarily involves direct traumatized client contact	3.537	2.035	1.738	.086

OLS - ordinary least squares;

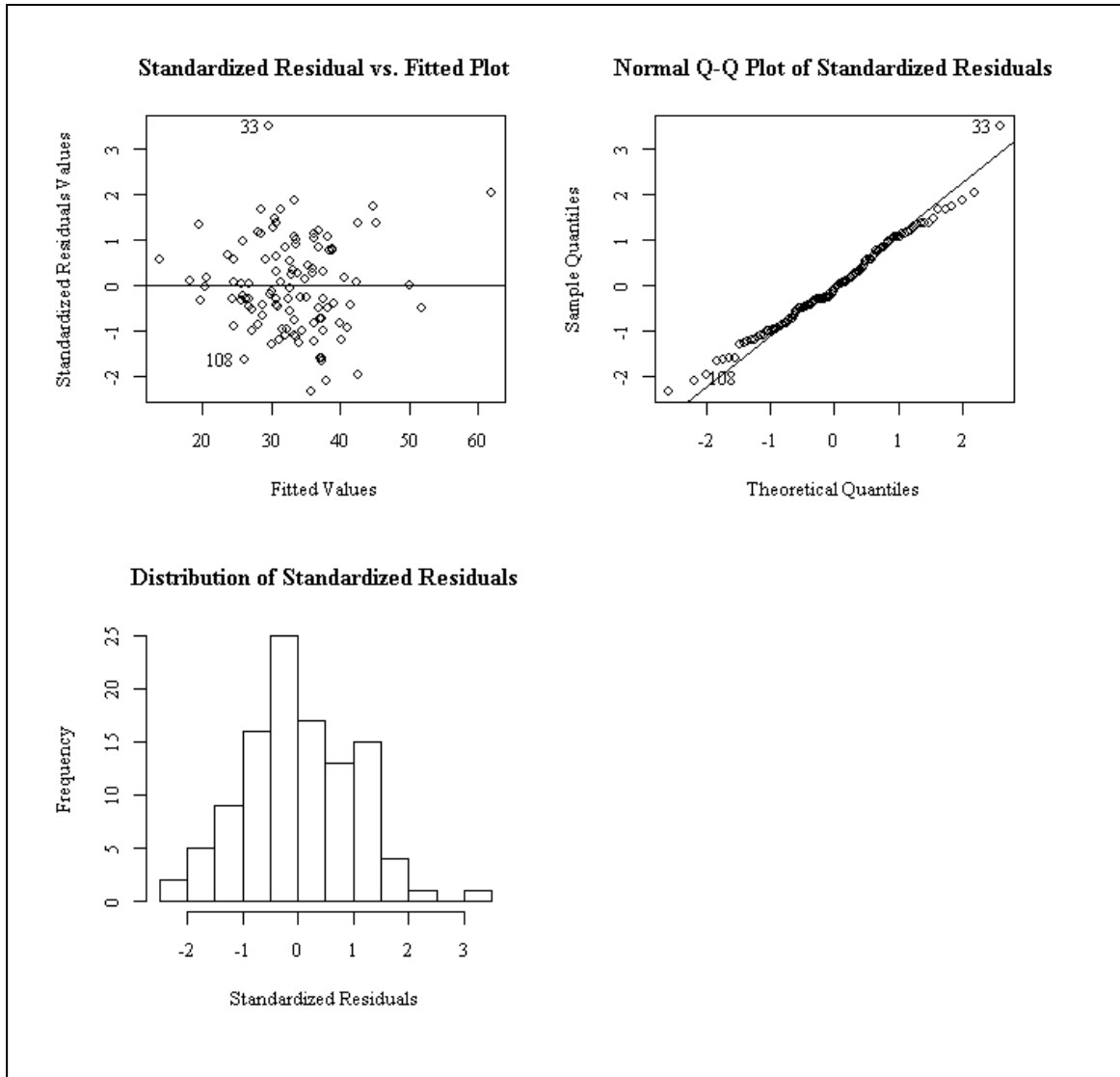


Figure 3.1.1. Elastic net model, standardized residual versus fitted value plot, standardized residual Q-Q plot, and histogram of standardized residuals showing outliers.

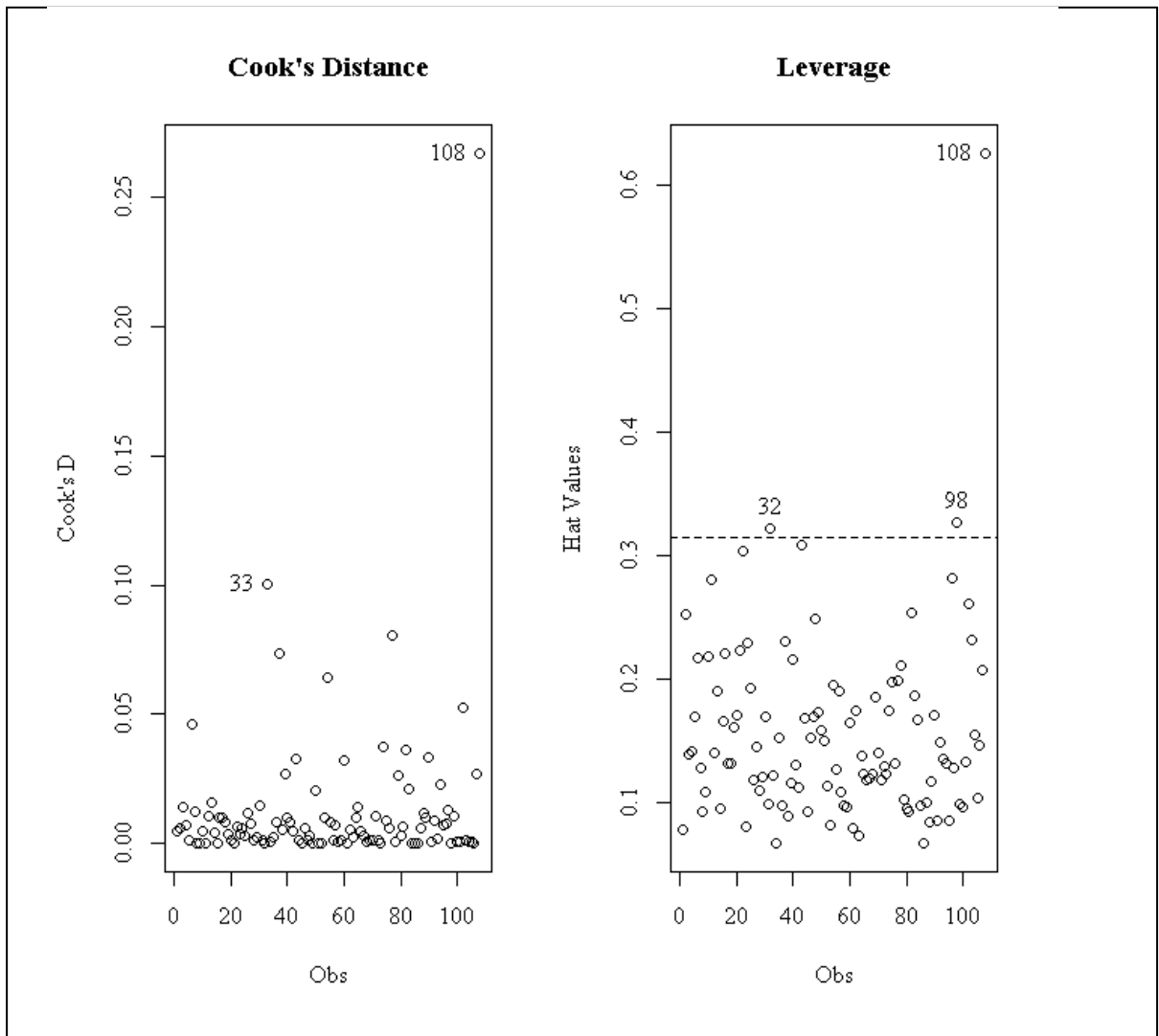


Figure 3.1.2. Elastic net model, influence and leverage plots showing outliers by observation number.

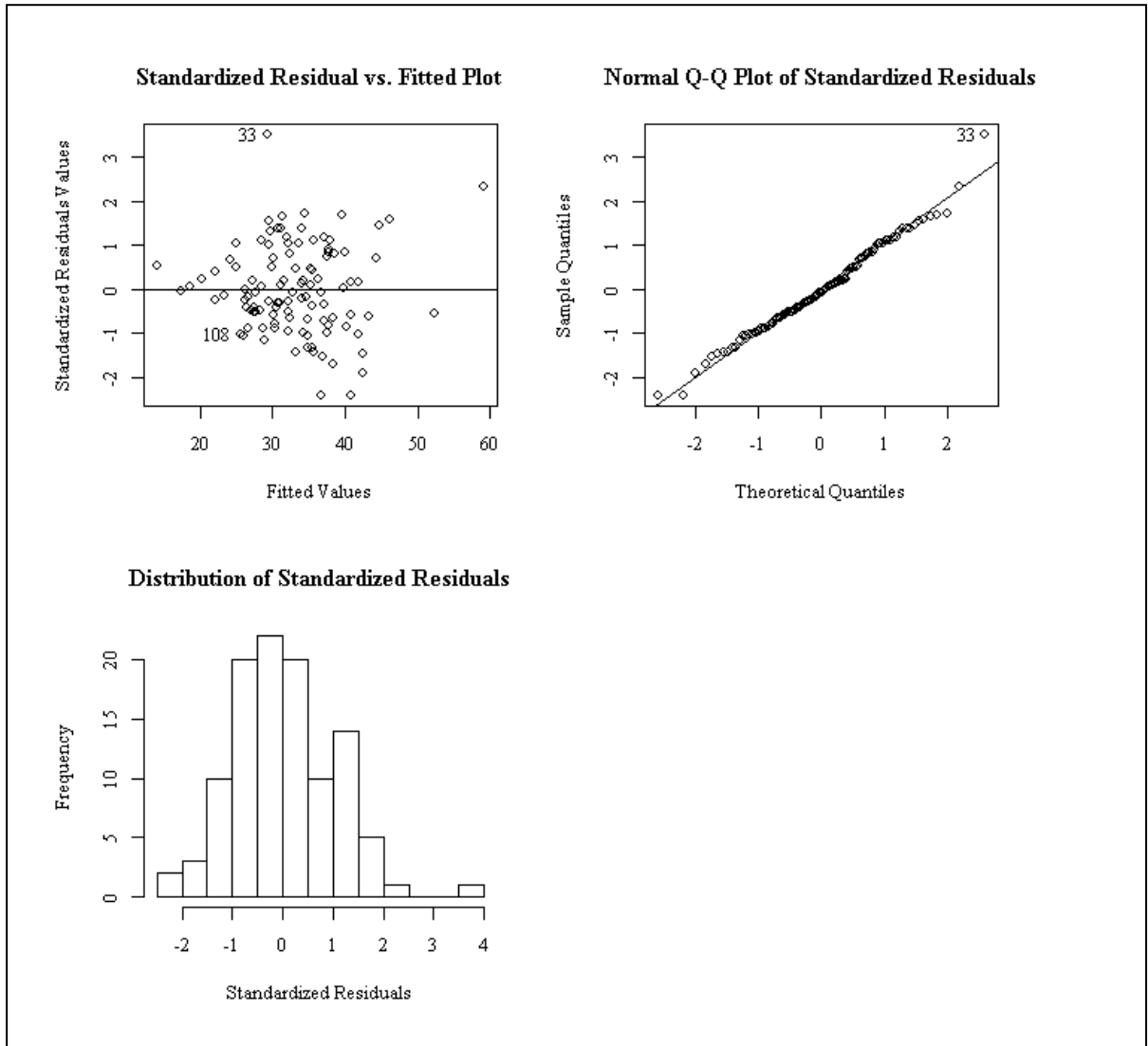


Figure 3.2.1. Best subsets model, standardized residual versus fitted value plot, standardized residual Q-Q plot, and histogram of standardized residuals showing outliers.

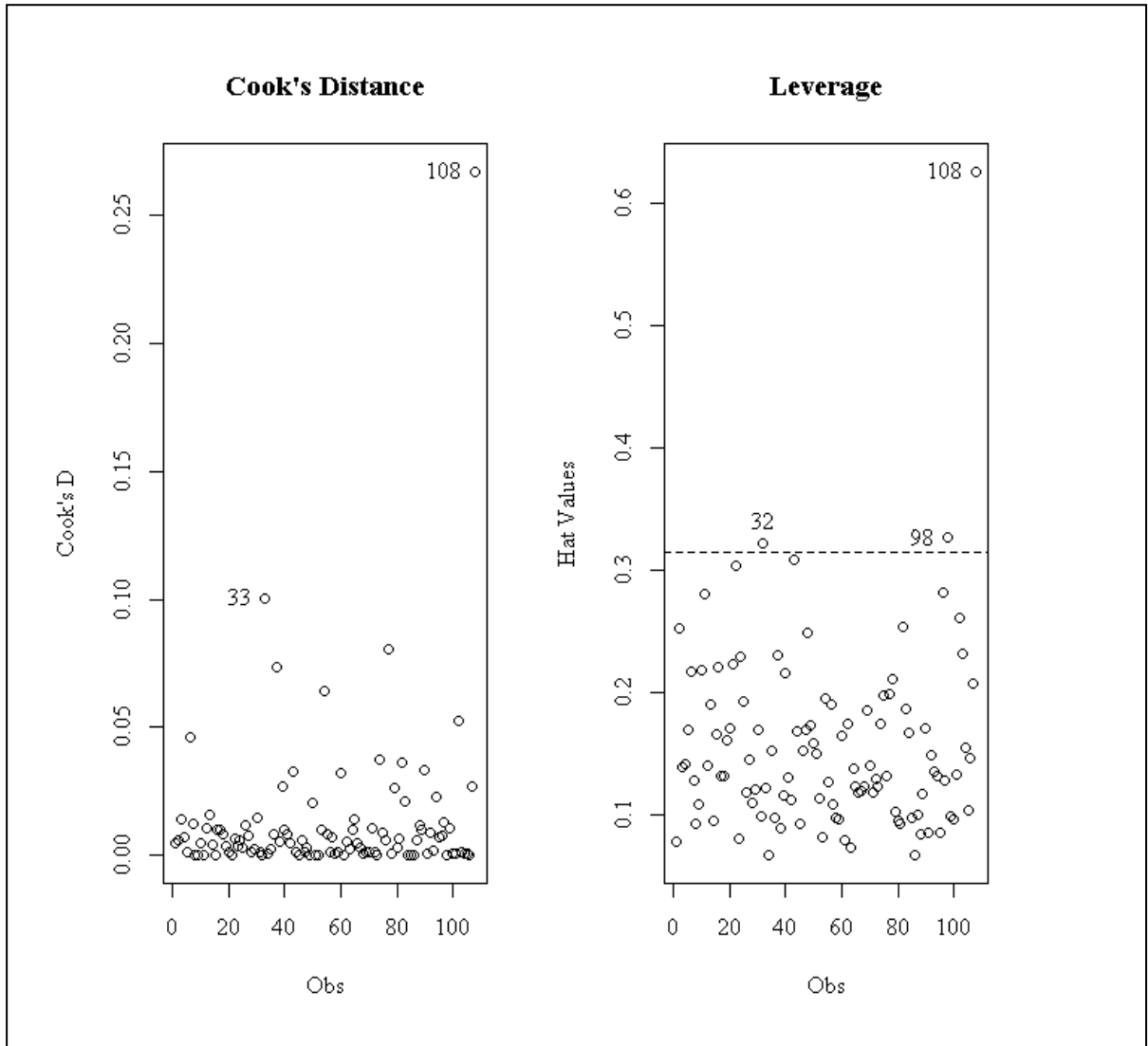


Figure 3.2.2. Best subsets model, influence and leverage plots showing outliers by observation number.

CHAPTER 4

DISCUSSION

This study was the first of its kind in that it sought to obtain a “best” subset of variables that predict secondary traumatic stress (STS) among masters-level clinical social workers. Moreover, this study’s primary objective was to examine the extent that the clinical supervisory relationship impacted the incidence of STS. The primary findings suggest that the quality of the supervisory relationship is a strong negative predictor of STS. Furthermore, among many candidate variables, two variable selection methods employed in this study consistently retained the supervisory relationship variable, suggesting that this variable may be a strong predictor of STS.

Specifically, positive ratings of the supervisory relationship were found to be significantly associated with lower STS scores after controlling for frequency of supervision, supervisor gender, and respondent’s own experience of anxiety, in addition to other demographic variables. This finding suggests that clinical supervision is an important factor in social workers’ experiencing trauma symptoms resulting from their chosen profession.

Secondary traumatic stress is hypothesized to occur as a result of clinical exposure to traumatized clients. In the current study, this hypothesis was not supported. Although the measure of respondent-reported traumatized client caseloads was positively associated with STS, it failed to possess statistical significance at or below a 5% probability level. A second variable that indicated whether or not the respondents worked primarily in direct contact with traumatized clients was also positively associated with STS, but failed to be statistically significant as well.

Among the sample of clinical social workers surveyed in this study, approximately 30% indicated that their work primarily involved direct contact with traumatized clients.

This study's findings suggest that despite experiencing exposure to traumatized clients, other factors may contribute to the incidence of STS among clinical social workers. The results from this study suggest that personal yearly income, caseload size, the degree of experiencing anxiety, and the quality of the supervisory relationship may protect the social worker against, or leave the social worker vulnerable to, the onset of secondary traumatic stress symptoms.

CHAPTER 5

RECOMMENDATIONS

Practice recommendations

The findings reported in this study suggest a number of recommendations for social work practice. At an administrative level, the results suggest that providing clinical social workers low salaries, assigning them large client caseloads, and providing poor-quality clinical supervision may increase the risk of social workers developing STS. With the costs of providing health insurance, increased employee turnover, and lost productivity due to STS and burnout in mind, administrators may be able to reduce financial losses in the long run by providing higher salaries, reasonable client caseloads, and skilled clinical supervisors to clinical social workers, particular those social workers that primarily work with traumatized clients. At an individual level, the results suggest that social workers experiencing anxiety may possess an increased vulnerability to developing STS. Personal self-care to reduce daily anxiety levels may be important to protect clinical social workers from developing STS symptoms. Likewise, administrators can also play a role by providing free or reduced-cost stress-relief activities for their employees.

Future research

This study is one of few that examine the quality of the supervisory relationship as a predictor of STS among clinical social workers. Further examination of the supervisory relationship, as well as other aspects of social workers' work experiences, are needed in order to build an evidence base with the potential to affect positive change in the workplace as well as at the policy level. Future research should address the extent that the supervisory relationship

mediates and moderates the hypothesized causal pathway between exposure to client trauma and the onset of STS. In addition, research should examine the positive benefits of providing workplace anxiety-reduction programs (e.g., yoga and other forms of stress-reduction activities provided in the workplace or at reduced cost outside the workplace may be a productive starting point for this type of research).

Limitations

This study possessed a number of limitations. First, the survey response rate was relatively low - though comparable to similar studies examining STS. Social workers who did not respond to the survey may possess qualitatively different characteristics compared to the respondents. For example, social workers with higher levels of STS may have been more likely to respond because the survey possessed personal meaning to them. In contrast, avoidance of trauma-related stimuli is a cornerstone of typical trauma symptoms and, therefore, social workers with higher levels of trauma may have been more likely to be nonrespondents. In addition, the sample of social workers in this study was selected based on increasing the chances of obtaining respondents who were currently receiving clinical supervision. As a result, the sample may not be representative of the population of social workers who experience secondary trauma. A third limitation was that the data was cross-sectional in nature and therefore limits the ability to draw inferences regarding causal pathways between exposure and trauma, as well as between the supervisory relationship and STS. Finally, this study attempted to obtain a “best” subset of predictor variables from a relatively limited number of candidate variables. Other factors which are important to understanding STS may have been overlooked in the current survey.

CHAPTER 6

CONCLUSION

This study examined predictors of secondary traumatic stress, with a focus on beneficial aspects of clinical supervisory relationship among masters-level clinical social workers. Specifically, this study employed two variable selection methods in order to obtain a best predictive subset of variables, obtained from a larger set of candidate variables. The findings suggest that salary, caseload size, anxiety, and the quality of the supervisory relationship may be salient factors in the development of secondary trauma among social workers, particularly those working with traumatized client populations. In particular, positively-rated supervisory relationships predicted a substantial decrease in the degree to which a social worker possessed secondary trauma symptoms. The quality of the supervisory relationship may be an important aspect in protecting social workers from developing secondary traumatic stress.

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APPENDIX

Table A.1. *Survey document*

INSTRUCTIONS: Please provide the following information.

1) Gender: _____ Female _____ Male

2) Current Age: _____

3) Ethnicity: _____ African American _____ Native American
 _____ Asian/Asian American _____ Multiethnic
 _____ Caucasian _____ Other (please specify)
 _____ Hispanic/Latino _____

4) Personal Income: _____ Less than \$25,000 _____ \$55,001 - \$65,000
 _____ \$25,001 - \$35,000 _____ \$65,001 - \$75,000
 _____ \$35,001 - \$45,000 _____ \$75,000 - \$85,000
 _____ \$45,001 - \$55,000 _____ More than \$85,000

5) Household Income: _____ Less than \$25,000 _____ \$55,001 - \$65,000
 _____ \$25,001 - \$35,000 _____ \$65,001 - \$75,000
 _____ \$35,001 - \$45,000 _____ \$75,000 - \$85,000
 _____ \$45,001 - \$55,000 _____ More than \$85,000

6) Highest Earned Social Work Degree: _____ BSW/BSSW Year granted _____
 _____ MSW/MSSW Year granted _____
 _____ Ph.D./DSW Year granted _____

7) Length of social work experience: Total _____ years _____ months
 post-Masters _____ years _____ months
 post-Bachelors* _____ years _____ Months

* (if you have both a bachelors and masters degree only include experience up to the time of receipt of Masters degree in the space for post-Bachelors experience)

8) In a typical week, what is the average number of hours you work? _____

9) In a typical week, how many hours do you work in each of the following settings:

Note: Total should be equal to the amount noted in item 8.

_____ Public _____ Private Practice
 _____ Private, non-profit _____ Private, for profit (not private practice)
 _____ Other _____

10) During a typical week how many hours do you spend in the following fields of practice:

Note: Total should be equal the amount noted in item 8.

_____ Health Care	_____ School Social Work
_____ Mental Health	_____ Substance Abuse
_____ Developmental Disability	_____ Community Organization
_____ Public Welfare	_____ Other (please specify)
_____ Child Welfare	_____

11) Length of time in current setting: _____ years _____ months

12) Length of time in current position: _____ years _____ months

13) During a typical week, how many hours are you engaged in the following activities:

Note: Total should be equal to the amount noted in item 8.

_____ Direct client contact (i.e., face-to-face, telephone)
_____ Client related activities (i.e., charting, treatment planning, case review, etc.)
_____ Provision of clinical supervision to direct service providers
_____ Other clinical activities not identified above
_____ Research/Evaluation
_____ Professional education
_____ Administration/Management
_____ Policy activities
_____ Other non-clinical activities

14) During a typical week, how many hours are you engaged in the following activities specifically related to traumatized clients?

_____ Direct client contact (i.e., face-to-face, telephone) with traumatized clients.
_____ Client related activities (i.e., charting, treatment planning, case review, etc.) related to traumatized clients
_____ Provision of clinical supervision to direct service providers related to traumatized clients
_____ Other clinical activities not identified above related to traumatized clients
_____ Research/evaluation related to trauma issues
_____ Professional activities related to trauma issues

15) In a typical week, how many individuals do you provide services to? _____

16) How many of those individuals are between the ages of:

Note: Total should equal amount specified in item 15.

0 - 12 years _____ 13 - 17 years _____ 18 - 55 years _____ 56+ years _____

17) Of those individuals served in a typical week (the number identified in item 15) how many have experienced the following traumas either as a child (prior to age 18) or as an adult (age 18+):

	As a child	As an adult	
a)			Physical abuse or assault
b)			Sexual abuse or assault
c)			Combat or combat like situation
d)			Natural or man-made disaster
e)			Diagnosis of a life threatening illness
f)			Diagnosis of family member/friend with life-threatening illness
g)			Life-threatening accident
h)			None of the above traumatic events
i)			Other (please list):

18) Please indicate with a check mark if you have personally experienced any of the following traumas either in the past year or in your lifetime?

	Past year	Lifetime	
a)			Physical abuse or assault
b)			Sexual abuse or assault
c)			Combat or combat like situation
d)			Natural or man-made disaster
e)			Diagnosis of a life threatening illness
f)			Diagnosis of family member/friend with life-threatening illness
g)			Life-threatening accident
h)			None of the above traumatic events
i)			Other:

19) Overall, to what extent is your client population traumatized?

1	2	3	4	5
not at all	mildly	moderately	severely	very severely

20) To what extent does your work with clients address issues related to their traumatic experiences?

1	2	3	4	5
not at all	mildly	moderately	severely	very severely

21) To what extent have you experienced symptoms of depression?

1	2	3	4	5
not at all	mildly	moderately	severely	very severely

22) To what extent have you experienced symptoms of anxiety?

1	2	3	4	5
not at all	mildly	moderately	severely	very severely

[Secondary Traumatic Stress Scale]

The following is a list of statements made by persons who have been impacted by their work with traumatized clients. Read each statement, then indicate how frequently the statement was true for you in the past seven (7) days by circling the corresponding number next to the statement.

		Never	Rarely	Occasionally	Often	Very Often
1)	I felt emotionally numb.	1	2	3	4	5
2)	My heart started pounding when I thought about my work with clients.	1	2	3	4	5
3)	It seemed as if I was reliving the trauma(s) experienced by my client(s).	1	2	3	4	5
4)	I had trouble sleeping.	1	2	3	4	5
5)	I felt discouraged about the future.	1	2	3	4	5
6)	Reminders of my work with clients upset me.	1	2	3	4	5
7)	I had little interest in being around others.	1	2	3	4	5
8)	I felt jumpy.	1	2	3	4	5
9)	I was less active than usual.	1	2	3	4	5
10)	I thought about my work with clients when I didn't intend to.	1	2	3	4	5
11)	I had trouble concentrating.	1	2	3	4	5
12)	I avoided people, places, or things that reminded me of my work with clients.	1	2	3	4	5
13)	I had disturbing dreams about my work with clients.	1	2	3	4	5
14)	I wanted to avoid working with some clients.	1	2	3	4	5
15)	I was easily annoyed.	1	2	3	4	5
16)	I expected something bad to happen.	1	2	3	4	5
17)	I noticed gaps in my memory about client sessions.	1	2	3	4	5

The following questions ask about your current clinical supervision. If you meet with more than one supervisor regularly, please think about the supervisor with whom you meet most frequently while answering the questions below.

*If you do not meet regularly with a clinical supervisor to discuss your work with clients (e.g., less than twice per month), please think of the primary person with whom you consult regularly regarding your clients, such as an informal supervisor or a professional colleague/peer. If you meet in a group supervision/consultation setting only, please think about the primary leader of this group while answering the questions below.

1) Please indicate the gender of your supervisor: _____ Female _____ Male

2) How often do you meet with this supervisor? _____ Once a week _____ Twice a week
 _____ Every other week _____ Once a month
 _____ Other

3) How long have you met with this supervisor for clinical supervision? _____ years _____ months

4) Approximately how much supervised clinical training (including in your Masters program) had you had prior to your current supervisor?

_____ years _____ months

5) How would you rate the quality of the supervision you have received?

1 Poor	2 Fair	3 Good	4 Excellent
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6) Overall, how satisfied are you with the supervision you have received?

1 Quite dissatisfied	2 Indifferent or mildly dissatisfied	3 Mostly satisfied	4 Very satisfied
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[Supervisory Relationship Inventory]

Please rate your supervisor on the following items according to your experience of the supervisory relationship. Circle the number to the right of each item which corresponds to how strongly you feel each statement is true or not true according to the key below. Please mark every item.

I strongly feel it is not true	I feel it is not true.	I feel it is probably untrue; more untrue than true.	I feel it is probably true, more true than untrue.	I feel it is true.	I strongly feel it is true.
1	2	3	4	5	6

1	My supervisor respects me.	1	2	3	4	5	6
2	My supervisor understands my words but not the way I feel.	1	2	3	4	5	6
3	My supervisor pretends that she/he likes me or understands me more than she/he really does.	1	2	3	4	5	6
4	My supervisor prefers to talk only about me and not at all about her/him.	1	2	3	4	5	6
5	My supervisor likes seeing me.	1	2	3	4	5	6
6	My supervisor is interested in knowing what my experiences mean to me.	1	2	3	4	5	6
7	My supervisor is disturbed whenever I talk about or ask about certain things.	1	2	3	4	5	6
8	If I feel negatively toward my supervisor, she/he responds negatively to me.	1	2	3	4	5	6
9	My supervisor appreciates me.	1	2	3	4	5	6
10	Sometimes my supervisor thinks that I feel a certain way, because she/he feels that way.	1	2	3	4	5	6
11	My supervisor behaves just the way she/he is, in our relationship.	1	2	3	4	5	6
12	My supervisor will freely tell me her/his own thoughts and feelings, when I want to know them.	1	2	3	4	5	6
13	My supervisor cares about me.	1	2	3	4	5	6
14	My supervisor's own attitudes toward some of the things I say, or do, stop her/him from really understanding me.	1	2	3	4	5	6
15	I do not think that my supervisor hides anything that she/he feels toward me.	1	2	3	4	5	6

16	Sometimes my supervisor is warmly responsive to me, at other times cold or disapproving.	1	2	3	4	5	6
17	My supervisor is interested in me.	1	2	3	4	5	6
18	My supervisor appreciates what my experiences feel like to me.	1	2	3	4	5	6
19	I feel that I can trust my supervisor to be honest with me.	1	2	3	4	5	6
20	I feel that my supervisor adopts a professional role which makes it hard for me to know what she/he is like as a person.	1	2	3	4	5	6
21	My supervisor does not really care what happens to me.	1	2	3	4	5	6
22	My supervisor does not realize how strongly I feel about some of the things we discuss.	1	2	3	4	5	6
23	There are times when I feel that my supervisor's outward response is quite different from her/his inner reaction to me.	1	2	3	4	5	6
24	Depending on my supervisor's mood, she/he sometimes responds to me with quite a lot more warmth and interest than at other times.	1	2	3	4	5	6
25	My supervisor seems to really value me.	1	2	3	4	5	6
26	My supervisor responds to me mechanically.	1	2	3	4	5	6
27	I don't think that my supervisor is being honest with herself or himself about the way she/he feels toward me.	1	2	3	4	5	6
28	My supervisor wants to say as little as possible about her/his own thoughts and feelings.	1	2	3	4	5	6
29	My supervisor feels deep affection for me.	1	2	3	4	5	6
30	My supervisor usually understands all of what I say to her/him.	1	2	3	4	5	6
31	Sometimes my supervisor is not at all comfortable but we go on, outwardly ignoring it.	1	2	3	4	5	6
32	My supervisor's general feeling toward me varies considerably.	1	2	3	4	5	6
33	My supervisor regards me as a disagreeable person.	1	2	3	4	5	6
34	When I do not say what I mean at all clearly, my supervisor still understands me.	1	2	3	4	5	6
35	I feel that my supervisor is being genuine with me.	1	2	3	4	5	6
36	My supervisor's own feelings and thoughts are always available to me, but never imposed on me.	1	2	3	4	5	6
37	At times my supervisor feels contempt for me.	1	2	3	4	5	6
38	Sometimes my supervisor responds quite positively to me, at other times she/he seems indifferent.	1	2	3	4	5	6
39	My supervisor does not try to mislead me about her/his own thoughts or feelings.	1	2	3	4	5	6
40	My supervisor can be deeply and fully aware of my most painful feelings without being distressed or burdened by them herself/himself.	1	2	3	4	5	6

Thank you for completing this questionnaire!
Please return in the stamped envelope provided.

Table A.2.0. *Multicollinearity statistics with all variables in dataset*

	r_{DV}	VIF	Condition Indices (> 10)
			10.8
sex_c(1)Female	.12	1.5	.
race_c(2)African American		2	.
race_c(3)Other		1.7	.
pincome_c(2)\$35k - 45k		4.5	41
pincome_c(3)\$45k - 55k		3.9	.
pincome_c(4)\$55k or more		3.1	.
hincome_c(2)\$35k - 55k		9.1	87
hincome_c(3)\$55k - 85k		7.5	85
hincome_c(4)\$85k or more		8.6	87
sexsup_c(1)Female	.18	1.6	.
supfrq_c(2)Every Other Week		2	.
supfrq_c(3)Once a Month		1.9	.
iownpytraum_c(1)Past-year Trauma	.11	1.7	.
iownlttraum_c(1)Life-time Trauma	-.03	2	.
age	-.06	3	.
mswyr	.15	3.4	.
swexpyrs	-.1	2.9	.
curjobyrs	-.07	3.7	.
curposyrs	-.06	3.8	.
workhrs	.08	1.9	.
csldfrq	.1	7.9	.
csldtraum	.23	2.7	.
traumtx	-.05	2.2	.
csldfrq12	-.09	2.8	.
csldfrq13to17	-.14	4.2	.
csldfrq18to55	.19	4	.
csldfrq56	.17	3.3	.
owndep	.35	3	.
ownanx	.4	3	.
curupyrs	-.13	2.6	.
pstsupyrs	-.21	3.2	.
supqual	-.21	6.4	.
supsat	-.2	5	.
sritot	-.25	2.4	.
icommset_c(1)Work Community Setting	.02	1.8	.
imhfld_c(1)Work Mental Health Field	.09	1.9	.
iwkhrtx_c(1)Work Hrs Direct Client Contact	.06	2.3	.
itraumhrtx_c(1)Work Hrs Direct Trauma Client Contact	.17	2	.

Table A.2.0. *Multicollinearity statistics with all variables in dataset*

	r_{DV}	VIF	Condition Indices (> 10)
iclddevtraum_c(1)Work Clients with Dev.Trauma	.09	1.7	.
icldleptraum_c(1)Work Clients with Ep.Trauma	.05	1.8	.

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

Table A.2.1. *Multicollinearity statistics after 1 variable was removed*

	r_{DV}	VIF
sex_c(1)Female	.12	1.5
race_c(2)African American		2
race_c(3)Other		1.5
pincome_c(2)\$35k - 45k		3.5
pincome_c(3)\$45k - 55k		3.4
pincome_c(4)\$55k or more		2.5
sexsup_c(1)Female	.18	1.6
supfrq_c(2)Every Other Week		1.8
supfrq_c(3)Once a Month		1.7
iownpytraum_c(1)Past-year Trauma	.11	1.7
iownlttraum_c(1)Life-time Trauma	-.03	1.6
age	-.06	3
mswyr	.15	3.3
swexpyrs	-.1	2.8
curjobyrs	-.07	3.5
curposyrs	-.06	3.8
workhrs	.08	1.8
csldfrq	.1	7.7
csldtraum	.23	2.6
traumtx	-.05	2.2
csldfrq12	-.09	2.8
csldfrq13to17	-.14	3.9
csldfrq18to55	.19	3.9
csldfrq156+	.17	3.2
owndep	.35	2.7
ownanx	.4	2.9
cursupyrs	-.13	2.5
pstsupyrs	-.21	3.2
supqual	-.21	6.3
supsat	-.2	4.9
sritot	-.25	2.4
icommset_c(1)Work Community Setting	.02	1.6
imhfld_c(1)Work Mental Health Field	.09	1.8

Table A.2.1. *Multicollinearity statistics after 1 variable was removed*

	r_{DV}	VIF
iwkhrtx_c(1)Work Hrs Direct Client Contact	.06	2.2
itraumhrtx_c(1)Work Hrs Direct Trauma Client Contact	.17	1.9
icldevtraum_c(1)Work Clients with Dev.Trauma	.09	1.6
icleptraum_c(1)Work Clients with Ep.Trauma	.05	1.7

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

Table A.2.2. *Multicollinearity statistics after 5 variables were removed*

	r_{DV}	VIF
sex_c(1)Female	.12	1.4
race_c(2)African American		1.7
race_c(3)Other		1.4
pincome_c(2)\$35k - 45k		3.2
pincome_c(3)\$45k - 55k		3
pincome_c(4)\$55k or more		2.2
sexsup_c(1)Female	.18	1.6
supfrq_c(2)Every Other Week		1.8
supfrq_c(3)Once a Month		1.7
iownpytraum_c(1)Past-year Trauma	.11	1.5
iownlttraum_c(1)Life-time Trauma	-.03	1.6
age	-.06	2.9
mswyr	.15	3
swexpyrs	-.1	2.5
curjobyrs	-.07	3.4
curposyrs	-.06	3.7
workhrs	.08	1.6
csldfrq	.1	1.6
csldtraum	.23	2.4
traumtx	-.05	2.1
owndep	.35	2.7
ownanx	.4	2.8
cursupyrs	-.13	2.3
pstsupyrs	-.21	2.9
supqual	-.21	5.6
supsat	-.2	4.4
sritot	-.25	2.2
icommset_c(1)Work Community Setting	.02	1.6
imhfld_c(1)Work Mental Health Field	.09	1.7
iwkhrtx_c(1)Work Hrs Direct Client Contact	.06	2.1
itraumhrtx_c(1)Work Hrs Direct Trauma Client Contact	.17	1.9

Table A.2.2. *Multicollinearity statistics after 5 variables were removed*

	r_{DV}	VIF
icldevtraum_c(1)Work Clients with Dev.Trauma	.09	1.6
icleptraum_c(1)Work Clients with Ep.Trauma	.05	1.5

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

Table A.2.3. *Multicollinearity statistics after 6 variables were removed*

	r_{DV}	VIF
sex_c(1)Female	.12	1.4
race_c(2)African American		1.7
race_c(3)Other		1.4
pincome_c(2)\$35k - 45k		3
pincome_c(3)\$45k - 55k		3
pincome_c(4)\$55k or more		2.2
sexsup_c(1)Female	.18	1.5
supfrq_c(2)Every Other Week		1.8
supfrq_c(3)Once a Month		1.7
iownpytraum_c(1)Past-year Trauma	.11	1.5
iownlttraum_c(1)Life-time Trauma	-.03	1.6
age	-.06	2.8
mswyr	.15	3
swexpyrs	-.1	2.5
curjobyrs	-.07	3.3
curposyrs	-.06	3.6
workhrs	.08	1.6
csldfrq	.1	1.6
csldtraum	.23	2.4
traumtx	-.05	2.1
owndep	.35	2.6
ownanx	.4	2.8
cursupyrs	-.13	2.2
pstsupyrs	-.21	2.9
supsat	-.2	1.8
sritot	-.25	2
icommset_c(1)Work Community Setting	.02	1.6
imhfld_c(1)Work Mental Health Field	.09	1.7
iwkhrtx_c(1)Work Hrs Direct Client Contact	.06	2
itraumhrtx_c(1)Work Hrs Direct Trauma Client Contact	.17	1.9
icldevtraum_c(1)Work Clients with Dev.Trauma	.09	1.6
icleptraum_c(1)Work Clients with Ep.Trauma	.05	1.5

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

Table A.2.4. *Multicollinearity statistics after 7 variables were removed*

	r_{DV}	VIF
sex_c(1)Female	.12	1.3
race_c(2)African American		1.7
race_c(3)Other		1.4
pincome_c(2)\$35k - 45k		3
pincome_c(3)\$45k - 55k		3
pincome_c(4)\$55k or more		2.2
sexsup_c(1)Female	.18	1.5
supfrq_c(2)Every Other Week		1.8
supfrq_c(3)Once a Month		1.7
iownpytraum_c(1)Past-year Trauma	.11	1.5
iownlttraum_c(1)Life-time Trauma	-.03	1.6
age	-.06	2.8
mswyr	.15	2.9
swexpyrs	-.1	2.4
curjobyrs	-.07	2
workhrs	.08	1.6
csldfrq	.1	1.5
csldtraum	.23	2.4
traumtx	-.05	2.1
owndep	.35	2.6
ownanx	.4	2.8
cursupyrs	-.13	1.9
pstsupyrs	-.21	2.7
supsat	-.2	1.8
sritot	-.25	2
icommset_c(1)Work Community Setting	.02	1.6
imhfld_c(1)Work Mental Health Field	.09	1.6
iwkhrtx_c(1)Work Hrs Direct Client Contact	.06	2
itraumhrtx_c(1)Work Hrs Direct Trauma Client Contact	.17	1.9
icldevtraum_c(1)Work Clients with Dev.Trauma	.09	1.6
icleptraum_c(1)Work Clients with Ep.Trauma	.05	1.4

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

Table A.2.5. *Multicollinearity statistics after 8 variables were removed*

	r_{DV}	VIF
sex_c(1)Female	.12	1.3
race_c(2)African American		1.7
race_c(3)Other		1.4
pincome_c(2)\$35k - 45k		3
pincome_c(3)\$45k - 55k		3

Table A.2.5. *Multicollinearity statistics after 8 variables were removed*

	r_{DV}	VIF
pincome_c(4)\$55k or more		2.2
sexsup_c(1)Female	.18	1.5
supfrq_c(2)Every Other Week		1.7
supfrq_c(3)Once a Month		1.7
iownpytraum_c(1)Past-year Trauma	.11	1.5
iownlttraum_c(1)Life-time Trauma	-.03	1.6
age	-.06	2.7
swexpyrs	-.1	2.1
curjobyrs	-.07	2
workhrs	.08	1.6
csldfrq	.1	1.4
csldtraum	.23	2.4
traumtx	-.05	2
owndep	.35	2.5
ownanx	.4	2.8
cursupyrs	-.13	1.9
pstsupyrs	-.21	2.1
supsat	-.2	1.8
sritot	-.25	2
icommset_c(1)Work Community Setting	.02	1.5
imhfld_c(1)Work Mental Health Field	.09	1.6
iwkhrtx_c(1)Work Hrs Direct Client Contact	.06	1.9
itraumhrtx_c(1)Work Hrs Direct Trauma Client Contact	.17	1.9
icldevtraum_c(1)Work Clients with Dev.Trauma	.09	1.6
iclepraum_c(1)Work Clients with Ep.Trauma	.05	1.4

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

Table A.2.6. *Multicollinearity statistics after 9 variables were removed*

	r_{DV}	VIF
sex_c(1)Female	.12	1.3
race_c(2)African American		1.7
race_c(3)Other		1.4
pincome_c(2)\$35k - 45k		3
pincome_c(3)\$45k - 55k		2.9
pincome_c(4)\$55k or more		2.2
sexsup_c(1)Female	.18	1.5
supfrq_c(2)Every Other Week		1.7
supfrq_c(3)Once a Month		1.7
iownpytraum_c(1)Past-year Trauma	.11	1.5
iownlttraum_c(1)Life-time Trauma	-.03	1.6

Table A.2.6. *Multicollinearity statistics after 9 variables were removed*

	r_{DV}	VIF
age	-.06	2.6
swexpyrs	-.1	2.1
curjobyrs	-.07	1.9
workhrs	.08	1.5
csldfrq	.1	1.4
csldtraum	.23	2.2
traumtx	-.05	2
ownanx	.4	1.7
cursupyrs	-.13	1.9
pstsupyrs	-.21	2.1
supsat	-.2	1.7
sritot	-.25	2
icommset_c(1)Work Community Setting	.02	1.5
imhfld_c(1)Work Mental Health Field	.09	1.6
iwkhrtx_c(1)Work Hrs Direct Client Contact	.06	1.9
itraumhrtx_c(1)Work Hrs Direct Trauma Client Contact	.17	1.8
icldevtraum_c(1)Work Clients with Dev.Trauma	.09	1.6
icleptraum_c(1)Work Clients with Ep.Trauma	.05	1.3

Shaded region indicates variables to be removed due to multicollinearity; r_{DV} = Pearson correlation with dependent variable (Secondary Traumatic Stress); VIF = variance inflation factor

Table A.3.1. Elastic net selection procedure results showing fit and selection criteria before outlier removal

Model ($\alpha = .61$)	Variables	Model <i>df</i>	Error <i>df</i>	R^2	<i>AIC</i>	<i>BIC</i>	<i>cvMSE</i>	Minima
1	5	9	98	.14	825.68	855.18	123.02	
2	7	11	96	.33	803.00	837.86	122.49	
3	7	11	96	.33	803.00	837.86	121.31	
4	7	11	96	.33	803.00	837.86	119.20	
5	7	11	96	.33	803.00	837.86	117.14	BIC
6	8	12	95	.35	801.20	838.75	115.18	
7	8	12	95	.35	801.20	838.75	113.33	
8	8	12	95	.35	801.20	838.75	111.77	
9	9	13	94	.38	798.09	838.32	110.45	
10	10	14	93	.39	798.37	841.29	109.05	
11	10	14	93	.39	798.37	841.29	107.72	
12	10	14	93	.39	798.37	841.29	106.64	
13	11	15	92	.40	798.7	844.3	105.76	
14	12	16	91	.42	796.86	845.14	105.00	AIC
15	13	17	90	.43	797.76	848.72	104.33	
16	13	17	90	.43	797.76	848.72	103.54	
17	14	18	89	.43	798.93	852.57	102.65	
18	15	19	88	.43	800.17	856.5	101.93	
19	15	19	88	.43	800.17	856.5	101.47	
20	15	19	88	.43	800.17	856.5	101.24	
21	16	20	87	.44	801.26	860.27	101.18	<i>cvMSE</i>
22	16	20	87	.44	801.26	860.27	101.31	

Models with minimum criterion shaded; *df* = degrees of freedom; *AIC* = Akaike's Information Criterion; *BIC* = Bayesian Information Criterion; *cvMSE* = cross-validated mean-squared error

Table A.3.2. *Elastic net and ordinary least squares statistics before outlier removal*

	Elastic Net Estimates	OLS Estimates	SE	<i>t</i>	<i>p</i>
(Intercept)	27.698	30.528	8.111	3.764	<.001
Gender (Female)	8.588	10.37	3.306	3.137	.002
Race/ethnicity (African American)	-3.195	-3.837	2.299	-1.669	.099
Race/ethnicity (Other)	-.002	1.049	3.571	0.294	.77
Personal income (\$35k - \$45k)	-4.773	-5.461	2.672	-2.044	.044
Personal income (\$45k - \$55k)	-4.272	-3.612	2.863	-1.262	.21
Personal income \$55k or more	-4.275	-3.044	3.127	-.973	.333
Supervisor gender (Female)	2.591	5.91	2.562	2.307	.023
Supervision frequency (Every Other Week)	2.29	3.305	2.227	1.484	.141
Supervision frequency (Once a Month)	2.746	3.541	2.399	1.476	.143
Caseload size	.024	.089	.051	1.737	.086
Extent client caseload traumatized	1.843	1.679	1.008	1.665	.099
Extent of own anxiety	2.065	2.806	1.024	2.739	.007
Past supervision experience	-.054	-.353	0.31	-1.141	.257
Supervisory relationship rating of current supervisor	-2.985	-4.795	1.282	-3.739	<.001
Work in community setting	-.149	-3.602	1.986	-1.814	.073
Work primarily involves direct traumatized client contact	1.36	3.501	2.087	1.678	.097

Shaded region indicates variable removed in the final model after outlier deletion; OLS - ordinary least squares

Table A.3.3. *Best subsets results before outlier removal*

Model	Variables	Model <i>df</i>	Error <i>df</i>	R^2	<i>AIC</i>	<i>BIC</i>	Minima
1	6	10	98	.25	20.04	20.52	
2	7	11	97	.33	11.28	13.64	<i>BIC</i>
3	8	12	96	.35	9.75	14.24	
4	9	13	95	.38	7.74	14.10	
5	10	14	94	.40	7.23	15.65	<i>AIC</i>
6	11	15	93	.41	7.24	17.77	
7	12	16	92	.42	8.06	20.92	
8	13	17	91	.43	8.90	24.06	
9	14	18	90	.43	10.23	27.85	
10	15	19	89	.44	11.62	31.70	

df = degrees of freedom; *AIC* = Akaike's Information Criterion; *BIC* = Bayesian Information Criterion

Table A.3.4. *Best subsets results displaying ordinary least squares statistics before outlier removal*

	OLS Estimates	SE	<i>t</i>	<i>p</i>
(Intercept)	30.518	8.061	3.786	0
Gender (Female)	10.445	3.332	3.135	.002
Race/ethnicity (African American)	-3.45	2.294	-1.503	.136
Race/ethnicity (Other)	0.559	3.58	0.156	.876
Personal income (\$35k - \$45k)	-5.528	2.691	-2.054	.043
Personal income (\$45k - \$55k)	-4.198	2.866	-1.465	.146
Personal income \$55k or more	-3.571	3.05	-1.171	.245
Supervision frequency (Every Other Week)	2.621	2.214	1.184	.24
Supervision frequency (Once a Month)	2.905	2.381	1.22	.225
Extent client caseload traumatized	1.497	1	1.496	.138
Supervisor gender (Female)	6.097	2.581	2.362	.02
Extent of own anxiety	3.239	0.998	3.246	.002
Supervisory relationship rating of current supervisor	-4.726	1.29	-3.664	0
Work in community setting	-3.276	1.98	-1.654	.101
Work primarily involves direct traumatized client contact	4.483	2.036	2.202	.03

OLS - ordinary least squares