An Internet-Based Expressive Writing Intervention
for Kidney Transplant Recipients

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Abstract

Background: Previous research has found that psychiatric problems and stress in kidney transplant recipients negatively impact upon their quality of life (QOL) and how they heal from surgery. In a pilot study, Possemato and Geller (in submission) reported that increased daily stress mediates the relationship between post-traumatic stress symptoms and poor QOL in kidney transplant recipients. Writing interventions based on Pennebaker’s expressive writing model have been shown to modify both daily and post-traumatic stress symptoms and lead to many positive health benefits for healthy and medically ill participants. In this study, the effects of an expressive writing intervention on stress, PTSD symptoms, QOL and affect in kidney transplant recipients were explored.

Methods: An innovative internet-based methodology was used to administer baseline self-report measures, three expressive writing assignments and follow-up questionnaires three month after baseline. A combination of general and transplant specific measures were used. Participants were recruited from transplant websites, local transplant awareness groups and a hospital transplant center and then randomly assigned to the experimental expressive writing condition or the medical fact control condition. Whether individual differences regarding emotional non-expressiveness, i.e., alexithymia or emotional suppression, are related to changes in stress, PTSD symptoms, QOL and affect in the experimental writing group were also assessed.

Findings: Forty-eight kidney transplant recipients participated. Internet-based expressive writing was found to be feasible, safe and effective for kidney transplant recipients. Participants reported no harmful consequences of participating in the study and those who wrote about their thoughts and emotions in the experimental group experienced significantly less stress, better QOL and increased positive affect. In addition, characteristics of emotional non-expressiveness were found to be important factors in determining who will most benefit from expressive writing.
post-transplant. Individuals who normally suppress their emotions can benefit more while alexithymic individuals may benefit less. The current study provides support for recommending expressive writing tasks to kidney transplant recipients according to specific individual differences and pursuing further research into internet-based expressive writing for medical population.
Introduction

Within the medical arena, the field of kidney transplantation has made many gains in improving survival rates and post-transplant medical health. However, within the social and psychological domains there is still much room for improvement. The high rates of psychiatric problems, especially symptoms of Posttraumatic Stress Disorder (PTSD), and high levels of daily stress have been correlated to reports of diminished QOL (Possemato & Geller, in submission). Stress and the negative affect associated with the experience of stress, such as worrying and pessimism, can lead to physiological changes in the endocrine, cardiovascular and immune systems (Schwarzer & Schulz, 2003). For example, stress-related cardiovascular reactivity can be expressed as hypertension, the most common disorder that leads to kidney failure. Pennebaker (1997) theorizes that the inhibition and suppression of stress and negative affect leads to chronic autonomic arousal and eventually to poor health. Expression and regulation of emotion have been shown to improve health and decrease psychological distress (i.e, Smyth, 1998). The expressive writing paradigm allows transplant patients an opportunity for cognitive and emotional regulation and this may improve their QOL. By offering this invention via the internet it is highly accessible to diverse groups of kidney transplant patients and participants may have an increased comfort level in journaling about their emotions within their own homes.

This dissertation includes an introduction to kidney transplantation and then reviews literature concerning PTSD and its relationship to poor health. Next, psychiatric symptoms, stress and QOL in kidney transplant patients are highlighted. The findings from the pilot study will be discussed in each of the relevant sections. Expressive writing and its theoretical underpinnings will then be discussed. Expressive writing studies demonstrating the diverse
populations included and varied health outcomes found are also detailed. The aims, hypotheses, methodology and statistical analyses are outlined. The results section includes information about the participants, recruitment, how the hypotheses were supported, the feasibility of the study and an adherence analysis. Finally, results are discussed in terms of their clinical implications and how the current findings fit with previous research. Limitations of the study and areas for future exploration are also discussed.

Kidney Transplantation

The kidney was the first vital organ to be transplanted successfully. Much of what the medical field knows about solid organ transplant surgery is derived from kidney transplantation (Levy, 1994). The kidney is the most commonly transplanted organ with 16,477 kidneys transplanted in 2005. The United States Transplantation Organization reports that there were almost two and a half times as many kidney transplants compared to liver transplants, seven times as many compared to heart transplants and twelve times as many compared to lung transplants in 2005. This is, in part, because there are more people in need of and waiting for kidney transplants. In 2005, 46,351 people were on the kidney transplant waitlist. Kidney transplantation has significantly lower mortality and morbidity rates compared to other organ transplantations. Heart transplant recipients are twice as likely and liver transplant recipients are 3.5 times more likely to die than kidney recipients (US Transplant Org, 2005). However, kidney transplant recipients suffer from similar psychiatric and QOL problems as heart and liver transplant recipients (Fukunishi et al., 2002; Possemato & Geller, in submission).

Dialysis

Kidney transplant is not the only therapeutic option for patients suffering from end-stage kidney disease. Dialysis is an effective substitute for a functioning kidney and can sustain a
person’s life for many years. While dialysis is less risky than transplant surgery, it is also associated with a lower QOL (Nui & Li, 2005) and poorer long-term survival. The most common type of dialysis, hemodialysis, removes the body’s waste sporadically instead of constantly. This increases risk for organic brain disorders including, hyperparathyrodism and dementia. Dialysis patients suffer a greater degree of sexual dysfunction, dietary restrictions, and less freedom than kidney transplant recipients due to the time needed for dialysis, which can exceed twelve hours a week (Levy, 1994).

Post-traumatic Stress Disorder

The DSM-IV-TR (2000) describes PTSD as a psychiatric disorder that develops when an individual experiences, witnesses or is confronted with an event or events that involves actual or threatened death or serious injury. The individual reacts with intense fear and the subsequent symptoms of reexperiencing the event, avoidance of stimuli associated with the event and increased arousal. Manifestations of reexperiencing involve nightmares and flashbacks related to the traumatic event. Flashbacks can include recurrent and intrusive recollections of the event, acting or feeling as if the event was reoccurring. The avoidance symptom cluster can include efforts to avoid thoughts, activities, people or places related to the event. Numbing sensations are also included in the avoidance cluster: they consist of an inability to recall details related to the trauma, loss of interests in activities that were formally important, feelings of detachment from other people and restricted affect. The last symptom category of increased arousal involves a heightened startle response as well as insomnia, irritability and difficulty concentrating (Fairbank, Ebert & Caddell, 2001). Symptoms from each cluster must last for more than one month. Acute stress disorder describes similar but less severe symptoms, that last from two days to four weeks (APA, 2000).
The criteria for a PTSD diagnosis have changed significantly from the DSM-III versions in the 1980s to now. In the DSM-III and III-R the initial traumatic event was described as being “outside the range of usual human experience” and that it would “invoke significant symptoms of distress in most people.” Both of these criteria have been omitted due to research findings that dispute them. Exposure to traumatic events is not unusual; in fact, the majority of adults experience at least one potentially traumatic event over the course of their lifetime. Also, many people experience these events without developing psychological distress and impairments (Fairbank, Ebert & Caddell, 2001). The DSM-IV states that exposure alone is insufficient for the event to be traumatizing. The person’s cognitive or affective reactivity to the event determines the traumatizing effects (APA, 2000).

Researchers have found several pre and post exposure risk factors for PTSD. For those who experience a potentially traumatic event, female gender, a preexisting psychiatric disorder, family history of psychopathology and prior exposure to trauma increase the likelihood for developing PTSD. Following the event, inadequate social support and exposure to additional traumatic events also increase the risk for PTSD (Fairbank, Ebert & Caddell, 2000). PTSD is frequently comorbid with other psychiatric disorders. Researchers have established that around eighty percent of individuals with PTSD have at least one other co-morbid disorder in their lifetime, most commonly these are depressive or other anxiety disorders (Breslau et al., 1991; Helzer et al., 1987).

Overall, approximately eight percent of individuals in U.S. community samples have been diagnosed with PTSD sometime within their life, while three to four percent currently are diagnosed with PTSD (APA, 2000). While general prevalence rates for populations with severe physical illnesses are not available, these may fall somewhere between rates for community
samples and samples who are commonly diagnosed with PTSD. For instance, a third to one-half of individuals exposed to rape, combat or attempted genocide develop PTSD (APA, 2000).

PTSD is increasingly diagnosed for medical patients such as bone marrow transplant recipients (Jacobsen et al., 2002), breast cancer survivors (Andrykowski et al., 1998) and transplant patients (Dew et al., 2001; Rothenhausler et al., 2002), which will be discussed further in subsequent sections. Increasing rates of PTSD in medical patients is often attributed to increased awareness about PTSD and interest in assessing for the disorder (Tedstone & Terrier, 2003).

Post-traumatic Stress Disorder and Physical Health

   In recent years, a wealth of research has documented that psychological responses to stress, including PTSD symptoms, impact upon medical outcomes (i.e., Ouimette et al., 2004). Both Weisberg et al. (2002) and Zayfert et al. (2002) found that patients seeking mental health services with a primary diagnosis of PTSD self-reported more current and lifetime medical conditions than patients with anxiety disorders other than PTSD. Additionally, Weisberg et al. (2002) concluded that PTSD was a stronger predictor of reported number of medical problems than trauma history, physical injury, life style factors, or co-morbid depression. PTSD symptoms and diagnoses are also associated with poorer health related QOL (Ouimette et al., 2004). These studies demonstrate that PTSD symptoms and medical problems are strongly correlated. However, the specifics of this relationship are currently unknown.

   Researchers have also explored the relationship between specific stressful life experiences, PTSD, and physical impairments and diseases. The literature is especially abundant, as is all PTSD research, in the areas of combat exposure and sexual assault. Studying Dutch Resistance Veterans from World War II, Falger and colleagues (1992) found that 56 percent of the sample was suffering from PTSD. They reported more risks factors for
cardiovascular disease than veterans without PTSD and non-veterans who recently suffered a myocardial infarction. Additionally, Boscarino (1997) found a strong and complex link between PTSD and a spectrum of diseases including circulatory, endocrine and nervous system disorders in a large sample of American war veterans (n=4462). These findings remained significant after controlling for many factors such as, health behaviors, socioeconomic status, and substance abuse. The participants were administered the Diagnostic Interview Schedule (DIS) and therefore the prevalence of all major psychiatric disorders were obtained. No other disorders were associated with decreased health to the same degree as PTSD. In another study with veterans, Wagner et al. (2000) established that PTSD symptoms predicted poorer self-reported health over and above the effects of combat exposure. These studies suggest that it may be the reactions to stress, instead of the direct effects of stress, that lead to illness.

Similar results were found with samples of sexual assault survivors. While negative life events, anger, depression and PTSD severity all predicted self-reported physical symptoms, this relationship was strongest for PTSD severity (Zoellner, Goodwin and Foa, 2000). Kimerling, Clum and Wolfe (2000) elaborated on these findings by examining symptoms of PTSD as mediators in the relationship between traumatic exposure to sexual assault and reports of health problems. They found that the ability for sexual assault to predict health problems depended the presence of PTSD symptoms. From this same research group, Clum, Calhoun and Kimerling (2000) explored specific health symptoms in sexual assault victims. They found that PTSD, as well as, depression were associated with self-reported health perception in general, while only PTSD symptoms were associated with reproductive health symptoms. This lends support for the site of trauma hypothesis, explaining that more health problems are present at the bodily region where the trauma occurred.
A review exploring PTSD following medical illness by Tedstone and Tarrier (2003) concluded that PTSD most likely influences a patient’s use of health services and that this in turn can affect the clinical outcome of medical illnesses. For instance, individuals with PTSD who experienced a myocardial infraction were less likely to adhere to their prescribed medications compared to those without PTSD. Due to the implications concerning medical adherence and its effect on mortality, it is important to identify those individuals who may be suffering from symptoms of PTSD (Tedstone & Tarrier, 2003).

Kidney Transplantation, Post-traumatic Stress Disorder and other Psychiatric Symptoms

Ziegelmann and his research team (2002) assessed the emotional and behavioral response to receiving a kidney transplant and the pressure and stress that accompanies transplant. Their findings, in part overlap with symptoms of PTSD. For instance, recipients report of excessive worry about the transplant may equate to hyperarousal. This describes being overly aware of oneself and one’s environment, especially regarding the traumatic event. Also, avoiding disclose of information about the transplant may be symptomatic of PTSD. While many of these responses are appropriate for transplant recipients, sensitivity to bodily sensations and avoidance of transplant-related stimuli may become exaggerated in recipients with increased levels of anxiety.

To date only the pilot study has explored the prevalence of PTSD symptoms among kidney transplant recipients. Possemato and Geller (in submission) found high rates of PTSD three to six months post-transplant among kidney, liver and heart transplant recipients. Twenty-eight percent of the 61 kidney transplant recipients that participated met full DSM-IV criteria for PTSD, as assessed by a self-report measure.
Several other researchers have revealed that many kidney transplant patients suffer from other psychological symptoms (Fukunishi, 1992; Hibberd et al., 1995; Niu & Li, 2005; Sensky, 1989). Sensky (1989) evaluated 51 participants, first as they were awaiting transplantation and were using chronic dialysis, and then twelve months after transplant. He found that 33 percent warranted psychiatric diagnoses before transplant and 17 percent after transplant. These diagnoses consisted almost equally of anxiety and depressive disorders. More specific information was not given. A past history of psychiatric disturbances was the strongest predictor of a post-transplant psychiatric diagnosis. Fukunishi (1992) performed a similar study that found 44 percent of patients had a psychiatric diagnosis before transplant while using hemodialysis, and 19 percent had a diagnosis one year after transplantation. Waiting twelve months post-transplant to evaluate psychological symptoms may have contributed to the sharp decrease in symptoms from pre to post-transplant. Fukunishi and his research team (2001) later found that the highest prevalence of psychological symptoms for both kidney and liver transplant recipients is three months post-transplant compared to just prior to transplant, one year after and three years after. From these studies it is clear that as physical health improves post-operatively, mental health improves as well.

Post-traumatic Stress Disorder in other Transplant Populations

PTSD has been assessed more among heart and liver than kidney transplant recipients. Two studies have reported rates of heart transplant related-PTSD one year after transplant. Dew et al. (1996) found that 17 percent met criteria and Stukas et al. (1999) found that 10.5 percent met criteria. Only one previous study assessed PTSD in liver transplant recipients and symptoms were not evaluated for several years after surgery. Specifically, Rothenhausler et al. (2002) found that five percent of liver transplant recipients met full PTSD criteria and 17 percent met
partial criteria an average of 3.8 years post transplant. It seems possible that more recipients had PTSD symptoms in the months immediately following transplant and that some participants who met partial criteria at the time of assessment may have met full criteria earlier. Out pilot study included a limited number of liver and heart transplant recipients. Three to six months post-transplant, three of the ten liver and three of the five heart transplant recipients reported symptoms of PTSD consistent with a DMS-IV diagnosis. Few conclusions can be made from this pilot data, due to the limited number of participants. However, it appears that PTSD rates among heart and liver transplant recipients may be comparable to the high rates found in kidney transplant recipients when they are assessed with a standard methodology and within the first few months after transplant.

Quality of Life

QOL consists of an individual’s perception of their health within their cultural context. It is a broad concept consisting of complex interactions between a person’s physical and psychological health, level of independence and social relationships (Orley & Kuyken, 1994). The different components of QOL both influence each other and add together to create a total QOL measurement. For example, emotional well-being may hinge on both social participation and physical functioning. Responses on QOL measures are also very individualistic because different people value different areas of their lives; therefore QOL means different things to different people (Bowling, 2003). Non-medical factors, such as psychological symptoms, are often over-looked in people who have significant medical illnesses. Patient-reported QOL is a key factor in analyzing the effectiveness of a procedure. In fact, many transplant patients report being more concerned about their QOL than their longevity (Bravata et al., 1999). Research investigating the QOL of dialysis and kidney transplant recipients will be reviewed next.
Following this, the relationship between stress and QOL among transplant recipients will be explored.

Quality of Life in Dialysis Patients

It is important to examine the psychological symptoms and QOL issues associated with dialysis because many kidney transplant recipients are treated with dialysis for several years. Their experiences with dialysis will contribute to their view of transplant. Vasquez et al. (2005) found that both depression and anxiety are closely associated with the health-related QOL of hemodialysis patients. While patients with physical QOL problems (i.e., mobility, pain) were more likely to have depressive symptoms, patients reporting problems regarding emotional and social components of QOL reported elevated trait anxiety. For hemodialysis patients, QOL has been found to increase with perceived control and perceived social support and decrease with hostility and complications from diabetes (Tovbin et al., 2003). Steele and colleagues (1996) examined QOL issues for patients receiving continuous peritoneal dialysis. The participants reported that psychological symptoms of anxiety and depression were stronger determinants of their overall QOL than the adequacy of the dialysis treatment. These studies demonstrate the interplay between psychological and physical aspects of QOL and the larger contribution emotional and social factors often made to a patient’s perceived QOL.

Quality of Life in Kidney Transplant Recipients

In general, QOL post-transplant is superior to QOL pre-transplant and while on dialysis (Dew et al., 1997) and in comparison to dialysis patients, transplant recipients have a significantly higher QOL (Niu & Li, 2005). While some studies (e.g., Franke et al., 2000) have found the QOL kidney transplantation recipients to be on par with healthy experimental controls, others found that post-transplant QOL remains impaired compared to the general population (i.e.,
Lim Lim Kong & Molassiotis, 1999). Also, previous researchers have found that psychiatric symptoms, such as anxiety, are associated with poorer QOL (i.e., Franke, 2000). Franke et al. (2003) reported that greater psychological distress predicted lower QOL, while medical measures, such as graft functioning, did not. Our pilot study found a significant relationship between QOL and specific kinds of psychological distress, post-traumatic and perceived daily stress.

Pucheu and her colleagues (2004) offer some clues as to how psychological distress and QOL are related. They found that when dialysis patients believed their behaviors influence their health condition, they experienced higher QOL. Also, engaging in emotional avoidance was associated with lower QOL. Increased stress may lead to beliefs that medical problems persist regardless of participants’ own health behaviors, such as medication adherence. Elevations in stress may also promote emotional avoidance coping strategies, which will be further discussed in subsequent sections. The pilot study found that many participants reported that they did not adhere to diet and exercise recommendations pre-transplant. This could be attributed to beliefs that they did not have the personal power to affect their health. This lack of internal control is associated with avoiding illness-related stimuli like attending doctors’ appointments and taking medication, which can also lead to QOL decrements via physical health problems.

Stress and Quality of Life

Possemato and Geller (in submission) found that perceived daily stress is a mechanism by which increased PTSD symptoms are associated with QOL decrements. Transplant recipients experience increased daily stress associated with functional limitations, financial concerns, strained interpersonal relationships and fear that their health will further deteriorate (Achille et al., 2004; Lim Lim Kong & Molassiotis, 1999). PTSD symptoms resulting from a life
threatening illness or an invasive medical procedure may serve to exacerbate daily stress. This could occur through the emergence of stressful thoughts and emotions relating to specific PTSD symptoms, in addition to the already existing stress. For instance, an individual’s worry about experiencing intrusive thoughts or having nightmares may compound daily stresses concerning finances or functional limitations. Also, PTSD can decrease an individual’s resources to cope with daily stress. For example, hyperarousal is often associated with physical and mental fatigue. Low energy levels can reduce transplant recipients’ ability to handle interpersonal or medical problems and feel overwhelmed by their strict medical regimen. In the pilot study, the increase in daily stress was associated with lower QOL in each of the domains surveyed: energy, mobility, emotional reaction, sleep and social interaction. It is important to highlight how the participants’ individual reactions to transplant and other life stressors determined the level of stress they experienced. All of the participants experienced an organ transplant, yet some reported experiencing very little stress and high levels of QOL, while others reported high stress levels and poor QOL following the transplant.

Assessing Quality of Life in Medical Patients using the Internet

There is some early research regarding the assessment of QOL in medical patients using the internet. Two notable studies have used have administered QOL and social support questionnaires online to 213 individuals with diabetes (Glasgow et al., 1999) and gathered at home daily QOL measures from hematopoietic stem cell transplant patients (Bush et al., 2005). Both of these studies reported that the online protocols were feasible and had high participant compliance and satisfaction rates. Bliven et al., (2001) had 55 cardiac outpatients complete the same QOL assessment online and in paper and pencil form. They found the electronic and written data had comparable reliability, validity and were of the same quality. Also computer
literacy, level of education, age, sex and race were not significantly associated with the participants’ ability to complete the online questionnaire. A computer game has also been successfully used in a pediatric hemodialysis center to promote coping with chronic physical illnesses (Bers et al., 2003). Computerized, at home QOL assessments are usually less taxing for the patients, since travel to a medical facility is not required. Given this, patients may be more likely to report decreased QOL, especially in the areas of fatigue, pain and mobility, when being assessed at a medical facility. Simple, at home assessments may be a more reliable picture of how the patient is functioning at home on a daily basis.

Expressive Writing

Given the psychiatric problems, stress and low levels of QOL in many kidney transplant recipients, an intervention that has been shown to improve both the physical and psychological symptoms in medical patients is called for. Expressive writing offers a simple, well studied intervention that may help many recipients. The theoretical constructs of expressive writing will first be explained. James Pennebaker, the creator of the expressive writing paradigm (1997) theorizes that the cumulative physiological drain associated with the emotional inhibition of distress may cause or exacerbate stress related-disease processes. Emotional expression can facilitate the processing of traumatic memories and this can lead to affective and physiological change. More specifically, emotional expression can lead to the transduction of the traumatic experience into a linguistic structure that can promote assimilation and understanding of the event and reduce the negative affect associated with the event (Pennebaker et al., 1997).

Currently there are several theories that attempt to explain how expressive writing produces physiological and psychological health benefits. Emotional expression via writing may help individuals regulate their expression of negative emotions. Writing can decrease the
frequency and impact of stress-related cognitions and intrusive thoughts as well (Davidson et al., 2002). Expressive writing is also theorized to foster the development of a coherent narrative, facilitate social processes and help to habituate the writer to traumatic experiences (Horn & Mehl, 2004). These theories are all components of cognitive and emotional regulation, which is thought to lead to less chronic autonomic arousal (Davidson et al., 2002). Pennebaker (2004) believes that a single explanatory theory is unlikely given that expressive writing affects people on multiple levels—cognitive, social, emotional and biological. It is important to note, the process of catharsis or venting is no longer seen as a viable theory to explain the benefits of expressive writing. Some type of emotional regulation must take place. Pure cathartic expression is associated with greater distress (Compas et al., 1999).

Expressive writing interventions have been developed with the goal of having individuals express their thoughts and feelings about a traumatic event. They are asked to write for a brief time, ranging from 15 to 30 minutes for one to four sessions, depending on the research study. This experimental condition is compared to a control group of participants who are asked to write about neutral topics for the same duration, such as what they will do for the rest of their day or to the facts about their medical condition. Short-term mood and physiological responses and long-term psychological and physical outcomes are often assessed (Pennebaker & Seagal, 1999).

Currently there are many active avenues of research concerning expressive writing. These include expanding Pennebaker’s protocol to new populations, especially medical populations, exploring what types of writing instructions work best for what patients, and looking at individual differences that are related to the benefits achieved through expressive writing. Studies that use expressive writing with medical populations and that experiment with
writing instructions are detailed in subsequent sections, while individual differences that may interfere with emotional expression, including inhibition, suppression and alexithymia, are described next.

Expressive Writing and Emotional Non-Expressiveness

Beneficial disclosure can only occur when a writer can recognize and acknowledge the existence of stressful life experiences, activate emotional memories of these experiences, identify and put their emotions into words and eventually think differently about their experience (Lumley et al., 2002). When a writer fails in any of these areas it is termed emotional non-expressiveness. Emotional non-expressiveness can be divided into two subcategories—suppression and alexithymia.

Suppression, also referred to as inhibition, occurs due to negative attitudes towards the expression of emotions (Lumley et al., 2002). Suppressors are people who commonly avoid emotionally tense situations and thoughts, have frequent intrusive thoughts and worry excessively (Lumley et al., 2002). Many people suppress their emotions due to concepts of masculinity or fear of ridicule or appearing vulnerable. When people are encouraged to express emotions in confidential and safe environments, inhibition can often be overcome and beneficial emotional expression can take place. Men tend to inhibit more than women and a meta-analysis on the effects of expressive writing (described further below) showed that, in general men benefit more than women (Smyth, 1998). A concept similar to suppression is Type D personality; defined as the tendency to experience increased negative emotions paired with the non-expression of these emotions. Pederson et al. (2006) found that heart transplant recipients deemed to have Type D personalities were significantly more impaired in both mental and physical QOL domains than heart transplant recipients without Type D personalities.
Several expressive writing studies have examined the impact of emotional suppression. Among depression-vulnerable college students, expressive writing was found to decrease depressive symptoms only in participants who scored high on a measure of suppression (Gortner, Rude & Pennebaker, 2006). Davidson et al. (2002) has theorized that in patients with hypertension, emotional inhibition may be socially motivated and that writing minimizes the impact of social processes by reducing stressful social interactions. McGuire et al. (2005) found that hypertensive patients in the expressive writing group, compared to the control group, experienced a significant reduction in systolic and diastolic blood pressure at a one-month follow-up. Within the cancer literature suppression is often termed as “Type C personality” with suppression of emotion has been linked to the initiation and progression of cancer (Goodkin, 1999). Women with breast cancer are more likely than controls without breast cancer to limit their expression of negative emotion (McKenna et al., 1999). Stanton and Danoff-Burg (2002) conceptualize that women with breast cancer who actively attempt to explore, understand and express their emotions about life stressors fair better mentally and physically than their counterparts who avoid emotional processing and expression. They term these two coping styles emotion approach and emotional avoidance. Expressive writing research with women with breast is further detailed below.

Alexithymia is a deficit in processing and regulating emotional states via cognitive mechanisms such as introspection and imagination. Alexithymic individuals often cannot verbally describe their emotions and instead express distress somatically. Alexithymic individuals often show behavioral and physiological signs of negative emotions, but report a positive sense of self. Fukunishi et al. (2002) found that 42 percent of 65 kidney transplant recipients experienced alexithymia. Unlike suppressors, writers with alexithymic characteristics
are less likely to benefit from expressive writing. Alexithymia and emotional suppression have been found to be negatively related constructs that have independent influences on health-related QOL (Verissimo, Mota-Cardosa & Taylor, 1998).

One study has investigated the impact of alexithymia on expressive writing. Smyth et al. (2002) found patients with asthma and rheumatoid arthritis reported significant alexithymia, however, alexithymia was not related to narrative structure, which is believed by Smyth to be a key component of regulating emotions through writing.

Evidence for the Effects of Expressive Writing

Numerous research studies have lent support to Pennebaker’s hypotheses regarding detrimental effects of emotional inhibition and the health promoting effects of expression. Pennebaker and Beall (1986) found that college students who participated in an expressive writing intervention experienced negative short-term effects, such as higher blood pressure and negative moods immediately after writing. However, in the long term they visited the campus health center significantly less than the control group in the six months following the study. In this same study they found that order to experience long-term benefits, it is necessary to write about the emotions regarding a traumatic event, not just the factual information.

In 1998, Smyth performed a research synthesis and meta-analysis on expressive writing studies with healthy participants. He found that written emotional expression leads to significantly better reported physical health, psychological well-being, physiological functioning, (e.g., immunocompetence, heart rate, cholesterol), and better general functioning, (e.g., reemployment, grade point averages, alcohol use). Smyth (1998) also concluded that while writing tasks increase immediate distress for the participant, this is unrelated to long-term health benefits. An overall effect size for the studies analyzed was found to be .47 (p<.0001). This
represents a 23 percent improvement over the control group. Smyth’s (1998) recommendations included that future research be conducted with chronic disease populations.

A number of studies have investigated the effects of expressive writing in medical patients. Stanton and her research team (2000, 2002) have studied emotional expression in breast cancer patients. In their 2000 study they found that participants writing about their deepest emotions regarding breast cancer had decreased physical symptoms and fewer medical appointments. However, it was revealed that emotional expression was more beneficial for the individuals who showed low cancer-related avoidance. For those women high in avoidance it was more beneficial to write about their positive thoughts and experiences regarding breast cancer. Prescriptions for expressive writing may be most useful when tailored individually for each client, especially in regards to their tendency to avoid their emotions. In Stanton et al.’s 2002 study participants who coped expressively had higher quality of life only if they perceived their social contexts to be highly receptive. Individuals need someone to who is receptive to their expression of emotion in order to benefit from this. However, in expressive writing some benefits may be achieved without the availability of a receptive social context. Additionally, participants who scored high on acceptance scales (and therefore low on avoidance scales) were shown to have enhanced QOL overtime.

De Moor and his colleagues (2002) studied the effects of expressive writing in patients with metastatic renal cell carcinoma. While no significant benefits were found for the experimental group in the areas of distress, perceived stress or mood disturbance, they reported significantly less sleep disturbance, better sleep quality, longer sleep duration and less daytime dysfunction. Another expressive writing study examined the effects of writing about general traumatic experiences in participants with either asthma or rheumatoid arthritis (Smyth et al.,
1999). At the four-month follow-up experimental groups experienced significant clinical improvements in their disease status compared to the control groups. Specifically, 47% of the patients in the experimental group improved, relative to only 24% of controls. Another study with rheumatoid arthritis patients, as well as patient with lupus, found experimental writing to be effective in lowering fatigue and decreasing pain (Danoff-Burg et al. 2006). Among adolescents with asthma, expressive writing was found to increase positive affect and decrease asthma symptoms (Warner et al. 2006).

The expressive writing paradigm has recently been extended to several new medical populations with mixed results. HIV positive adults experienced better immune functioning when their expressive writings included more social words and increasing insight over time (Rivkin et al., 2006). Among patient awaiting transurethral resection of the prostate, expressive writing reduced psychiatric symptoms and post-operative hospital stays only for patients whose surgery was deemed “low risk.” The authors call for further investigation of whether expressive writing is beneficial under highly stressful conditions (Salano et al., 2007). Expressive writing was not found to effective as an adjunctive intervention to brief smoking cessation for young adults (Ames et al., 2005). A recent metanalysis of 29 expressive writing studies found that participating in an expressive writing protocol reduces health care utilization cost among healthy samples, but not in samples selected for psychological and medical criteria (Harris, 2006). However, the author notes that his analysis with medical samples may have lacked sufficient power and that it is currently unknown whether health care utilization is associated with actual health.

The studies finding expressive writing interventions to be efficacious have given rise to several studies that examined the effectiveness of expressive writing in real world setting.
Broderick and colleagues (2004) have used instructional videotapes to teach patients with rheumatoid arthritis to do expressive writing at home. They found that the methods of this intervention were feasible and participants were able to comprehend and follow the videotaped instructions. This study also determined that expressive writing at home is safe, that is, no untoward psychological or physical side effects of writing were reported by participants. Unfortunately, this first attempt at home-based expressive writing did not find that expressive writing had a clear effect on QOL and health. The authors recommend that future effectiveness studies explore any individual differences associated with who benefits from expressive writing and who does not.

Another study used self-administered stress management workbooks for individuals with asthma (Hockemeyer & Smyth, 2002). The four week intervention included deep breathing, identifying and restructuring thoughts, feelings and emotions in a cognitive behavioral framework and four twenty-minute writing assignments. The patients found the workbooks credible and reported good compliance. The experimental group showed significant improvement in lung function, but not levels of perceived stress. The authors hypothesized that a later follow-up (e.g., 3 months) may have revealed a reduction in stress.

In exploring expressive writing as a self-help tool, Smyth and Helm (2003) emphasize the high demand for a low cost, home-based behavioral medicine intervention that has been shown to be efficacious for medical patients. They believe expressive writing may be beneficial for individuals unable or unwilling to engage in psychotherapy. They also warn researchers to not be discouraged when the results of effectiveness studies are less robust than those of efficacy studies. Lab-based efficacy studies are well controlled experiments that exclude many participants who have characteristics that make them less likely to benefit from the intervention,
while community-based effectiveness studies include participants with diverse characteristics, have less researcher-participant contact and are subject to many of extraneous factors that may confound results. However, effectiveness studies are a necessary step to bring useful interventions to the public.

Expressive Writing on the Internet

Lange and his colleagues (2002) have successfully brought their expressive writing procedure into the community. They have developed a line of research and clinical treatment using an internet-based expressive writing protocol for traumatized individuals. They describe two basic components for the treatment of trauma. Self-confrontation involves habituation to the traumatic experience through imaginal exposure. Cognitive reappraisal of the event includes challenging dysfunctional automatic thoughts, reinterpreting misattributions and creating a new symbolic meaning for the trauma. In a pilot study they found that essays about self-confrontation and essays about cognitive reappraisal both significantly reduced traumatic symptoms of avoidance and intrusion (reexperiencing symptoms were not assessed) six weeks post-writing, but cognitive reappraisal essays did this to a greater degree. Another pilot study found that adding a third component of writing a letter “taking leave of the past” enhanced the effect on trauma symptoms compared to groups that did not write the dignified letter.

From these studies a formal therapy protocol was created. Patients from around the world can now access the Interapy website (http://Interapy.nl) and be evaluated for services. Individuals who report high levels of depression, an inclination to dissociate, a risk for psychosis, use of neuroleptics or are enrolled in other therapy, cannot take part in Interapy. Interapy clients begin email correspondence with an advanced clinical psychology doctoral student, who is supervised by a licensed psychologist. In the first two weeks, four self-
confrontation essays are written, followed by two weeks of writing four cognitive reappraisal essays and one week of writing two essays in the form of letters taking leave of the past. Feedback is given to the client by the therapist regarding all essays via email. Treatment outcome studies with traumatized students and traumatized people from the general population used the Impact of Events Scale (IES; Horowitz et al., 1979) and the Symptom Checklist-90 (SCL-90; Derogatis, 1977) to assess symptom change. Both studies found clients who received Interapy experienced significant decrease in trauma, depression, anxiety and somatization symptoms compared to wait-list controls. The studies also revealed that level of internet expertise, gender and age were not associated with who improved with Interapy. Lange et al. (2002) are hopeful Interapy is reducing several of the common barriers to psychological care that many people experience. Interapy is easily accessible for people with physical disabilities, who live in rural, underserved areas, who do not have adequate transportation and it can be offered a rate less than face-to-face therapy, since it requires less therapist time. However, Interapy is not suitable for high-risk and lower functioning clients and does not allow for a strong client therapist bond to develop.

While Lange’s ultimate goal was to develop an internet-based expressive writing therapy available to the public, the current proposal seeks to explore the feasibility and effectiveness of an internet-based expressive writing protocol as an experimental intervention, not as a therapeutic intervention. Online therapy is a controversial topic that is beyond the scope of this proposal. This author hopes that a successful outcome of this project may lead to more research exploring the effectiveness of online expressive writing protocols as a simple behavioral medicine stress management intervention that could be prescribed within transplant centers or primary care offices. This invention may also be found to be beneficial as an adjunct to tradition
psychotherapy (Graf, Gaudiano & Geller, 2007 manuscript submitted). Despite the different goals of Lange’s research and the current project, Interapy highlights that expressive writing can be administered using an online format and online writers can experience decreases in psychiatric symptoms, including traumatic stress symptoms and somatization.

Rationale

Many kidney transplant recipients are experiencing significant amounts of daily and posttraumatic stress and this can negatively impact their QOL. This study used a more heterogeneous population to replicate the findings of the pilot study. Participants in the pilot study were recruited from one hospital and were predominately African American and of lower socioeconomic status. They reported many non-medical traumatic stressors that may have lead to reports of PTSD symptomology that are not representative of kidney patients in general. In the current study only PTSD symptoms that occur as a reaction to experiences with kidney failure and transplant were assessed. Given the negative impact stress has on QOL, a study exploring the effectiveness of a behavior medicine intervention is appropriate. Expressive writing is an excellent candidate for this intervention because it is has been shown to be efficacious in medical populations. Additionally, expressive writing is simple and portable. Many researchers have suggested the importance of investigating what individual differences may serve as a barrier to benefiting from expressive writing. This is especially important to do with medical patients, given the connection between emotional non-expressiveness and poor health in patients with hypertension, cancer and other illnesses.

This project is the first known research study to apply the expressive writing paradigm to solid organ transplant patients. It is also the first known study to use an online modification of the traditional expressive writing protocol. Exploring the effectiveness of internet-based
expressive writing joins other research attempting to bridge the results from lab-based studies to community-based studies. Employing an online methodology is thought to make participants more comfortable and willing to write about their emotional experiences. Also, this study was highly accessible to the many transplant recipients who currently use Internet resources to gather information about their medical conditions and participate in online communities for kidney failure and transplant patients. Websites highly utilized by kidney transplant recipients include, the National Kidney Foundation (www.kidney.org), Transplant Recipient International Organization (www.trioweb.org), United Network of Organ Sharing (UNOS, www.transplantliving.org) and American Association of Kidney Patients (www.aakp.org). A guide to web resources for transplant candidates, recipients and donors has recently been published. This guide describes how individuals can benefit from the use of transplant specific websites and highlights high quality web resources that medical professionals can recommend to internet literate patients and their families (Possemato & Geller, 2007).

**Aims and Objectives**

This project aims to investigate how an expressive writing paradigm may effect the experience of stress, PTSD symptoms, QOL and reported positive and negative affect of kidney transplant patients. An expressive writing condition will be compared to a medical fact control condition. Previous research has shown that increased levels of stress in kidney recipients are associated with decreased QOL. It is proposed that an expressive writing intervention may serve to decrease stress symptoms and in turn, increase QOL. In addition to the main analyses assessing the effect of expressive writing, we also plan to explore how emotional suppression and alexithymia may moderate the effectiveness of expressive writing. Empirical evidence (Fukunishi, 1992; Fukunishi et al., 2001) as well as clinical observations suggests that kidney
transplant recipients experience difficulty expressing their emotions and therefore alexithymia and suppression appear to be important covariates to examine.

The research hypotheses are as follows:

**Hypothesis 1:** Participating in an expressive writing intervention effects daily stress, PTSD symptoms, QOL and positive and negative affect.

Specifically, it was hypothesized that participating in an expressive writing intervention decreases daily stress, PTSD symptoms and negative affect and increases QOL and positive affect. This hypothesis was assessed using five statistical tests, one for each dependent variable.

**Hypothesis 2:** Alexithymia and emotional suppression predict the benefits participants receive from expressive writing.

Specifically, it was hypothesized that higher levels of emotional suppression would predict larger decreases in daily stress, PTSD symptoms and negative affect, and larger increases in QOL and positive affect from baseline to follow-up. Diagram 1 depicts this hypothesized relationship. Higher levels of alexithymia were expected to predict smaller decreases in daily stress, PTSD symptoms and negative affect, and smaller increases in QOL and positive affect from baseline to follow-up.

**Methods**

**Participants**

Participants had to meet the following inclusion criteria:

- Received a kidney transplantation.
- Able to read and write English.
- Willing to answer questions and write about their life experiences and physical and emotional health.
• Be at least eighteen years of age.

* Participants could participate using the online protocol or an identical paper and pencil protocol. No participants used the paper and pencil protocol.

Participants were recruited from three different sources.

1. Transplant staff at Hahnemann Hospital and Lankenau Hospital could opt to give patients a recruitment flyer (see appendix A). Ten Philadelphia area hospitals were contacted by mail and phone and asked to distribute flyers. Only Hahnemann and Lankenau hospitals agreed to participate. At Hahnemann Hospital a research associate was available to meet with patients who medical staff recommended for the study. In a private room the study was explained, the recruitment flyer given and informed consent contained. At Lankenau hospital a social worker distributed recruitment flyers.

2. With permission from appropriate website officials, postings were placed on message boards on the following websites:


The postings read:

“An internet-based research study is currently being conducted that explores what the experience of kidney transplant is like for patients. If you are interested in learning more about this study please email akp26@drexel.edu.”

The following reply will be sent:

“Thank you for contacting us about the Writing About Transplant Research Project. We are interested in learning more about the stress people with kidney transplants experience. This survey will ask you questions about any stress you may be experiencing and how you are currently feeling, both mentally and physically. We then will ask you to journal about your experience with transplant on your computer for three 15 minute sessions, over a one week period. Many people have found journaling to improve the way they feel. However, you can judge this for yourself. After journaling for three 15 minute sessions, you will be asked to log back into this website in three months and answer a few more questions about how you feel. When you complete this study you will be eligible to win a $50 Target gift...
card. Your answers, journal writing and contact information will be kept private and confidential.

We first need you to review the attached consent form, type your signature on the designated spot on the last page and attach it in an email to this address. After you return the consent form, you can log on to www.pages.drexel.edu/~akp and begin the study. Your participant ID number is ****. Please email or call (215-762-7625) with any questions or concerns about the study in general or the consent form. Thank you for your interest in this study.”

3. Invited presentations were given at the Transplant Awareness Group in Syracuse, NY and Transplant Awareness Organization in Rochester, NY and recruitment flyers (see appendix A) were distributed.

Procedure

The website includes the following information for Day 1:
1. Description of study and benefits and risk for participation.
2. Baseline questionnaires (these take approximately 25 minutes to complete)
   a. Sociodemographic and Medical Information
   b. Positive and Negative Affect Schedule
   c. Perceived Stress Scale
   d. Transplant-Related Stressors Scale
   e. Posttraumatic Stress Checklist- Civilian Version
   f. Kidney Transplant Questionnaire
   g. Nottingham Health Profile
   h. Toronto Alexithymia Scale-20
   i. Courtauld Emotional Control Scale
3. Writing Assignment #1
4. Post-writing questions
5. Signing up for a reminder email to take the other portions of the protocol.

The Day 2 portion of the website includes:
1. Writing Assignment #2
2. Post-writing questions

The Day 3 portion of the Website includes:
1. Writing Assignment #3
2. Post-writing questions

The 3 Month Follow-up portion of the website includes:
1. Follow-up questionnaires (these take approximately 15 minutes to complete)
   a. Positive and Negative Affect Schedule
   b. Perceived Stress Scale
   c. Transplant-Related Stressors Scale
d. Posttraumatic Stress Checklist- Civilian Version  
e. Kidney Transplant Questionnaire  
f. Nottingham Health Profile  
g. Follow-up writing questions

2. Debriefing information

Participants are able to email the study coordinator or call the research office concerning any questions or concerns they may have about the online protocol. National and local twenty-four hour, toll-free mental health hotline numbers will be provided for all areas in which the study participants may live.

Measures

Sociodemographic and Medical Information

Sociodemographic questions assessed gender, date of birth, education, income and employment status. Medical history questions inquired about use of dialysis, date of transplant and post-transplant compliance with medication, diet, exercise and abstaining from harmful substances.

Stress

The 14-item Perceived Stress Scale (PSS, Cohen, Kamarck & Mermelstein, 1983) assessed the degree that participants perceive their daily life to be stressful. The PSS measures how uncontrollable, unpredictable and overwhelming patients perceive their lives to be. A five-point likert scale is used to report stress within the last month. Adequate psychometric properties were established for the PSS through examining the role of non-specific appraised stress in the etiology of disease. Test-retest reliability and internal consistency reliability were both found to be .85. The PSS is correlated with depressive and physical symptomology and utilization of health services, among other things. It was also found to be a better predictor of disease outcomes than life-event scores (Cohen, Kamarck & Mermelstein, 1983). The PSS has been
used to assess the effect of expressive writing on stress in patients with asthma (Hockemeyer & Smyth, 2002).

The Transplant-Related Stressors Scale (TRSS, Frazier et al., 1994) is a 17-item scale that asked respondents to rate the amount of stress they are currently experiencing for each item on a five point likert scale. The TRSS inquires about the patient’s perceived stress reactions associated with stressors specifically relevant to kidney transplant, such as fear of rejection and restrictive medical regiment. An additional item assessing feelings of indebtedness used by Achille et al. (2004) will also be used in this study. Limited psychometric properties are available for the TRSS, however it is the only known measure of kidney transplant-related stress. The overall internal consistency of the 18-item scale is .89 (Achille et al., 2004). The scale can be divided into five subscales (future health issues, finances, medication side effects/ physical limitations, interpersonal relationships, and following the medical regiment/ dealing with the medical community). The subscales range in internal consistency from .70 to .84, with the exception of finances that is .56 (Frazier et al., 1995).

Post-traumatic Stress

The PTSD Check List-Civilian Version (PCL-C, Weathers et al. 1994) measures 17 symptoms of PTSD on a five-point likert scale and is based on DSM-IV criteria. Questions inquire about reactions to a “stressful experience.” For the current study, the wording has been changed to query about reactions to “stressful experiences regarding kidney failure and transplant.” The psychometric properties of the PCL have been established with a variety of populations including motor vehicle accident victims and sexual assault victims (Blanchard et al., 1996), patients with breast cancer (Andrykowski et al., 1998) and survivors of bone marrow transplantation (Smith et al., 1999). Results indicate that the PCL-C has excellent internal
consistency ranging from .94 to .97 and a test-retest reliability of .96. The diagnostic utility of this instrument is similar to that of the PTSD module of the Structured Clinical Interview for DSM-IV (SCID, Spitzer et al., 1992). The PCL has been used to assess PTSD symptomatology in an expressive writing study (Koopman et al., 2005).

Positive and Negative Affect

The Positive and Negative Affect Schedule (PANAS; Watson, Clark & Tellegen, 1988) assessed positive and negative affect. Respondents are asked to indicate to what extent they experience ten negative affect words (i.e., distressed, nervous) and ten positive affect words (i.e., excited, strong) on a five-point likert scale ranging from “not at all” to “extremely.” The internal consistency reliability is .89 for the Negative Affect (NA) Scale and .85 for the Positive Affect (PA) scale (Crawford & Henry, 2004). The NA scale is significantly positively correlated with Beck Depression Inventory, The Hopkins Symptom Checklist and the State Scale of the State Trait Anxiety Inventory while the PA scale is negatively correlated with these scales (Watson, Clark & Carey, 1988).

Quality of Life

The Nottingham Health Profile (NHP, Hunt, McEwen & McKenna, 1985) is a health-related QOL measure that asks patients to report on perceived emotional, social and physical health problems. Respondents are asked to answer “yes” or “no” to the 38 items on this measure. The NHP inquires about six QOL dimensions, including physical mobility, pain, social isolation, emotional reactions, energy, and sleep. The validity and reliability of this measure have been established on a variety of chronically ill populations (Jenkinson, Fitzpatrick & Argyle, 1988). The test-retest reliability for the six dimensions ranged from .77-.88 in test groups of patients with osteoarthritis and peripheral vascular disease. Also, the NHP was found
to differentiate successfully between elderly people who are fit, chronically ill, and those who do not consult their general practitioners; it also was correlated with number of workdays missed due to ill health (Hunt, McEwen & McKenna, 1985). The NHP has advantages over many other QOL measures such as the Sickness Impact Profile (SIP, Bergner et al., 1981) and the Medical Outcomes Survey Short Form 36 (SF-36, Ware et al., 1992). The NHP assesses emotional states directly, rather than through changes in behavior and has fewer problems with floor and ceiling effects among the seriously ill (Bravata et al., 1999). The NHP has been used extensively in medical psychology populations, especially with liver transplant recipients (Bonsel et al., 1992; Collis et al., 1995).

The Kidney Transplant Questionnaire (KTQ, Laupacis et al., 1993) was designed to be a disease specific QOL questionnaire for patients with a kidney transplant. The original consists of 25-items and measures five QOL dimensions (physical symptoms, fatigue, uncertainty/fear, appearance and emotions). Responses are on a 5-point likert scale ranging from “all of the time” to “none of the time.” In the original version, the items on the physical symptom dimension are patient specific. Patients are asked to list the six most problematic physical symptoms they are having and then rate them on the likert scale. For this study, participants will be asked to rate eight physical symptoms that were found to be the most common among 50 test patients. The KTQ has good test-retest reliability in each subscale (.82-.91) and has good construct validity when the KTQ subscales are compared to the subscales of the Sickness Impact Profile (SIP, Berger et al., 1981), a well-established QOL measure. In addition, the KTQ is more responsive to change than the SIP within the fatigue and physical symptom dimensions (Laupacis et al., 1993). The internal consistency reliability of each subscale ranged from .80 to .93 with the exception of appearance, which was .69 (Rebollo et al., 2003).
The KTQ is the only known kidney disease specific QOL measure. The Kidney Disease-QOL (Hays et al., 1994) was developed for use with dialysis patients and is sometimes used with transplant recipients, despite the lack of transplant specific QOL questions. A measure also exists that evaluates the effects of immunosuppressant medication on QOL after renal transplant (End Stage Renal Disease Symptom Checklist- Transplantation Module, Franke et al., 1999).

Alexithymia

The Toronto Alexithymia Scale-20 (TAS-20, Bagby, Parker & Taylor, 1994; Bagby, Taylor & Parker, 1994) is a 20-item revision of the original Toronto Alexithymia Scale. The items are clustered into three subscales, difficulty identifying feelings, difficulty describing feelings and externally-oriented thinking. Responses are on a five-point likert scale ranging from “strongly disagree” to “strongly agree.” The overall internal consistency reliability is .81 and each of the subscales have adequate reliability ranging from .66-.78. The test-retest reliability is .77 (Bagby, Parker & Taylor, 1994). Convergent and discriminate reliability of the TAS-20 was demonstrated with significant correlations with the NEO Personality Inventory and measures of psychological mindfulness and need for cognition. Positive correlations between the TAS-20 and observer ratings of alexithymia in behavioral medicine outpatients lend support to concurrent validity (Bagby, Taylor & Parker, 1994). The TAS-20 has been used to measure alexithymia in liver and kidney transplant patients (Fukunishi et al., 2002) and in an expressive writing study with medical patients (Smyth et al., 2002).

Emotional Suppression

The Courtauld Emotional Control Scale (CECS, Watson & Greer, 1983) is a 21-item questionnaire developed to measure the extent to which individuals report that they control their emotions. Subscales are consistent with the primary emotions of anger, depressed mood, and
anxiety. Each subscale contains seven questions that are “reactions people have towards certain feelings.” Participants were asked to rate how much each item describes the way they generally react on a four point likert scale ranging from “almost never” to “almost always”. Internal consistency measures demonstrated alpha coefficients ranging from .86 (anger subscale) to .88 (depressed mood and anxiety subscales). One-month test-retest reliability for the total CECS is .95. Evidence of concurrent validity is demonstrated via inverse correlations with the Marlowe-Crowne Social Desirability Scale, the Spielberger State-Trait Personality Inventory, the Eysenck Personality Questionnaire and the Bortner Type A Behavior Scale. The CECS has been used widely with medical populations, including patients with breast cancer and heart problems (Watson & Greer, 1983).

Writing Instructions

Participants were randomized to either the expressive writing or the medical fact control group via a coin flip. They were asked to write for fifteen minutes three times over a one week period. Writing instructions were modeled after those used with breast cancer survivors (Stanton et al., 2002), the most studied group of medical patients in the expressive writing literature.

The experimental/ expressive writing (EW) group were given the following instructions:

“What I would like you to write about for these three sessions are your deepest thoughts and feelings about your experience with kidney failure and transplant. I realize that people who have had a kidney transplant experience a full range of emotions, and I want you to focus on any and all of them. In your writing, I want you to really let go and explore your very deepest emotions and thoughts. You might think about all the various feelings and changes that you experienced before finding out your kidneys were failing, while on dialysis, waiting for a transplant, being transplanted, and now. Whatever you choose to write, it is critical that you really focus on your deepest thoughts and feelings. Ideally, I would like you to focus on feelings, thoughts, or changes that you have not discussed in great detail with others. You might also tie your thoughts and feelings about your experiences with kidney transplant to other parts of your life, i.e., your childhood, people you love, who you are, or who you want to be. Again, the most important part of your writing is that you really focus on your deepest emotions and thoughts. The only rule we have is that you write continuously for the entire fifteen minutes. If you run out of things to say,
just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Just write.”

The medical fact control group (MF) were given these instructions:

“What I would like you to write about for these three sessions is a detailed account of the facts regarding your kidney failure and transplant and their treatment. I am interested in how the specifics of diagnosis and treatment differ for people who get kidney transplants; therefore, it is critical you provide an extremely detailed account of all that happened to you in regards to kidney failure and transplant. I realize that people who have had a kidney transplant experience a full range of emotions, but in your writing I want you to focus only on the facts, not on your emotions. No fact is too big or too small. You might write about when and where you found out that you had kidney failure, appointments you had with your doctors, information you were given and what treatments you received (dialysis, medication, transplantation). Again, the most important part of your writing is that you focus on the facts and try to reconstruct what happened in as factual detail as possible. The only other rule is that you write continuously for the entire fifteen minutes. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Just write.”

Post-Writing Questions

After each writing session the participants were asked to answer three questions that are commonly used in expressive writing research studies (Pennebaker, Colder & Sharp, 1990). The following questions were rated on a five-point likert scale ranging from “not at all” to “a great deal”: 1) How personal is the essay you just wrote? 2) To what degree did this essay reveal your emotions? 3) How much of the essay’s content have you told others about? Theses questions were analyzed to assess adherence to writing instructions. At three month follow-up the participants were asked to rate the following two questions on the same likert scale: 1) How much have you thought about your essays in the time since you wrote them? 2) How much has your writing of the essays impacted upon your life?

Additional Assessment

Feasibility

Broderick et al. (2004) outlined criteria for assessing an expressive writing study’s feasibility. The criteria consist of: 1) the percentage of individuals willing to take information
about the study, 2) the percentage of individuals who actually complete the study protocol, 3) if participants are able to express their feelings via expressive writing at home and 4) if the protocol is safe. These criteria were adapted for use in the current study and additional feasibility criteria were added. The current feasibility assessment consists of: 1) the percentage of the individuals who were given information about the study that at least began participation, 2) the percentage of participants able to complete the study protocol, 3) if there are differences in socio-demographic information and baseline measure scores between the non-completers and completers, and 4) if the protocol is safe (this is discussed in the “Study Risk” section below). How feasibility differed according to recruitment source was also assessed. In addition, after completing the three month follow-up questions, participants were asked if they had trouble understanding any of the instructions on the website. They were asked to explain any difficulties they may have experienced in an open-ended, written format.

Adherence

A research team member scanned all essays on the study website to see if they were completed. One third of the essays were reviewed at random to assess if the writing instructions were followed correctly. Essays were considered to adhere to the writing instructions if the experimental/ expressive essays contained emotion and thought words and if the control/ medical fact essays did not contain emotion and thought words. In addition, the post-writing questions described above were used to assess writing instruction adherence.

Study Risk

Any reports of distress via emails or calls to the project coordinator by the participants would have been recorded in order to assess the protocol’s safety, however, no such emails or calls were received. Also after completing the three month follow-up portion of the study,
participants were asked, “Since beginning this study three months ago, have you contacted a mental health hotline, your transplant center social work or other mental health professional because completing the questionnaires or writing exercises caused you emotional distress?” Participants answering “yes”, were asked to describe who they contacted and why they contacted them. However, no participants answered “yes.”

PTSD Diagnoses

In addition to examining PTSD symptoms as a continuous variable, which participants met DSM-IV diagnostic criteria for PTSD based on the PCL-C were assessed at both baseline and three month follow-up. To have PTSD symptoms consistent with a PTSD diagnoses, participants must have reported at least one reexperiencing symptom, three avoidance symptoms and two arousal symptoms according to the PCL-C. Differences in PTSD diagnoses according to socio-demographic variables were also explored.

Human Subjects

The participants were asked to complete online psychological measures and write about their experiences with kidney disease and transplant. In person or email informed consent for the study was collected prior to filling out any measures or completing writing assignments. All information obtained from the surveys remained confidential and were not shared with any person outside the research team. Confidentiality was protected by assigning a code number to the participants’ online data forms and maintaining data in password protected computer files that are accessible only to the research team. No hard copies of the data were produced or maintained.

Participation in this study posed no physical risk and minimal psychological risk to the transplant recipients. Participants could have experienced emotional discomfort completing
certain assessments that are part of the study (e.g., PCL-C) and completing writing exercises. In reviewing the consent form, participants were informed of the services that are available to them if they should experience distress while completing the measures and writing assignments. Mental health hotlines were provided. Each participant denied experiencing any physical or psychological distress due to their participation.

Results

Participants

Recruitment for this project began in March 2006. The time frame and number of participants recruited according to each site/method are described below. At the Hahnemann and Lankenau Hospital Transplant Centers, recruitment took place from March of 2006 to July 2006. At Hahnemann Hospital nineteen patients were given information about the study, of these patients twelve gave informed consent. Three individuals did not give informed consent because they did not have computers and three did not give informed consent because they reported not having time to complete the study. Only one of the twelve patients who gave informed consent from Hahenmann completed the online study. At Lankenau Hospital a social worker reported distributing 10 flyers. One person contacted the study research office to gather more information. No patients from Lankenau Hospital participated. On the selected websites (www.trioweb.org, www.transplantliving.org, www.kidney.org, www.kidneyfund.org), recruitment began in July 2006. Fifty-eight individuals responded to the website postings. Of these individuals, 36 participants completed online participation by April 2007. During November 2006, information was presented to sixteen kidney transplant recipients at the Transplant Awareness Group in Syracuse, NY and Transplant Awareness Organization in
Rochester, NY. Ten of these sixteen individuals participated. Recruitment results are displayed in table 1.

Forty-eight participants completed the online study and were included in the analyses. This number represents 47 percent of the 103 individuals who had some contact with the study. However, it is likely that many more eligible individuals read the website postings and choose not to contact the study. It was not possible to gather information on individuals who signed consents, but then did not participate or individuals who responded to internet postings, but then did not participate. Therefore it is not possible to compare the sociodemographic information of participants to non-participants.

The socio-demographic information of the current sample is displayed in table 2. Fifty-four percent (n=26) of the sample was female. Sixty-nine percent (n=33) were Caucasian, 27 percent (n=13) African American and four percent (n=2) were Hispanic. Participants reported a mean education level of 13 years. At the time of assessment, about one-third (n=17) of the participants were receiving some sort of disability payment. The mean income of the participants was $31,000. Half of the sample reported being currently employed, one quarter reported being retired and one quarter reported being unemployed. The sample reported participating in the study an average of 3 years after their transplant. Participants reported using dialysis for an average of 22 month before their transplant and the mean reported creatinine level was 2.17 milligrams per deciliter.

Twenty-three participants were randomized to the control writing group and 25 participants were randomized to the experimental writing groups. These groups did not significantly differ on any socio-demographic or medical variable. They also did not significantly differ on their mean scores for any of the baseline measures. Table 3 displays
means and standard deviations for all measures according to writing group. Figure 1 displays this information graphically.

Data obtained from the current sample was compared to data for all kidney transplants that took place in the United States in 2006. This information was gleaned from The Scientific Registry of Transplant Recipients available at ustranplant.org and is displayed in table 4. This registry is under a federal contract to collect solid organ transplantation data. It annually reports information on over 99 percent of the organ transplants and donations that take place in the United States. Information from the kidney transplant recipients who participated in the Possemato and Geller (in submission) study is also included in table 4. The samples are compared on three characteristics: race, age and sex of the recipients. Overall, the current sample is much more similar to the national data than the sample used by Possemato and Geller. For instance, 69 percent of the sample from the current study are Caucasian, compared to 70 percent from the national data and 26 percent of the Possemato and Geller study. Also, seventeen percent of the sample from the current study were between the ages of 18 and 34, compared to 18 percent of those represented in the national data, and 5 percent of the Possemato and Geller study. However, the current study did have more females (54 percent verses 41 percent) than the Registry of Transplant Recipients recorded.

Preliminary Data Analysis

Prior to running the planned statistical tests, the appropriate assumptions were checked. For repeated measures ANOVAs and MANOVAs the following assumptions were met: random sampling, similar sample sizes, the independent variables are categorical, the dependent variables are continuous, there are no extreme outliers (checked by box plots), the independent variables are hypothesized to be causal and recursive to the dependent variables, error is orthogonal (due
to randomization). Three assumptions were violated: The population distributions of follow-up scores for the PSS, PCL, NHP, KTQ and NA scale of the PANAS are not normally distributed. Therefore, homogeneity of variance for these variables is also violated (as checked by Levene’s test). Lastly, homogeneity of co-variance is also violated for these variables (as checked by Keppel’s test). The violation of these assumptions increases standard error, therefore reducing confidence in the results of hypothesis 1 presented below.

No assumptions for the regression tests were violated. There is no heteroscedasticity; that is error is not correlated with the independent variable, as can be seen in graphs of the regression line with residuals. There is no multicollinearity; that is the predictor variables are not correlated. One outlier was found and excluded to prevent any skewing of the data. All analyses were conducted using SPSS version 15.

Hypotheses

**Hypothesis 1:** Participating in an expressive writing intervention significantly effects stress, PTSD symptoms, affect and QOL.

**Hypothesis 1a:** The influence of writing condition on PSS and TRSS scores depends on time of assessment. Specifically, stress levels for the participants in the experimental writing condition will be lower at follow-up then they were for either the control or experimental group at baseline and lower than the control group at follow-up.

A repeated measures MANOVA was used to test hypothesis 1a. The two levels of time of assessment were entered as the within-subject factor, writing condition was entered as the between subjects factor, and PSS and TRSS scores from baseline and follow-up were entered as the dependent variables. Writing condition and time significantly interacted on stress overall (F (1,47) = 5.574, p=.007) and on both stress measures independently (PSS- F (1,47) = 11.388,
Hypothesis 1 results, including main effects for each test and eta squared values (a measure of effect size) are displayed in table 5. Participants who engaged in expressive writing had a significantly less stress at follow-up, while the participants in the control condition did not.

Hypothesis 1b: The influence of writing condition on PCL scores depends on time of assessment. Specifically, PTSD symptoms for the participants in the experimental writing condition will be lower at follow-up then they were for either the control or experimental group at baseline and lower than the control group at follow-up.

A repeated measures ANOVA was used to test hypothesis 1b. The two levels of time of assessment were entered as the within-subject factor, writing condition was entered as the between subjects factor, PCL scores from baseline and follow-up were entered as the dependent variables. Writing condition and time did not significantly interact with PTSD symptoms ($F(1,47) = 8.218, p = .096$). Participants in the experimental writing condition did not have significantly less PTSD symptoms at follow-up than they did at baseline and they did not have significantly less PTSD symptoms than the control group at either time point.

Hypothesis 1c: The influence of writing condition on NHP and KTQ scores depends on time of assessment. Specifically, QOL for the participants in the experimental writing condition will be better at follow-up than they were for either the control or experimental group at baseline, and better than the control group at follow-up.

A repeated measures MANOVA was used to test hypothesis 1c. The two levels of time of assessment were entered as the within-subject factor, writing condition was entered as the between subjects factor, and NHP and KTQ scores from baseline and follow-up were entered as the dependent variables. Writing condition and time significantly interacted on QOL overall ($F(1,47) = 7.355, p = .009$).
(1,47) = 12.920, p= .001) and KTQ independently (F (1,47) = 8.923, p= .004), but not on the NHP independently (F (1,47) = 1.913, p= .173). Participating in the experimental writing condition significantly increased kidney transplant specific QOL (KTQ) and significantly increased QOL when the generic and specific QOL scales were examined together, however the increase in QOL on the generic QOL (NHP) measure was not significant.

**Hypothesis 1d:** The influence of writing condition on PA scores depends on time of assessment. Specifically, positive affect for the participants in the experimental writing condition will be higher at follow-up than it was for either the control or experimental group at baseline, and higher than the control group at follow-up.

A repeated measures ANOVA was used to test hypothesis 1e. The two levels of time of assessment were entered as the within-subject factor, writing condition was entered as the between subjects factor, PA scores from baseline and follow-up were entered as the dependent variables. Writing condition and time significantly interacted on PA scores (F (1,47) = 32.261, p= .001). Participants who engaged in expressive writing had significantly higher positive affect at follow-up, while the participants in the control condition did not.

**Hypothesis 1e:** The influence of writing condition on NA scores depends on time of assessment. Specifically, negative affect for the participants in the experimental writing condition will be lower at follow-up then it was for either the control or experimental group at baseline, and lower than the control group at follow-up.

A repeated measures ANOVA was used to test hypothesis 1e. The two levels of time of assessment were entered as the within-subject factor, writing condition was entered as the between subjects factor, NA scores from baseline and follow-up were entered as the dependent variables. Writing condition and time did not significantly interact on NA scores (F (1,47) =
1.797, p=.187). Participants in the experimental writing condition did not have significantly less negative affect at follow-up than they did at baseline. They did have significantly less negative affect than the control group at either time point.

**Hypothesis 2: Alexithymia and emotional suppression predict the benefits participants received from expressive writing.**

Multiple linear regressions were used to analyze hypothesis two. Only the participants in the expressive writing group were included in the analyses. For each regression equation, alexithymia (TAS) and emotional suppression (CECS) were regressed on the change scores for a dependent variable (PSS, TRSS, PTSD symptoms, NHP, KTQ, PA or NA), while controlling for the baseline score of that dependent variable. For instance, PSS change was regressed on TAS and CECS while controlling for baseline PSS. Results for hypothesis two are displayed in table 6.

Emotional suppression was found to significantly impact the change in perceived daily stress (PSS, b=.44, p<.001), transplant specific daily stress (TRSS, b=.94, p<.001), PTSD symptoms (PCL, b=.58, p=.038), transplant specific QOL (KTQ, b=.30, p=.011) and negative affect (NA scale of PANAS, b=.45, p=.030). Support was not found for a relationship between emotional suppression and change in generic QOL (NHP, b=.34, p=.207) or positive affect (PA of the PANAS, b=.26, p=.126). Therefore, for participants who engaged in expressive writing, higher levels of emotional suppression predicted larger reductions in generic perceived stress, transplant specific stress, PTSD symptoms, transplant specific QOL and negative affect.

Alexithymia was found to significantly impact the change in perceived daily stress (PSS, b=-.36, p<.001), transplant specific daily stress (TRSS, b=-.63, p<.001), and transplant specific QOL (KTQ, b=-.28, p=.005). Support was not found for a relationship between
alexithymia and change in PTSD symptoms (PCL, b=.08, p=.768), generic QOL (NHP, b=-.17, p=.571), positive affect (PA of the PANAS, b=-.06, p=.584) or negative affect (NA scale of PANAS, b=.00, p=.998). Therefore, for participants who engaged in expressive writing, higher levels of alexithymia predicted smaller reductions in generic perceived stress, transplant specific stress and transplant specific QOL.

Additional Analyses

Clinical Significance

Effect sizes were calculated to help determine the clinical significance of the results. For hypothesis one, eta squared (\( \eta^2 \)) measures the variability in the dependent variable that can be explained or accounted for by the independent variable. For instance, 19.8 percent (\( \eta^2= .198 \)) of the variability in the PSS can be explained by the interaction between the time of assessment and writing condition. The effects sizes for the significant results for hypothesis 1 range from small (TSS \( \eta^2= .138 \)) to large (PA \( \eta^2= .412 \)) (Cohen, 1988). These results are displayed in table 5. For hypothesis 2, R² was calculated to determine effect size. R² also measures the variability in the dependent variable that can be explained by the independent variable. For example, 77 percent (R²= .77) of the variability in the PCL can be explained by alexithymia and emotional suppression. All the effect sizes for significant results in hypothesis 2 are in the high range (Cohen, 1988). These results are displayed in table 6.

Feasibility

The feasibility of this study differs by recruitment source (see table 1). Overall, 47 percent of the individuals who were given information about the study participated. Six percent and zero percent of individuals given information participated at Hahnemann and Lankenau Hospitals, respectively, while 62 percent of individuals who responded to website postings
participated. Also, 60 and 67 percent of the eligible participants at two transplant awareness groups in upstate New York participated.

The study is feasible because 48 participants were able to complete the study protocol. Thirty-one of the participants were able to complete the three writing assignments within a ten day period without email reminders. The reminder (n= 17) were emailed on the eleventh day after they began the study and asked to complete their remaining writing exercises. Those participants that had to be reminded, took a mean of nineteen days to complete all writing assignments. In addition to the 48 completers, four participants completed the baseline measures and the first writing assignment and then did not respond to any email reminders to complete the writing assignments. Three non-completers were in the control group and one non-completer was in the experimental group.

The socio-demographic variables and baseline measure scores for the non-completers were compared to the completers. Non-completers were more likely to be male and older. Their baseline measure scores were more likely to be lower. T-tests were not used to analyze differences since there were only four non-completers and this violated the assumption of equal variances in groups.

Adherence

Adherence to writing instructions was in part assessed with the post writing questions. An one-way ANOVA was used to assess if writing condition effected participants’ mean ratings for how personal, emotionally revealing and how much of the essay’s content had been shared with others significantly differed by their group assignment. The experimental group indicated that their essays were significantly more personal (F(1,47) = 108.30, p< .001), emotionally revealing (F(1,47) = 240.95, p< .001), and they had shared less of the content with others (27.05,
An independent samples t-test was used to compare the three month follow-up writing questions. The experimental group rated that in comparison to the control group, they had thought more about their essays over the last three months ($t(1,47) = -2.53, p= .016$) and that the essays impacted their lives more ($t(1,47) = -5.00, p< .001$). These results are displayed in table 7.

In addition, of the 144 writings completed by the participants, one-third ($n= 48$) were randomly selected to be reviewed for adherence to the writings instructions. All experimental/expressive writings reviewed ($n= 22$) contained content about the writer’s emotions and thoughts regarding transplant. All of the medical fact (control) writings reviewed ($n =26$) contained facts regarding the writers’ transplant. However, five of the medical fact writings also contained emotions and thoughts about transplant. These five writings had fewer emotion and thought words than writings from the expressive writing condition. Two examples of writings are given below. These two were chosen because they are quite typical of the writing exercises for each group in that there is much more emotional content in the expressive writing then the medical fact writing. Also, these two writings show the variations that were present within both groups.

The length and sophistication of the writings varied by author, not by group. The writings below are exact quotes from participants.

Expressive Writing Condition:

“Deepest thoughts and feelings. That could be emotional. Just the phrase puts tears in my eyes and has my chest give a heave. My donor was my aunt. She really wanted to do it, which makes it easier. But it's still hard to accept that from her. And her husband probably didn't want her to do it. And he's a bit compulsive, obsessive, protective, neurotic. I'm really very close to both of them, but it's stressful knowing what they've done for me. That I owe them something. That when my aunt gets sick they worry that it might be because of her one kidney or that having one kidney might make her more vulnerable to complications of any sickness. She wanted me to be more expressive of my emotions I think. Encouraged me to cry in the hospital one time when I did, she said it would be better for everyone that way. Ok. I'm just writing. I'm afraid that this kidney will fail eventually, my doctor tells me to expect it and that we'll "get another kidney for me". But I don't want to have to get another living donor kidney (though I probably would accept one), and I don't want to have to do dialysis. When/if this one fails, I feel like a "vampire" so to speak, to be thinking of family as potentially a source of body parts to help me live better. I think my husband is the only person I wouldn't feel guilty getting a kidney from or having him donate so that I could
get one from someone more compatible in an exchange or to move me to the top of the list, which they do in New England. And the only reason I wouldn't feel guilty is that he could make the decision by how it would affect “our” lifestyle. Meaning if I have to be on dialysis or if I die sooner than I would otherwise, that affects him directly since we live together. So me getting a transplant directly benefits him also. Which helps my feelings about the whole thing. My aunt said she was doing it “for the family”. It does seem like it was as much for my mother (her sister) as it was for me. I have gained back about 20 pounds since my transplant. Which I had lost before my transplant. I'm 5'-4" and just over 200 pounds. Which qualifies me as obese. I'd really like to get down to 179 pounds to start. Just "overweight". by BMI standards. Would feel more vitality, then I think. BTW, I'm 43 years old. And I want my husband to have a less fat wife to be with. The prednisone (5 mg/day) might have something to do with it. But I think it's mostly just not having the discipline to follow meal plans daily with low calories and lots of vegetables and fruits. And also not being active for long enough and frequent enough times. 15 minutes is up. Will write again later this week. Bye.”

Medical Fact Condition:

“I was diagnosed w/ systemic lupus during my sophomore year in college. I was 19 years old. My physician at the time suggested I have my kidney function tested, because of the high incidence of people with lupus, who had kidney disease. Well, he was right. My kidneys were affected. At that point, I had 75% function left of my kidneys. I was immediately started on high dose steroids and other meds in order to halt the kidney disease, and stop the damage to my kidneys. Nothing worked. The last result was a course of I.V. cytoxan, a chemotherapeutic drug. Although I lost my hair, (which is literally my crowning glory), the kidney disease was arrested. I went for a couple years, and bouts with lupus flares, which only exacerbated the lupus nephritis. Also during this time, I took ACE inhibitors, and maintained a low salt, low protein diet. I had another course of IV cytoxan in 1999, which forced me into early menopause. By then, my kidneys were at 30% function. I was able to stave off dialysis until the winter of 2003, when my creatinine shot up to 7.0. My doctor suggested I start dialysis before I got too ill and would delay my planned kidney donor transplant. I have always known from the beginning of finding out that I had CKD, that I would try to have a transplant. My doctors even encouraged me to pursue transplantation. I thankfully, have five siblings and my sister was a match.”

Study Risks

At the end of the three month follow-up portion of the study participants were asked to click “Yes” or “No” to the following questions:

“Since beginning the study three months ago, have you contacted a mental health hotline, your transplant center social worker or other mental health professional because completing the questionnaires or writing exercises caused you emotional distress?”

Every participant answered “No” to this question. Also, no participants contacted the research study office to report any adverse reactions. However, many participants did contact the research office by phone or email to ask computer related questions and to further discuss the consent form. A record of these contacts was kept and participants in the control and experimental groups did not differ by the number of contacts they made.
PTSD

Twenty-one percent (n= 10) of all participants reported PTSD symptoms consistent with a DSM-IV diagnosis at baseline. Five of these participants were in the control group and five were in the experimental group. At three month follow-up, only one of ten participants with symptoms consistent with PTSD at baseline, no longer met PTSD criteria. This participant was in the experimental group. PTSD diagnoses were examined according to socio-demographic variables. Males and participants under the age of 45 were more likely to have PTSD symptoms consistent with a diagnosis. Table 8 details these results.

In order to compare the PCL-C scores of the current sample to previous samples, the percentage of participants that scored a 50 or higher (i.e., “severe”) on the PCL-C were calculated and compared to a previous kidney transplant sample (Possemato & Geller, in submission) and samples of individuals who experienced sexual assault, motor vehicles accidents and military combat (Stamm et al., 1996). Theses results are displayed in table 9. The current sample has the lowest percentage of “severe” scores at both baseline and three month follow-up.

Discussion

Effectiveness of Expressing Writing

Participants in the expressive writing condition experienced significant decreases in perceived stress and kidney transplant specific stress and significant increases in kidney transplant specific QOL and positive affect. At this point in time, these changes are best explained theoretically. Written emotional expression leads to the transduction of a stressful experience into a linguistic structure that can 1) promote assimilation and understanding of the event, 2) decrease the frequency and impact of stress-related cognitions and intrusive thoughts, and 3) habituate the writer to traumatic experiences associated with the event (Davidson et al.,
In sum, expressive writing leads to cognitive and emotional regulation, which is thought to lead to less chronic autonomic arousal (Davidson et al., 2002). Chronic autonomic arousal can lead to physiological changes in the endocrine, cardiovascular and immune systems (Schwarzer & Schulz, 2003) and therefore to poor health. It is through these theorized pathways that expressive writing most likely effects stress, QOL and positive affect.

Previous research has shown a similar decrease in perceived stress following expressive writing. Specifically, a meta-analysis of nine studies by Frisina et al. (2004) reported expressive writing produced decreases on the PSS with a mean effect size of .1808. However, some studies with medically ill participants have failed to show the same effect. Patients with metastatic renal cell carcinoma did not experience reduction in perceived stress (De Moor et al., 2002). Another study used self-administered stress management workbooks, which included expressive writing exercises, for individuals with asthma (Hockemeyer & Smyth, 2002). The experimental group did not show significant improvement in levels of perceived stress. The authors hypothesized that a later follow-up (e.g., 3 months) may have revealed a reduction in stress. No other expressive writing studies have assessed kidney transplant specific stress, however, the current study lends support for this measure’s sensitivity in detecting post-expressive writing changes in kidney transplant recipients.

Previous research also supports the mixed results found for QOL in the current study. Compared to the control group, the experimental group experienced a significant decrease in transplant-related QOL and a non-significant decrease in generic QOL. In general, expressive writing studies have not found support for broad, overly inclusive QOL measures. Broderick and colleagues (2004) found that home-based expressive writing did not have a clear effect on QOL.
However, support has been found for many specific QOL components. De Moor and his colleagues (2002) reported significantly less sleep disturbance and less daytime dysfunction for individual who engaged in expressive writing. Significant decreases in pain and fatigue were found with participants with rheumatoid arthritis and lupus (Danoff-Burg et al., 2006). The transplant specific QOL measure appears to be more sensitive to post-writing changes and provides rationale for the importance of using disease specific and multi-measure assessments.

The significant change in positive affect and insignificant change in negative affect (as assessed by the PANAS) found in the current study mirrors the results found in a randomized controlled trial exploring the effectiveness of expressive writing in adolescents with asthma (Warner et al., 2006), and a meta-analysis of expressive writing studies with clinical (both medical and psychiatric) populations (Frisina et al., 2004). In the current study, this pattern of PANAS results most likely emerged because the baseline reports of negative affect were low and therefore there was little room for variance from baseline to three month follow-up. The results of the current study combined with the previous ones cited here call into question the usefulness of the NA scale of the PANAS in expressive writing studies. It appears that participants are more likely to experience a change in positive affect than a change in negative affect.

Previous research concerning the effect of expressive writing on PTSD symptoms is scare and very mixed. Two pilot studies and one larger randomized controlled trial of Interapy, a therapy program that involves patients completing specific expressive writing assignments and therapists providing feedback via the internet, found that essays focusing on self-confrontation, cognitive reappraisal and “taking leave of the past” significantly reduced the posttraumatic stress symptoms of avoidance and intrusion (reexperiencing symptoms were not assessed) six weeks post-writing (Lange et al., 2002). Also, undergraduates writing about stressful life events
showed fewer intrusive thoughts and less avoidance behavior from pre-treatment to six week follow-up. However, expressive writing had no effect on PTSD symptoms for female survivors of intimate partner violence. In the current study it appears that low baseline reports of PTSD symptoms in the sample left little room for variation. It is unknown if a larger sample size or a greater frequency of reported PTSD symptoms would have made the decrease in PTSD symptoms statistically significant in the current study.

Emotional Suppression

The current study found that emotional suppression is an important factor to consider when determining who will and will not benefit from expressive writing. Within the expressive writing group, participants with higher levels of emotional suppression experienced greater reductions in perceived stress, transplant-related stress, PTSD symptoms, transplant-related QOL and negative affect. Therefore, participants who reported having negative feelings towards the expression of emotions and avoiding emotionally tense situations and thoughts benefited more than people who reported a willingness to be express their thoughts and feelings and a more positive attitude about their emotions. It appears that when the participants were encouraged to express emotions in a confidential and safe manor, through internet-based expressive writing, they were able to overcome their inhibitions, and beneficial emotional expression took place.

Individuals who reported emotional suppression were especially likely to benefit in the area of stress reduction. Both the generic and the transplant-specific stress measures appear to be sensitive to the changes kidney transplant recipients’ experienced. The Perceived Stress Scale (PSS) focuses largely on feeling confident and in control of one’s life while the Transplant Stressors Scale (TSS) focuses on an individual’s ability to “handle” transplant related problems and anxiety about health and appearance. Therefore, emotional expression appears to be related
to increased self-efficacy. The association between emotional suppression and a decrease in PTSD symptoms can likely be explained by the tasks that are involved in the writing assignment. Through writing participants are essentially “exposed” to thoughts about their transplant and in this way PTSD symptoms of avoidance are decreased. It is possible that expressive writing also serves to decrease reexperiencing and hyperarousal symptoms because the transplant experience is “processed” via the writer developing a narrative about the experience, reflecting on their experience in a new way and even coming to a new understanding of what the experience means to them in the context of their own lives.

Emotional suppression also predicted change in transplant specific QOL. Emotionally suppressive writers reported decreases in both emotional and physical aspects of transplant related QOL. Given the wealth of evidence for expressive writing inducing positive physical health changes, it is not surprising that the KTQ detected post-writing changes. Lastly, emotional suppression most likely predicted change in negative affect because emotional suppressors, by definition, would have high levels of negative affect at baseline. The writing exercise likely helped them express these emotions and think about their experience of transplant in a more balanced and realistic way. Other research has found similar findings regarding the impact of emotional suppression on the benefits writers receive from expressive writing. Gortner, Rude and Pennebaker (2006) found expressive writing decreased depressive symptoms among depression-vulnerable college students who scored high on a measure of suppression, but not students who scored low or in the normal range.

Support was not found for a relationship between emotional suppression and change in generic QOL. This is likely because the Nottingham Health Profile lacked adequate sensitivity to detect changes in kidney transplant recipients. This is a consistent finding throughout this
study and highlights the necessity of using population specific QOL measures. There was also no relationship between emotional suppression and positive affect. This is likely due to the fact that individuals who report the negative affect associated with emotional suppression are not likely to also report positive affect.

Alexithymia

While Alexithymia predicted fewer significant post-writing changes than emotional suppression, it was still found to be an important factor that determines the benefits writers receive from expressive writing. For participants who engaged in expressive writing, higher levels of alexithymia predicted smaller reductions in generic perceived stress, transplant specific stress and transplant specific QOL. Therefore, individuals who had a deficit in processing and regulating emotional states and have difficulty describing their emotions verbally, experienced smaller changes in stress and QOL. It is possible that writers who reported alexithymic characteristics benefits less in the area of stress reduction since they were unable to express and process their emotions, and therefore unable to gain more confidence and control over their life. Alexithymia likely predicted smaller changes in transplant specific QOL because alexithymic individuals often express distress somatically, which would elevate a QOL scale. Also, alexithymia and emotional suppression have been found to be negatively related constructs that have independent influences on health-related QOL (Verissimo, Mota-Cardosa & Taylor, 1998).

There were no significant relationships found between alexithymia and changes in PTSD symptoms, positive affect, negative affect or generic QOL. Since alexithymic individuals have such difficulty expressing their emotions, they probably endorsed few items at both baseline and follow-up. Alexithymia is also associated with showing behavioral and physiological signs of negative emotions, but reporting a positive sense of self, which will minimize any reports of
symptoms or problems. It is important to note again that the generic QOL measure most likely simply lacked adequate sensitivity for this population.

Community-Based Studies

The current study adds to the existing literature on community-based expressive writing studies being feasible, safe and effective (Broderick et al., 2004; Hockemeyer & Smyth, 2002). The effectiveness of the study was discussed above, while feasibility and safety are discussed here. Participants reported no increased risk or safety concerns due to their participation. Overall, the current study was feasible because 48 individuals completed participation. However, feasibility greatly varied by recruitment source, with individuals recruited from websites and local transplant awareness groups much more likely to participate then those recruited from hospital transplant centers. Transplant recipients “surfing the web” appear to be more likely to participate in an internet-based research study because they are 1) comfortable with using computers and the internet and 2) are interested and have time to engage in activities or education regarding their transplant. Similarly, transplant recipients who attend local transplant awareness groups have demonstrated a willingness to seek more information about transplantation and to share their own experiences, making them good candidates for successful recruitment. The results also show that a sample recruited from transplant websites and local transplant awareness groups is more representative of all kidney transplant recipients in the United States than a sample recruited from one hospital transplant center (see table 4). The current study provides initial support for the effectiveness, feasibility and safety of internet-based expressive writing for kidney transplant recipients. Smyth and Helm (2003) described that there is a need for more low cost, home-based behavioral medicine interventions. Internet-based expressive writing helps to fulfill this need.
PTSD Diagnoses

Within the current study 21 percent of all participants had PTSD symptoms consistent with a DSM-IV-TR diagnosis. This is less than the prevalence found in the only other study assessing PTSD in kidney transplant recipients. Possemato and Geller (in submission) found that 28 percent of all kidney transplant participants reported symptoms consistent with PTSD. This difference is likely due to several reasons. First, the methodology of assessing PTSD varied between the two studies. Possemato and Geller queried for any PTSD symptoms, regardless of the initial stressful event(s), while the current study inquired specifically about PTSD symptoms related to kidney failure and transplant. Also, the samples of the two studies differed. Possemato and Geller recruited participants who were more likely to be poorer, African American and residing in an urban setting, all factors known to increase rates of PTSD (Schwartz et al., 2005). The sample of the current study was more likely to be Caucasian, have a higher annual income and live in a rural or suburban area. Lastly, Possemato and Geller assessed PTSD when it is most likely to be present, three to six months post-transplant, while the current study assessed PTSD an average of three years post-transplant.

Possemato and Geller (in submission) and the current study both found that males and younger people were more likely to have PTSD symptoms consistent with the DSM-IV-TR diagnostic criteria. In general men report experiencing a higher number of stressful life events, which likely leads to higher rates of PTSD (Fairbank, Ebert & Caddell, 2001). The factors that explain why younger people have higher rates of PTSD are not as clear. It is possible that an individual’s reaction to stress changes as they age. With experience, they may learn more effective ways to cope with stress. This may be especially true for transplant patients. Younger participants did not have as long to learn and practice their coping skills and therefore may not
have had the resources to cope with organ failure. Also, organ failure and transplant can be viewed as more unexpected for a younger person than for an older person and this can increase stress.

PCL-C scores of the current sample are less severe than those of sexual assault victims, motor vehicle accident victims, and combat veterans (table 9). These results are consistent with the findings of Breslau et al. (1998) who calculated the risk of developing PTSD associated with specific types of trauma. PTSD risk associated with rape and being captured or tortured greatly exceeded that of having a life threatening illness or being in a serious car accident.

Limitations

The foremost limitation of the current study is the small sample size. When assessing the effectiveness of the expressive writing intervention (hypothesis one), several variables approached significance, including change in 1) PTSD symptoms, 2) general QOL and 3) negative affect. These findings may have proved to be significant with a larger sample size and more power. However, there are several published expressive writing studies with small samples. Stanton et al. (2002) compared three groups of 20 individuals each recovering from breast cancer. De Moor et al.’s (2002) study included 42 patients with renal cell carcinoma. Koopman et al. (2005) assessed PTSD in 47 with woman who had experienced domestic violence. All three of these studies found significant results for the effects of expressive writing.

Another limitation is that all variables were assessed solely by self-report. While self-report methods work especially well for some variables such as QOL and perceptions of stress, where the participant is the best source of information, relying on self-report for PTSD symptoms and health history may reduce accuracy. Also, there was no objective measure of health obtained. The methodology of the study did no allow contact with the participant’s
transplant center. Heath privacy requirements make collecting data on health history and current health status from transplant centers impossible in an internet-based study recruiting participants from across the United States. We attempted to collect a self-reported measure of health status: blood creatinine level. Unfortunately, 18 (38 percent) participants were unable to report their current creatinine level so this measure could not be included in the analyses.

The current study may have been susceptible to sampling bias. It is unknown whether transplant recipients who take the initiative to complete an online stress management study are more likely to benefit than transplant recipients who are not willing or able to participate via the internet. Participants in the current study may be more literate and articulate than the average transplant patient, given their reported level of education and that they were able to use a computer and the internet to participate. More literate and articulate patients may respond differently to this intervention. Comparing the current sample to one recruited from a hospital transplant center would be helpful to further understand any bias in sampling.

The results for hypothesis 1 must be interpreted cautiously given that three MANOVA assumptions were violated. Since some of the measure scores are not normally distributed and there is some heterogeneity of variance and co-variance, there is likely to be a high amount of standard error. As a result, we cannot be as confident in the results. Data collection will continue for the current study. Additional participants may help to normalize the distributions of the follow-up measures.

Another limitation is that the study may not have been as well controlled as other randomized control trials. The research team has no way of verifying that the participants are actual transplant recipients. While it seems unlikely that individuals would dedicate hours pretending to be a transplant recipient, it remains a slight possibility. Also, since participants
completed measures without a researcher present, a friend or family member could have assisted or completed the forms for them.

Clinical Implications and Future Areas of Exploration

While this intervention needs to be studied further, transplant centers can consider asking patients to engage in expressive writing exercises to reduce stress and improve QOL. While transplant recipients in the current study were able to benefit from expressive writing without professional monitoring, it is important to note that professional assistance was available if needed. Should transplant centers recommend expressive writing, similar precautions should be put into place.

Results from the current study lead to several other questions for future exploration. Foremost, can this simple behavioral medicine intervention work for other populations? Expressive writing has been found to be effective with a number of medically compromised populations (e.g., Danoff-Burg et al., 2006; McGuire et al., 2005) and may prove to be effective with other transplant populations (e.g., heart, liver or lung), patients experiencing serious surgeries (e.g., coronary artery bypass or spinal surgery) or individuals with chronic diseases that are yet to be studied (e.g., chronic obstructive pulmonary disease or hepatitis). Given that the effects of expressive writing on PTSD symptoms approached significance in this small sample, it seems warranted to study expressive writing in populations with increased rates of PTSD, such veterans and substance users (Ouimette, Goodwin & Brown, 2006), who in fact have not been previously studied. Primary care patients also report a variety of mental health issues, including PTSD (Kimerling et al., 2005) and may benefit from expressive writing interventions, given its potential to modify both physical and emotional distress.
Another area for future exploration involves what modifications may make this intervention assessable to more individuals. Previous expressive writing studies have used workbooks, tape recorders, and DVDs with success. Providing participants access to computers within their medical offices and clinics may increase accessibility. Also, gaining participant consent to have their writings monitored could increase the safety of this intervention. Allowing participants to choose the modality in which they complete expressive writing assignments that best fit their preferences and life style may be most effective. Research exploring the impact of this choice and the results derived from the different modalities used would advance the field of community-based behavioral medicine interventions.

More research also needs to be conducted on other simple behavioral medicine interventions. Several types of behavioral stress management techniques have been found to be efficacious for medical patients. For instance, Mindfulness-Based Stress Reduction was found to increase QOL in inner-city medical patients (Roth & Robbins, 2004) and reduce anxiety, depression and increase sleep in a pilot study with solid organ transplant patients (Gross et al., 2004). Also, Stress management training can reduce hypertension and risk for cardiovascular illness (Garcia-Vera et al., 2004).

Conclusions

Several important conclusions can be drawn from the current study. Internet-based expressive writing is feasible, safe and effective for kidney transplant recipients. Recruiting participants from websites and local transplant groups increases the feasibility of an internet-based study. Participants reported no harmful consequences of participating in the study and those who wrote about their thoughts and emotions in the experimental group experienced significantly less stress, better QOL and increased positive affect relative to those who wrote
about the facts regarding their transplant. Kidney transplant recipients were able to engage in these simple expressive writing tasks in the comfort of their own homes and experience clinically significant improvements in the lives. In addition, characteristics of emotional non-expressiveness are important factors in determining who will most benefit from expressive writing. Individuals who normally suppress their emotions can benefit more while alexithymic individuals will benefit less. This provides support for assigning expressive writing exercises according to specific individual differences.
Table 1

**Study Recruitment**

<table>
<thead>
<tr>
<th>Recruitment Source</th>
<th>Given information</th>
<th>Participated (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hahnemann Hospital</td>
<td>19</td>
<td>1 (5%)</td>
</tr>
<tr>
<td>Philadelphia, PA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lankenau Hospital</td>
<td>10</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Wynnewood, PA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transplant Awareness Organization</td>
<td>10</td>
<td>6 (60%)</td>
</tr>
<tr>
<td>Rochester, NY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transplant Awareness Group</td>
<td>6</td>
<td>4 (67%)</td>
</tr>
<tr>
<td>Syracuse, NY</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transplant Websites*</td>
<td>58</td>
<td>36 (62%)</td>
</tr>
<tr>
<td>Responded to posting</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>103</td>
<td>48 (47%)</td>
</tr>
</tbody>
</table>

*Transplant websites were [www.trioweb.org](http://www.trioweb.org), [www.transplantliving.org](http://www.transplantliving.org), [www.kidney.org](http://www.kidney.org), [www.kidneyfund.org](http://www.kidneyfund.org). Individuals who read postings, but did not respond could not be counted.*
<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>46</td>
</tr>
<tr>
<td>Female</td>
<td>26</td>
<td>54</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>33</td>
<td>69</td>
</tr>
<tr>
<td>African American</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Receive Disability Services</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
<td>35</td>
</tr>
<tr>
<td>Currently Employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>Unemployed</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Retired</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Category</td>
<td>Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>Age</td>
<td>46</td>
<td>12</td>
</tr>
<tr>
<td>Education in years</td>
<td>13</td>
<td>2.4</td>
</tr>
<tr>
<td>Yearly Income</td>
<td>$32,000</td>
<td>$44,000</td>
</tr>
</tbody>
</table>
Table 3

*Means and Standard Deviations of Study Measures by Group*

<table>
<thead>
<tr>
<th></th>
<th>Experimental Group (n= 25)</th>
<th>Control Group (n= 23)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline Measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Stress Scale</td>
<td>33</td>
<td>30</td>
</tr>
<tr>
<td>Transplant Stressors Scale</td>
<td>53</td>
<td>49</td>
</tr>
<tr>
<td>PTSD Checklist- Total Score</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>PTSD Checklist- Total Symptoms</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Nottingham Health Profile</td>
<td>404</td>
<td>409</td>
</tr>
<tr>
<td>Kidney Transplant Questionnaire</td>
<td>76</td>
<td>74</td>
</tr>
<tr>
<td>Positive Affect Schedule</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>Negative Affect Schedule</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Toronto Alexithymia Scale</td>
<td>54</td>
<td>53</td>
</tr>
<tr>
<td>Courtlaud Emotional Control Scale</td>
<td>49</td>
<td>50</td>
</tr>
<tr>
<td><strong>Follow-up Measures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Stress Scale</td>
<td>24</td>
<td>34</td>
</tr>
<tr>
<td>Transplant Stressors Scale*</td>
<td>37</td>
<td>51</td>
</tr>
<tr>
<td>PTSD Checklist- Total Score*</td>
<td>32</td>
<td>36</td>
</tr>
<tr>
<td>PTSD Checklist- Total Symptoms*</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Nottingham Health Profile</td>
<td>218</td>
<td>281</td>
</tr>
<tr>
<td>Kidney Transplant Questionnaire*</td>
<td>44</td>
<td>64</td>
</tr>
<tr>
<td>Positive Affect Schedule*</td>
<td>41</td>
<td>23</td>
</tr>
<tr>
<td>Negative Affect Schedule</td>
<td>21</td>
<td>25</td>
</tr>
</tbody>
</table>

* Significant mean differences at p ≤ .05
### Table 4

**Demographics of Current Sample Compared to U.S. Transplant Data for 2006**

<table>
<thead>
<tr>
<th></th>
<th>Previous Kidney Sample N=61*</th>
<th>Current Sample N=48</th>
<th>U.S. Kidney Data N= 14,770**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Race</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>16 (26)</td>
<td>33 (69)</td>
<td>10,266 (70)</td>
</tr>
<tr>
<td>African American</td>
<td>36 (64)</td>
<td>13 (27)</td>
<td>3,387 (23)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (10)</td>
<td>2 (4)</td>
<td>1,117 (8)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34</td>
<td>3 (5)</td>
<td>8 (17)</td>
<td>2,569 (18)</td>
</tr>
<tr>
<td>35-49</td>
<td>14 (25)</td>
<td>23 (48)</td>
<td>4,664 (33)</td>
</tr>
<tr>
<td>50-64</td>
<td>25 (41)</td>
<td>12 (25)</td>
<td>5,329 (34)</td>
</tr>
<tr>
<td>65+</td>
<td>18 (29)</td>
<td>5 (10)</td>
<td>1,529 (11)</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>17 (28)</td>
<td>26 (54)</td>
<td>6,019 (41)</td>
</tr>
<tr>
<td>Male</td>
<td>44 (72)</td>
<td>22 (46)</td>
<td>8,751 (59)</td>
</tr>
</tbody>
</table>

* Possemato & Geller (in submission)
** The Scientific Registry of Transplant Recipients available at [www.ustransplant.org](http://www.ustransplant.org)
Table 5
Main and Interaction Effects for Dependent Variables  \((n = 48)\)

<table>
<thead>
<tr>
<th>Measure(s)</th>
<th>F (1, 47)</th>
<th>p</th>
<th>(\eta^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived Stress Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>1.507</td>
<td>.226</td>
<td>.032</td>
</tr>
<tr>
<td>Group</td>
<td>5.070*</td>
<td>.029</td>
<td>.099</td>
</tr>
<tr>
<td>Interaction</td>
<td>11.388*</td>
<td>.002</td>
<td>.198</td>
</tr>
<tr>
<td>Transplant Stress Scale</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>4.465*</td>
<td>.040</td>
<td>.088</td>
</tr>
<tr>
<td>Group</td>
<td>2.998</td>
<td>.133</td>
<td>.048</td>
</tr>
<tr>
<td>Interaction</td>
<td>7.355*</td>
<td>.009</td>
<td>.138</td>
</tr>
<tr>
<td>Combined Stress Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>2.557</td>
<td>.089</td>
<td>.102</td>
</tr>
<tr>
<td>Group</td>
<td>2.508</td>
<td>.093</td>
<td>.100</td>
</tr>
<tr>
<td>Interaction</td>
<td>5.574*</td>
<td>.007</td>
<td>.199</td>
</tr>
<tr>
<td>PTSD Checklist Symptoms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>10.974*</td>
<td>.002</td>
<td>.193</td>
</tr>
<tr>
<td>Group</td>
<td>2.475</td>
<td>.123</td>
<td>.051</td>
</tr>
<tr>
<td>Interaction</td>
<td>8.218</td>
<td>.096</td>
<td>.052</td>
</tr>
<tr>
<td>Nottingham Health Profile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>53.570*</td>
<td>.000</td>
<td>.538</td>
</tr>
<tr>
<td>Group</td>
<td>1.958</td>
<td>.168</td>
<td>.041</td>
</tr>
<tr>
<td>Interaction</td>
<td>1.913</td>
<td>.173</td>
<td>.040</td>
</tr>
<tr>
<td>Kidney Transplant Questionnaire</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>32.485*</td>
<td>.001</td>
<td>.414</td>
</tr>
<tr>
<td>Group</td>
<td>7.680*</td>
<td>.008</td>
<td>.143</td>
</tr>
<tr>
<td>Interaction</td>
<td>8.983*</td>
<td>.004</td>
<td>.163</td>
</tr>
<tr>
<td>Combined QOL Measures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>111.064*</td>
<td>.001</td>
<td>.832</td>
</tr>
<tr>
<td></td>
<td>Value 1</td>
<td>Value 2</td>
<td>Value 3</td>
</tr>
<tr>
<td>----------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td>13.947*</td>
<td>.001</td>
<td>.383</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td>12.920*</td>
<td>.001</td>
<td>.365</td>
</tr>
<tr>
<td><strong>Positive Affect Schedule</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>1.542</td>
<td>.221</td>
<td>.032</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td>16.500*</td>
<td>.001</td>
<td>.264</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td>32.261*</td>
<td>.001</td>
<td>.412</td>
</tr>
<tr>
<td><strong>Negative Affect Schedule</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>.570</td>
<td>.454</td>
<td>.012</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td>1.232</td>
<td>.273</td>
<td>.026</td>
</tr>
<tr>
<td><strong>Interaction</strong></td>
<td>1.797</td>
<td>.187</td>
<td>.038</td>
</tr>
</tbody>
</table>

* Significant mean differences at p ≤ .05
Table 6

*The Relationship between Alexithymia, Emotional Suppression and the Dependent Variables (n=25)*

<table>
<thead>
<tr>
<th>Measure</th>
<th>Alexithymia</th>
<th>Emotional Suppression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R²</td>
<td>B</td>
</tr>
<tr>
<td>Perceived Stress Scale</td>
<td>.98</td>
<td>-.28</td>
</tr>
<tr>
<td>Transplant Stressors Scale</td>
<td>.94</td>
<td>-1.07</td>
</tr>
<tr>
<td>PTSD Checklist- Total Sx</td>
<td>.77</td>
<td>.05</td>
</tr>
<tr>
<td>Nottingham Health Profile</td>
<td>.55</td>
<td>-.88</td>
</tr>
<tr>
<td>Kidney Transplant Questionnaire</td>
<td>.98</td>
<td>-.55</td>
</tr>
<tr>
<td>Positive Affect Schedule</td>
<td>.97</td>
<td>-.04</td>
</tr>
<tr>
<td>Negative Affect Schedule</td>
<td>.82</td>
<td>.00</td>
</tr>
</tbody>
</table>

* Significant at p ≤ .05
Table 7

*Differences in the Participants’ Ratings of Writing Content by Group (n = 48)*

<table>
<thead>
<tr>
<th>Question</th>
<th>Control M(SD)</th>
<th>Experimental M(SD)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post Writing Questions</td>
<td></td>
<td>F(1,47)</td>
<td></td>
</tr>
<tr>
<td>How personal is the essay?</td>
<td>2.39(.47)</td>
<td>4.11(.65)</td>
<td>108.30</td>
</tr>
<tr>
<td>To what degree did you reveal your emotions?</td>
<td>2.01(.34)</td>
<td>4.19(.59)</td>
<td>240.95</td>
</tr>
<tr>
<td>How much of the essay content had you told others?</td>
<td>3.43(.90)</td>
<td>2.09(.88)</td>
<td>27.05</td>
</tr>
<tr>
<td>Follow-up Writing Questions</td>
<td></td>
<td>t (1.47)</td>
<td></td>
</tr>
<tr>
<td>How much have you thought about the essays since writing them?</td>
<td>1.87(.76)</td>
<td>2.72(1.49)</td>
<td>-2.53</td>
</tr>
<tr>
<td>How much has the writing of the essays impacted upon your life?</td>
<td>1.22(.43)</td>
<td>2.76(1.48)</td>
<td>-5.00</td>
</tr>
</tbody>
</table>

* Significant at p ≤ .05

Note: Higher mean scores indicate more agreement with the question.
Table 8

Participants with Symptoms Consistent with a PTSD Diagnosis

<table>
<thead>
<tr>
<th>Group</th>
<th>n of group</th>
<th>% (n) PTSD baseline</th>
<th>% (n) PTSD follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>All participants</td>
<td>48</td>
<td>21 (10)</td>
<td>19 (9)</td>
</tr>
<tr>
<td>African American</td>
<td>13</td>
<td>23 (3)</td>
<td>23 (3)</td>
</tr>
<tr>
<td>Caucasian</td>
<td>33</td>
<td>18 (6)</td>
<td>15 (5)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>2</td>
<td>50 (1)</td>
<td>50 (1)</td>
</tr>
<tr>
<td>Male</td>
<td>22</td>
<td>32 (7)</td>
<td>27 (6)</td>
</tr>
<tr>
<td>Female</td>
<td>26</td>
<td>12 (3)</td>
<td>12 (3)</td>
</tr>
<tr>
<td>&lt;45 years old</td>
<td>20</td>
<td>20 (4)</td>
<td>20 (4)</td>
</tr>
<tr>
<td>45-65 years old</td>
<td>40</td>
<td>15 (6)</td>
<td>15 (5)</td>
</tr>
<tr>
<td>&gt;65 years old</td>
<td>3</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>
Table 9

PTSD Checklist- Civilian Version Norms in Mean Scores for Current Sample Versus Other Groups

<table>
<thead>
<tr>
<th>Previous Transplant Sample</th>
<th>Current Sample</th>
<th>Sexual Assault</th>
<th>Motor Vehicle Accident</th>
<th>Combat Veterans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score &lt;50</td>
<td>57.7</td>
<td>81.9</td>
<td>89.6</td>
<td>55.0</td>
</tr>
<tr>
<td>Score ≥50</td>
<td>28.1</td>
<td>18.9</td>
<td>10.4</td>
<td>22.8</td>
</tr>
</tbody>
</table>

Baseline  Follow-up

Score <50  57.7  81.9  89.6  55.0  60.0  63.6
Score ≥50  28.1  18.9  10.4  22.8  26.6  34.4
Figure 1. Mean Scores of Measures by Group and Time.

* Significant mean differences at $p \leq .05$
References


Hibberd, P. L., Surman, O. S., Bass, M., Tolkoff-Rubin, N. E., Cosimi, A. B., Schooley, R. T.,


You are invited to participate in an online survey about stress and health.

This survey includes:
- Questions about your health and any stress you may be experiencing.
- Three short journaling exercises that ask you to write about your experience with kidney transplant.
- All your information will be kept confidential.

The survey can be completed from a computer either in your home or another place where you feel comfortable sharing personal information.

For more information please go to http://pages.drexel.edu/~akp26

Please contact our research office if you have any questions either by email (akp26@drexel.edu) or phone (215-762-8275)

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