THE RELATIONSHIP BETWEEN PSYCHOLOGICAL DISORDERS AND

MEDICATION ADHERENCE IN COLLEGE STUDENTS

by

Briana Cobos, B.A.

A thesis submitted to the Graduate Council of
Texas State University in partial fulfillment
of the requirements for the degree of
Master of Arts
with a Major in Psychological Research
May 2015

Committee Members:

    Kelly Haskard Zolnierek, Chair

    Krista Howard

    Michele Oliver

FAIR USE AND AUTHOR'S PERMISSION STATEMENT

Fair Use

This work is protected by the Copyright Laws of the United States (Public Law 94-553, section 107). Consistent with fair use as defined in the Copyright Laws, brief quotations from this material are allowed with proper acknowledgement. Use of this material for financial gain without the author's express written permission is not allowed.

Duplication Permission

As the copyright holder of this work I, Briana Cobos, authorize duplication of this work, in whole or in part, for educational or scholarly purposes only.

ACKNOWLEDGEMENTS

First and foremost, I would like to express my gratitude to my committee chair, Dr. Kelly Haskard Zolnierek, for her constant support, encouragement, and guidance during my graduate experience. Without her vast knowledge, research skills, and assistance, this thesis would not have been possible. I would also like to thank her for the invaluable research opportunities throughout my graduate experience. She has been instrumental in my development and growth into the researcher I am today. I am also thankful for her time, ideas and expertise to make my graduate experience rewarding and enjoyable. She has been a source of inspiration and motivation these past two years.

I would also like to express my gratitude to my committee member, Dr. Krista Howard, for her constant guidance, encouragement, and support these past two years. My thesis would not have been possible without her valuable statistical advice, research expertise and assistance. I would also like to thank her for generously sharing her time and expertise. I have learned a lot from her and she has also made my graduate journey a rewarding and an enjoyable learning experience. She has been instrumental in my academic, teaching and research development.

I would also like to thank my committee member, Dr. Michele Oliver, for her assistance and support throughout all levels of the thesis process. I am thankful for all of her contributions to my thesis writing process. Without her assistance and guidance, this thesis would not have been possible.

Furthermore, I would like to thank my family and friends for their unconditional love and support these past two years. Their constant words of encouragement and support these past two years have made my educational journey manageable and rewarding. Lastly and most importantly, I express my love and gratitude to my parents and sister who have always encouraged and supported me in all of my pursuits and dreams. Words cannot express how truly blessed I am to have them in my life. I would not be where I am today without their enduring love and support.

TABLE OF CONTENTS

LIST OF TABLES

Tables

LIST OF ABBREVIATIONS

Abbreviation	Description
ACHA	American College Health Association
ADAA	Anxiety and Depression Association of America
ADHD	Attention Deficit/Hyperactivity Disorder
MMAS	Morisky Medication Adherence Scale
PHQ	Patient Health Questionnaire
SF-36	Short Form 36 Health Survey
WHO	World Health Organization

ABSTRACT

Introduction: Medication adherence for a chronic health condition can determine the effectiveness of a treatment or medication regimen aimed at providing individuals with optimal health. Past research has shown that individuals who demonstrate symptoms of a mental health disorder, such as depression and/or anxiety, have lower adherence towards their treatment regimen. Therefore, this study aimed to assess how psychological disorders relate to medication adherence in college students with chronic conditions. Method: College students from Texas State University were invited to participate in an online study via advertisements across campus. One hundred and seventy-one students taking medication for a chronic health condition were included in the current study. Medication adherence was assessed using the Morisky 8-item Medication Adherence Questionnaire to identify significant relationships with demographic variables, psychological disorders, health related quality of life, and medication barriers. Results: Contrary to our hypothesis, the presence of a psychological disorder was not significantly associated with medication adherence. However, the presence of a psychological disorder was significantly related to known medication barriers towards adherence and mental and physical domains of health-related quality of life. Conclusion: Results from this study suggest the need for further research examining the relationship between psychological disorders and medication adherence, as well as known medication-taking barriers and quality of life in young adults.

CHAPTER I

Introduction

Adherence is defined as the degree to which a patient's behavior coincides with the agreed upon guidelines of a health-care provider (Osterberg & Blaschke, 2005; World Health Organization, 2003). According to the World Health Organization (WHO) (2003), adherence includes a wide range of health-related behaviors to treat acute and chronic diseases. These behaviors can include the following: filling prescriptions, taking medication, attending follow-up medical appointments, receiving immunizations, self-management of a chronic illness and/or modifying one's lifestyle behaviors for optimal health (WHO, 2003). Effective treatment plans are negotiated, discussed and prearranged by a collaborative effort between the patient and his or her doctor (Vermeire, Hearnshaw, Royen & Denekens, 2001; WHO, 2003). Furthermore, adherence is a primary factor in the effectiveness of a treatment plan or intervention aimed at providing patients with an optimal health outcome (WHO, 2003).

Nonadherence (i.e., the opposite of adherence) can be defined as an individual's failure to follow the recommended guidelines set forth by his or her provider, thereby reducing the optimum benefits of their treatment plan (DiMatteo, 2004; WHO, 2003). For example, a patient can be nonadherent to their regimen by failing to take their medication prescriptions (primary nonadherence), discontinuing their medications before the allotted time recommended by a physician (nonpersistence), not taking their medications correctly, or ignoring certain behavior modifications that are part of the treatment plan (DiMatteo, Haskard-Zolnierek & Martin, 2012).

Another form of nonadherence, known as intentional nonadherence, can be viewed as the patient actively deciding not to follow the physician's recommendations. According to Hugtenburg, Timmers, Elders, Vervloet and van Dijk (2013), this process is usually a rational decision where the patient has weighed the pros and cons of not adhering to their treatment plan. Within this process, the individual's beliefs and knowledge play a pivotal role in their decision. This can also be viewed as an individual's attempt to achieve their personal goals and preserve their quality of life and sense of identity (DiMatteo, 2004; Hugtenburg et al., 2013).

On the other hand, unintentional nonadherence can include behaviors that were unplanned and are less associated with the individual's beliefs. This could occur due to forgetfulness or a lack of knowledge about how to take their medication. Hugtenburg and her colleagues (2013) note that the complexity of a treatment could cause unintentional nonadherence as well, due to the difficulty of following the regimen, leading the patient to experience further aversive symptoms or secondary illnesses (Hugtenburg et al., 2013).

<u>Rates of Nonadherence</u>

According to the WHO (2003), adherence to long-term treatments in developed countries is estimated to be around 50% for any type of regimen. For example, patients in the United States have an adherence rate of 51% to their prescribed medications for hypertension (WHO, 2003). Furthermore, the WHO (2003) reports that rates of adherence to antidepressant medication treatment range from 40 to 70%. Additionally, high levels of adherence in depressed patients are positively correlated with positive treatment outcomes when antidepressants are solely used compared to antidepressants combined with other medications used to treat various chronic conditions. Adherence to

antiretroviral agents for HIV and AIDS varies between 37 and 83%, and research from the WHO suggests that individuals who fall between these rates are more likely to experience drug resistance compared to individuals with nearly perfect adherence (WHO, 2003).

When assessing the efficacy of treatments for various diseases or conditions, rates of nonadherence are important to consider. However, poor treatment adherence is to be expected in 30 to 50% of all patients regardless of their illness (Vermeire et al., 2001). Furthermore, adherence rates vary depending on whether the patient is diagnosed with an acute or chronic disease. Research indicates that adherence is higher for patients with acute illnesses versus patients with chronic illnesses. Adherence rates for individuals diagnosed with chronic illnesses have been shown to drop after the first six months. One factor contributing to this finding of effects on medication adherence, according to Osterberg and Blaschke (2005), could be the dosage frequency. One pill, once a day, has been shown to maximize adherence when combined with frequent doctor visits. However, 10 to 40% of patients taking one pill, once a day continue to be nonadherent due to various reasons (Osterberg & Blaschke, 2005). Another reason for nonadherence could be adverse side effects from the medication. Five to 10% of patients report adverse side effects as a reason they stopped taking their medication (Vermeire et al., 2001).

In a meta-analysis conducted by DiMatteo (2004), medication adherence averaged 76.3% in 491 studies published between 1980 and 1998. The most common methods of adherence measurement were self-reports and pill counts. Illnesses with the highest adherence rates were HIV disease (88.3%) and arthritis (81.2%). Conditions with the lowest adherence rates were diabetes (67.5%) and sleep disorders (65.5%). The data from

this analysis indicate that higher levels of adherence are achieved when medication is the

sole treatment as opposed to also requiring the patient to change health behaviors.

Results demonstrated a strong relationship between medication education and adherence

for chronic illnesses versus acute illnesses, suggesting that access to greater resources

such as education regarding their illnesses and medication taking is linked to better

adherence. However, education did not constitute the sole factor influencing difficulties

with medication taking. Nonadherence is dependent on varying situations for each

individual, which should be taken into account by health care providers (DiMatteo,

2004).

<div align="center">Outcomes of Adherence</div>

Research shows that individuals who are adherent to their treatment plan are 2.88

times more likely to experience a good health outcome than those who do not follow

through with their treatment plan (DiMatteo, Giordani, Lepper & Croghan, 2002). Thus,

patient health outcomes are 26% better when patients are adherent to their treatment plan

(DiMatteo, 2004).

Furthermore, according to DiMatteo, Haskard-Zolnierek and Martin (2012), the

economic burden of nonadherence in the United States is estimated to be between $290 to

$300 billion dollars each year. This is attributed to patients not attending medical visits,

inability to modify health behaviors and secondary illnesses associated with chronic

conditions, such as kidney failure due to diabetes, and unnecessary hospitalizations

(DiMatteo, Haskard-Zolnierek & Martin, 2012). When combining chronic diseases,

mental health conditions, tuberculosis and HIV/AIDS, this represented 54% of the burden

<div align="center">4</div>

of all illnesses worldwide in 2001. The World Health Organization (2003) predicts that the global burden of these illnesses will surpass 65% in 2020 (WHO, 2003).

Higher rates of adherence provide economic benefits. For example, high adherence rates would reduce the use of expensive healthcare services needed during cases of disease relapses or emergencies that could have been prevented by patients following their treatment plan. Therefore, based on these rates and findings, nonadherence should be considered a worldwide health care burden that needs to be addressed in order to achieve optimal health outcomes in patients. This represents a serious issue for healthcare professionals and patients in cases where optimal health is solely determined by the patient's medication adherence (WHO, 2003).

<u>Measurements of Adherence</u>

The type of adherence measurement utilized has a major effect on determining if a patient is adherent or nonadherent. One type of measure to calculate adherence has been to report adherence as the percentage of the prescribed doses of the medication taken by the patient over a certain time period (Osterberg & Blaschke, 2005). Other measurement methods, which are direct measures, include measuring the concentration of the drug in blood or urine, or directly observing the patient taking their medication. These are commonly used to assess adherence for some medications and are considered most accurate. However, these methods can be invasive, expensive, and burdensome for healthcare providers and patients (Osterberg & Blaschke, 2005; Vermeire et al., 2001).

Indirect approaches have also been utilized to measure adherence by administering a self-report questionnaire, pharmacy refill records, counting a patient's pills, or by using an electronic medication monitor. Although an indirect approach has

been shown to be easy to implement, such measures can be susceptible to misrepresentation. The most common indirect methods, questioning a patient and pill counts, have been shown to be susceptible to problems of patient dishonesty and errors in data collecting by not taking into account dose timing. However, with the advancement of technology, electronic medication monitors can provide precise results and are able to track medication taking patterns. To date, this method has been shown to provide the most accurate data on medication adherence (Osterberg & Blaschke, 2005). The use of electronic devices to measure adherence has led researchers to discover the occurrence of white-coat adherence, where adherence increases before or after a visit with their health-care provider, and drug holidays, in which the patient does not follow their treatment plan for a short period of days or weeks (Vermeire et al., 2001). Research has provided evidence that electronic devices are more accurate when assessing adherence in depressed individuals (WHO, 2003). However, such devices can be expensive and do not account for the patient actually ingesting the medication (Osterberg & Blaschke, 2005). Furthermore, these methods do not take into account other reasons a patient's health can deteriorate or remain stable if they do or do not adhere to their regimen (Vermeire et al., 2001). Despite the biases of self-report measurements, they are the simplest, least expensive, least invasive and the most common approach to adherence measurement.

CHAPTER II

Barriers to Medication Adherence

Barriers to medication adherence can contribute to a patient not following their treatment regimens. Factors related to physicians, patients, and the healthcare industry can all contribute towards the patient not adhering to their medication treatment. Osterberg and Blaschke (2005) mention that patients have control over the most common barriers to medication adherence. Research has shown the most common reasons for patients not taking their medication include the following: decision to not take their medication, forgetfulness, a lack of information regarding the medication, and emotional factors such as depression (Osterberg & Blaschke, 2005). Physicians can contribute to a patient's nonadherence by prescribing complex treatments, not communicating effectively about the benefits of the medication, not considering the cost of the medication or the patient's lifestyle, and not having a trusting therapeutic relationship with their patient. The healthcare industry can also be responsible for an individual's nonadherence by limiting access to healthcare services and by having high costs for medication or copayments for medical visits (Osterberg & Blaschke, 2005).

Mental Health Conditions

Prevalence and Symptoms of Depression and Anxiety Disorders

Mental health disorders are another barrier toward successful medication adherence. Depression affects an estimated 121 million people worldwide. According to the WHO (2012), depression is one of the leading causes of disability and is a significant public health concern in the United States (WHO, 2012). Anxiety and depression are the most common affective disorders in patients. Depression is the most common affective

disorder seen by physicians in the United States and is most likely to occur in individuals who have another significant health problem (DiMatteo, Lepper & Croghan, 2000). This can complicate the treatment of many chronic medical conditions. According to the Anxiety and Depression Association of America (ADAA) (2010), 40 million adults in the United States are affected by an anxiety disorder each year. Fifty percent of adults who are diagnosed with depression are more likely to be diagnosed with an anxiety disorder as well. Depression and anxiety have been associated with substantial daily life impairment, high comorbidity with other mental health problems, poor physical health and high mortality rates (ADAA, 2010; Hasin, Goodwin, Stinson & Grant, 2000; Reddy, 2010).

Depression is marked by abnormal and persistent low mood, sleep disturbance, a lack of appetite, suicidal thoughts, guilt, and pessimism. These symptoms can vary in severity and the illness pattern can range from mild to severe with periods of remission or relapse. For patients who suffer from depression, physicians advocate that treatment should continue for at least six months after a remission of symptoms. Additionally, for patients who have had two or more episodes of significant depression, physicians recommend preventive treatment. However, the effectiveness of treatment depends on patient adherence and the treatment plan recommended by physicians (WHO, 2012).

Anxiety disorders are characterized by excessive fear, worry or tension. There are several types of anxiety disorders such as generalized anxiety and panic disorder (WHO, 2004). Patients who have been diagnosed with an anxiety disorder are also more likely to utilize healthcare services when presented to them (DiMatteo, Lepper & Croghan, 2000). In addition, patients who are diagnosed with both depression and anxiety are more likely to have poorer health and a decrease in quality of life over time.

Measuring health-related quality of life in patients has been an invaluable tool in measuring the effectiveness of treatments for chronic conditions. Quality of life scales measure various domains related to emotional, physical, mental and social functioning. These measures focus on the effect the patient's perceived health status has on their quality of life (Hays, Sherbourne & Mazel, 1995). For example, research with renal transplant recipients indicated that recipients who demonstrated symptoms of depression and anxiety had a lower quality of life and were more likely to reject or have complications post-transplant (Jana et al., 2014).

Anxiety disorders are the most common psychiatric disorder worldwide with a lifetime prevalence ranging from 13.9 to 18.8%, which indicates that individuals will experience an anxiety disorder sometime in their life (Stein, Cantrell, Sokol, Eaddy & Shah, 2006). Results from a meta-analytic review of 13,085 patients indicated that 52% of the patients were diagnosed only with an anxiety disorder while 48% of the patients had a comorbid diagnosis of anxiety and depression. This study found most patients who were diagnosed solely with an anxiety disorder to be diagnosed with generalized anxiety disorder (Stein et al., 2006).

Nonadherence in Depression and Anxiety Disorders

Patients with depression and anxiety disorders may struggle with nonadherence to medical treatment. According to the WHO (2012), two-thirds of depressed individuals who had started an initial course of antidepressants stopped taking them within a month of their initial diagnosis while 40% had stopped adhering to their treatment within 12 weeks. According to Osterberg and Blaschke (2005), half of the individuals diagnosed with major depression and treated with antidepressants will not be adherent to their

9

regimen three months after the initial day of treatment. Research also demonstrates that only 20% of patients who were prescribed antidepressants refilled their prescriptions four or more times within a six month period, demonstrating that depressed individuals are less likely to adhere to their antidepressant medication (WHO, 2012). A retrospective study researching antidepressant articles from various databases containing patients who were prescribed antidepressants from 2001 to 2002 found that patients, who were diagnosed with an anxiety disorder alone, were 40% less likely to adhere to their medication regimen compared to those who were diagnosed with anxiety and depression. This could be due to patients with a comorbid diagnosis experiencing more severe symptoms and poorer health outcomes. As a result, they may benefit more from their treatment plan than those patients with one diagnosis (Stein et al., 2006).

One review reported that across studies, individuals with depression have been shown to be 65% adherent to their antidepressant medication (Osterberg & Blaschke, 2005). Although this review indicates a high percentage for antidepressant medication adherence, the measurement of adherence varied between studies and could have contributed to this high percentage.

Depression, Chronic Conditions and Nonadherence

Fifteen percent of depression diagnoses are in response to medical conditions such as stroke, heart disease, cancer, chronic pain, diabetes, AIDS, and end stage renal disease (Haskard-Zolnierek & Williams, 2013). Individuals diagnosed with depression have more difficulty following a medication regimen for chronic illnesses. Evidence from reviews of the literature indicates that there is an association between depression and nonadherence for individuals with chronic conditions. First, a meta-analysis conducted by

DiMatteo and her colleagues (2000), analyzing studies from 1968 to 1998, demonstrated that individuals who were depressed were three times more likely to be nonadherent than nondepressed individuals. The researchers noted that a depressed patient's degree of hopelessness might cause patients to be nonadherent since they may have had little optimism that the treatment would work. Second, depression can cause the patient to become socially isolated. Social support has been shown to help patients adhere to their medication by being a positive source of encouragement for adherence. Therefore, patients who are depressed and socially isolated do not have the essential emotional support needed to adhere to their medication. Finally, depression has been shown to be associated with decreased cognitive functioning. This can cause the patient to forget and not follow through with their treatment regimen. However, DiMatteo and her colleagues (2000) noted that the studies that were included in this meta-analysis could not determine whether depression caused nonadherence or whether nonadherence to their medication caused the depression because they did not feel the benefits of their medication and perceive improvements in their symptoms (DiMatteo, Lepper & Croghan, 2000).

In a more recent meta-analysis by Grenard and his colleagues (2011), the researchers found that patients with depression were 1.76 times more likely to be nonadherent than patients without depression. Grenard and his colleagues (2011) note that this nonadherence could be caused by a lack of energy or motivation, social withdrawal, changes in cognition or beliefs about their medication's benefits, or feelings of hopelessness toward their illness. The analysis provides further evidence that depression is associated with poor adherence to medication for chronic illnesses (Grenard et al., 2011). Researchers mention that psychological distress can influence a patient's

well-being, and depression's effect on medication adherence can be a way through which psychological distress can influence health outcomes.

Research in this area has focused on the effects of depression in individuals with severe chronic illnesses such as Human Immunodeficiency Virus (HIV). The effect of depression on medication adherence was demonstrated in a study examining medication adherence in HIV-positive individuals. Research shows that individuals diagnosed with HIV are twice as likely to be diagnosed with major depression (Cruess et al., 2012). It is critical to diagnose and treat depressed patients with HIV because nonadherence to antiretroviral treatments can increase the likelihood of the individual developing a drug-resistant viral strain. Consequently, this can increase mortality rates in HIV infected individuals. Cruess and his colleagues (2012) investigated the effects of depression on antiretroviral and antidepressant medication adherence in 324 participants across a 3 month period by unannounced pill counts and surveys. Results from this study indicated that an elevated depression score was significantly associated with lower antiretroviral medication adherence. The researchers noted that this placed participants at a high risk for developing resistant variants of HIV. However, if participants were taking psychotropic medications, they were more likely to adhere to their antiretroviral medications. Although this study demonstrated how depressive symptoms negatively affect medication adherence for HIV, this study was based on telephone self-reports and pill counts. These reports can cause adherence rates to not fully account for the participants' adherence due to the possibility of self-report biases. Additionally, 90% of the participants were middle-aged African Americans. As a result, these results cannot be generalized to the general population (Cruess et al., 2012).

Depression has also been shown to be a risk factor for medication nonadherence in individuals with end-stage renal disease and kidney transplant recipients. Cukor and his colleagues (2009) studied this relationship in participants with end-stage renal disease who were treated with either a kidney transplant or hemodialysis. Researchers state that both treatments require strict adherence to their treatment. The primary cause of kidney transplant rejection is nonadherence to medication. Additionally adherence to dialysis regimens is critical in order to decrease the individual's risk of earlier mortality. Therefore, Cukor et al. (2009) assessed 159 participants by administering a self-report survey. They divided the participants into two groups: functioning kidney transplants and hemodialysis treatment. Results from this study illustrated that participants receiving the hemodialysis treatment were significantly more depressed than the functioning kidney transplant participants. The individuals on hemodialysis were also less likely to adhere to their medication when compared to those in the kidney transplant group. The adherence rate for the hemodialysis group was 63%. Researchers state this adherence rate could be caused by the increased percentage of depressed participants in this group and a feeling of lack of control in their situation. This can increase their feelings of helplessness and self-blame. Again, although this study shows the negative relationship between depression and adherence, this was based on self-reports and could overestimate the participants' true adherence to their treatment regimen (Cukor, Rosenthal, Jindal, Brown & Kimmel, 2009).

Prior research has provided evidence of the effects of major depression on cognitive functioning, specifically on memory. This effect on memory could cause individuals to forget to take their medication or forget about discussions with their

physician about how to take their medication. Researchers have found that 50% of what is discussed during a medical visit is forgotten or remembered incorrectly. In depressed patients, this could be due to an inability to properly encode memories. As a result, they are more likely to have poor adherence to their medication or treatment plan due to their decline in cognition (Haskard-Zolnierek & Williams, 2013).

CHAPTER III

Purpose of Study, Research Questions, Hypothesis and Method

Depression and anxiety have been shown to be associated with nonadherence for patients with severe chronic conditions as shown by the presented literature. If a psychological disorder goes undiagnosed, this can result in poor adherence for chronic health conditions. The proposed study aimed to expand on the presented research examining the relationship between psychological disorders and medication adherence in a college student population, specifically filling the gap in literature regarding the relationship between depression, anxiety disorders, somatization disorders, panic disorders and medication adherence in young adults diagnosed with a wide variety of chronic conditions that has not been studied before in prior literature.

Four main research questions were proposed in this study. First, is there a significant difference in medication adherence for college students with and without a psychological disorder in? Based on previous research in adults, college students who show symptoms of a psychological illness were hypothesized to be more nonadherent to their medication for chronic illnesses than college students who do not show symptoms of a psychological illness. Second, is there a significant difference in physical and mental health-related quality of life for those with and without a psychological disorder? Third, is there a significant difference in barriers to medication adherence for those with and without a psychological disorder? Finally, did adherence relate to mental and physical health related quality of life? No hypotheses were proposed for research questions two, three, and four because of the lack of literature in this specific area. Instead, an exploratory analysis was conducted in order to answer these questions.

<center>Method</center>

Study Design

      The data for this study was taken from a larger study researching the effects of an intervention using a cell-phone application on medication adherence. The original study involved a baseline survey and a follow-up survey. The presented thesis study utilized the baseline survey only (the cell-phone application intervention was excluded) to measure medication adherence for participants exhibiting psychological disorder symptomology.

Participants

      This study included 180 individuals, males and females, from the surrounding greater San Marcos and Austin community. Participants were recruited from Texas State University through flyers and in-class announcements. The inclusion criteria for the study consisted of individuals 18 years or older, who had been previously diagnosed with a chronic health condition, and was currently taking prescribed medication for a chronic health condition. Each participant was provided with documentation of participation consent and an explanation of the study's objectives at the scheduled baseline appointment or upon initial click of a non-identifying Qualtrics survey link. The Institutional Review Board at Texas State University approved this study.

Procedure

      The participants completed a set of questionnaires using an online survey via Qualtrics that assessed the following: demographics, medical information (all current/past medical conditions), Short Form 36 Health Inventory, Patient Health Questionnaire (Axis I psychopathology), the Morisky 8-Item Medication Adherence Questionnaire, and questions created for this study regarding barriers toward medication adherence.

<center>16</center>

Measures

      The survey assessed the demographics of each participant, including their gender, age and marital status. Questions assessed the participants' medical information for all current medical conditions and current medications. Several questions asking about their medication and 12 items measuring barriers to medication adherence were created specifically for this study asking whether each scenario was applicable for their medication-taking. For example, one item asked if they "cannot afford their prescription" and the participant rates whether this is or is not a reason for taking their medication on a 1-10 scale, where 1 is "not a reason for not taking prescribed medications" and 10 is a "major reason for not always taking medications as prescribed."

      The Short Form 36 (SF-36) Health Inventory is a 36 item self-report measure of the participants' health-related quality of life within the last month. This inventory measures the participants' vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning and mental health. Research has indicated the inter-rater reliability to be an estimated .90 for ratings of depressed patients. In another sample of 44 patients, the test-retest reliability for a 4 week period ranged from .57 to .70 (Ware & Sherbourne, 1992).

      Participant's health was assessed using the Patient Health Questionnaire (PHQ). These questions measure the participants' emotional health. The PHQ is a self-report questionnaire that measures the presence of specific mental disorders such as major depressive disorder, somatoform disorder, anxiety disorder and panic disorder. The PHQ was validated against the Structured Clinical Interview for the DSM-IV. Research has shown that the internal consistency of this scale assessing the presence of psychological

illnesses to be between .86 and .89 (Spitzer, Kroenke & Williams, 1999; Patient Health

Questionnaire, 2008).

Participants' medication adherence was measured using the Morisky Medication

Adherence Scale (MMAS). It is an 8-item questionnaire used to assess a patient's

medication-taking behavior. This measure asks questions pertaining to when they took

their medication in the past. For example, the questionnaire asks, "Do you sometimes

forget to take your medication?" or "Have you ever cut back or stopped taking your

medication without telling your doctors because you felt worse when you took it?"

Participants answered these questions with a "yes" or "no" response. Past research

indicates the internal consistency of the scale to be .83 (Morisky, Green & Levine, 1986).

One study using the Morisky Medication Adherence Scale to measure adherence in

patients with hypertension reported a reliability level of .928 and a validity coefficient of

.682 (Al-Qazaz et al., 2010).

Statistical Analyses

The alpha level was set at .05 and analyses were conducted using SPSS v. 22.

Univariate analyses were conducted to evaluate medication adherence using the MMAS

and the various demographics of the participants using independent sample t-tests, one-

way ANOVAs and Pearson correlations. These tests were conducted to measure the

differences in medication adherence across the different demographic, psychosocial

health-related quality of life and adherence barrier variables. The type of medication

participants were taking was coded either as: Contraceptive, Mental Health Illness,

Physical Health Illness or ADHD. Coding for medication type was determined by the

participant's indication of the medication name and description of what it was used to

treat. Attention Deficit/Hyperactivity disorder (ADHD) was categorized separately because of a high percentage of participants taking this type of medication to treat ADHD. The MMAS scale was kept as a continuous dependent variable to measure adherence (rather than combining into categories of low, medium, and high adherence) since there were no significant differences between the independent groups in the subsequent analyses.

To test the first research question, independent samples t-tests were used to assess if participants with symptomatology of psychological disorders have higher rates of medication nonadherence. Due to the small sample size, major depression and other depression measured by the PHQ was categorized into a new variable measuring any type of depression. Chi Squares were used to compare the type of medication, and the presence of different types of psychological disorders. No multivariate analyses were conducted due to lack of significant differences in medication adherence between those with and without symptoms of a psychological disorder.

To test the second and third research questions, independent samples t-tests were conducted. First, t-tests measured whether there were significant differences in mental and physical health related quality in life in those with and without a psychological disorder. Second, t-tests measured group mean differences for known barriers to medication adherence in those with and without a psychological disorder. Finally, Pearson correlations were used to measure the relationship between physical and mental related quality of life and medication adherence.

CHAPTER IV

Results

<u>Data Collection and Scoring</u>

Based on the inclusion criteria, 180 participants completed the survey via

Qualtrics. From this sample, 171 participants completed the MMAS scale which was

used as the dependent variable in the statistical analyses. The MMAS items were recoded

as 1 for "no" responses to the questions and 0 for "yes" responses. Question number 5

was reverse coded for the yes/no conditions. A composite score (level of medication

adherence) was found by summing the 8 items, which was used as a continuous

dependent variable for the subsequent analyses.

The PHQ was scored to assess symptoms of a present psychological disorder

based on the categorical scale for each question. Symptoms of a somatization disorder

were present if participants marked that they were "bothered a lot" in the past 4 weeks by

3 or more health problems on a list of 13 health problems, such as chest pain, headaches,

and stomach pain. Furthermore, symptoms of major depression were present if a

participant experienced "little pleasure in doing things" and "feeling down, depressed or

hopeless" for   "more than half the days" and/or "nearly every day" in the past 4 weeks,

and if they experienced 5 or more of the 9 subsequent symptoms of depression such as

poor appetite or feeling tired for "more than half of the days" or "nearly every day".

Symptoms of "other depression" were present if the participant experienced "little

pleasure in doing things" and "feeling down, depressed or hopeless" for "more than half

the days" and/or "nearly every day" in the past 4 weeks and marked 2 to 4 of the 9

subsequent symptoms of depression. A panic disorder was present if the participant

marked "yes" in experiencing an anxiety attack in the last 4 weeks and if they had experienced an anxiety attack before that was sudden and bothersome. Additionally, participants had to have marked 4 or more of experiencing in the last 4 weeks the 11 listed symptoms of an anxiety attack such as sweating, feeling dizzy or short of breath to have symptoms of a panic disorder. An anxiety disorder was present if participants marked "more than half the days" to feeling nervous, anxious or on edge and experienced three or more of the 6 listed symptoms of an anxiety disorder for "more than half the days" such as restlessness or trouble concentrating.

The SF-36 was scored using a pre-programmed scoring template to formulate and generate the mental health and physical health composite scores. Participants' responses to the SF-36 were transferred to this scoring template and tabulated. Composite scores were then transferred to SPSS to use for the statistical analyses.

The barriers toward medication adherence items were created for this survey. Participants responded on a 10-point scale to 12 items that each listed reasons for not taking medication, where 10 was a "major reason I do not always take my medications as prescribed" , and 1 was "is not a reason for not taking my medications as prescribed." These items were analyzed individually using the items as continuous variables.

<u>Sample Characteristics</u>

Frequencies and descriptive data were derived for the demographic and health characteristics of the sample and each of the variables of interest (adherence, health-related quality of life, and barriers to medication adherence) (see Table 1). Univariate analyses were conducted to examine whether there were differences in medication adherence as a function of demographic variables, and barriers to medication adherence.

Results demonstrated that there were no significant differences in medication adherence across demographic groups (i.e., gender, ethnicity, marital status, type of medication).

<u>Adherence Characteristics</u>

According to the Morisky categories of adherence, 30.4% of the participants had low adherence scores (scores 0 through 5) while 51.5% of participants had medium adherence (scores 6 and 7) and 18.1% had high adherence (scores 8 and 9) towards their medication (as shown in Table 1) (based on the categories described in Morisky, Ang, Krousel-Wood & Ward, 2008). When analyzing the MMAS scores as a continuous variable, the mean was 6.09 (SD=1.43, range = 1-9). All subsequent analyses were generated using the MMAS as a continuous variable due to nonsignificant findings with the categorical MMAS variable.

Descriptive data for each barrier demonstrate the overall pattern for this sample, where each variable was rated on a 1-10 scale where 1 was "not a reason for not taking medication" and 10 was a "major reason for not taking medication". On average, most barriers were "<u>not</u> a reason for not taking their medications" which included; affordability (M=1.47; SD=2.51); medication did not work (M=1.68; SD=2.3); the medication caused weight gain (M=1.35; SD=2.41); a loss of appetite (M=1.34; SD=2.10); caused digestive issues (M=1.80; SD=2.62); or made participants drowsy (M=1.83; SD=2.76) or anxious (M=1.60; SD=2.56). Several variables had somewhat higher means. For example, symptoms disappearing was a reason participants did not always take their medications as prescribed (M=2.66; SD=2.88). Furthermore, participants who felt their medication was a hassle to take were more likely to indicate that this was a reason for not always taking their medication as prescribed as well (M=2.77; SD=2.61). Finally, if participants could

not drink alcohol, they were more likely to indicate this was a reason they did not always take their medication as prescribed (M=2.18; SD=3.01).

Results demonstrated that there was a significant association between several medication taking barrier variables and medication adherence. There was a significant negative correlation between perceptions that participants could not afford their medication, [r (125) = -.184, p=.038], or their medication did not work, [r (99) = -.314, p=.001], and medication adherence. Furthermore, there was a significant negative correlation between feeling better and not feeling the need to keep taking their medication and medication adherence, [r (116)=-.472, p=.000]. Finally, there was a negative association between thinking medication was a hassle to take, [r (135)= -.228, p=.007], or caused them to feel anxious or jittery, [r (95)=-.304, p=.002], and medication adherence.

Research Question 1:

Is there a significant difference in medication adherence for college students with and without a psychological disorder?

To examine the difference in medication adherence for college students with and without a psychological disorder, independent samples t tests were computed. It was hypothesized that participants who demonstrated symptoms of a psychological disorder would have a lower adherence score. There was not a significant difference in medication adherence for participants with a psychological disorder compared to those without a psychological disorder, [t (167) =.816, p=.415].

Further t-tests were conducted to analyze whether the presence of symptoms of four specific types of psychological disorder in participants would be associated with

lower adherence scores. Participants, who demonstrated symptoms of major depression or other depression based on the PHQ, were categorized into either showing symptoms of any type of depression or not showing symptoms of any type of depression. Those who demonstrated symptoms of any type of depression did not have significantly lower medication adherence, [t (168) = 1.24, p=.217]. In addition, differences between symptoms of a somatization disorder [t (168) = 1.102, p=.272] and medication adherence, symptoms of a panic disorder [t (168) = -.131, p=.896] and medication adherence, or symptoms of an anxiety disorder [t (167) = .676, p=.500] and medication adherence, were not significant.

Further analyses were conducted to analyze what type of medication those with or without symptoms of four types of psychological disorder were more likely to take. A crosstabulation assessed whether those that demonstrated any symptoms of depression were taking mental health medications such as antidepressants (as shown in Table 2).There was not a significant difference in medication type for those with depression or anxiety. However, as Table 2 illustrates, the descriptives indicate that the majority of non-depressed participants were on a mental or physical health medication. This observation will be further discussed in the discussion section.

Results further indicated that there was a significant difference between those without symptoms of a somatization disorder and the type of medication they were taking [X^2 (3) = 13.01, p=.005]. Those without symptoms of a somatization disorder were significantly more likely to be taking medication for a mental health condition (as shown in Table 2). Additionally, there was also a significant difference in the frequency of those without symptoms of a panic disorder and the type of medication they were taking [X^2

(3) = 14.48, p=.002]. Those without symptoms of panic disorder were more likely to be taking mental health or physical health medication (as shown in Table 2). These results will be further discussed in the discussion section as well.

Research Question 2:

Is there a significant difference in physical and mental health-related quality of life for those with and without a psychological disorder?

To test this question, independent samples t-tests were conducted to analyze whether those with a psychological disorder reported lower mental and physical health related quality of life than those without a psychological disorder. Results illustrated a significantly lower quality of life in those with a psychological disorder (as shown in Table 3). Participants who had symptoms of a psychological disorder were significantly more likely to have lower mental health related quality of life [t (135) =5.71, p=.000]. The effect size for this analysis was found to have a large effect (*d*=-.89). Furthermore, participants with the presence of a psychological disorder were also significantly more likely to have lower physical health related qualify of life [t (109) =2.53, p=.013]. The effect size for this analysis was found to have almost a medium effect (*d*=-.40).

Research Question 3:

Is there a significant difference in barriers to medication adherence for those with and without a psychological disorder?

Results indicated that there was a significant difference between those with and without a psychological disorder and 2 of 12 known barriers to medication adherence. Participants who had symptoms of a psychological disorder were more likely to indicate that they did not take their medication due to feeling that their medication does not work,

[t (87) =-2.95, p=.004]. Furthermore, those who had symptoms of a psychological disorder, were more likely to report that they did not take their medication due to their medication making them feel drowsy, dizzy or lightheaded, [t (75)= -3.01, p=.004].

Research Question 4:

Did adherence relate to mental and physical health related quality of life?

To test this question, Pearson correlations were generated. Analyses indicated that there was a nonsignificant relationship between mental health related quality of life and medication adherence [r (165)=-.008, p=.921] and physical health related quality of life and medication adherence [r (165) =.074, p=.343].

CHAPTER V

Discussion

This study examined the relationship between psychological disorders and medication adherence in young adults. In addition, we looked at the association between a psychological disorder and mental and physical health-related quality of life in participants. This study also observed how physical and mental health related quality of life related to medication adherence. Finally, this study also observed the relationship between common known barriers toward taking medication as prescribed and medication adherence.

Descriptives from this study indicated that the majority of participants were single White/Caucasian females who were most likely to be taking a medication to treat a mental or physical illness. Most participants were moderately adherent towards their medication. Furthermore, the majority of participants did not exhibit symptoms of any type of psychological disorder. When analyzing the medication adherence of each demographic group, we did not find significant differences. In general, past research has indicated that challenges with adherence are not specific to certain demographic groups, so this finding is not surprising (DiMatteo, 2004).

Many common barriers predicting medication nonadherence in past research were not an issue for this sample, including affordability, medication not working, or causing the following: weight gain, loss of appetite, digestive issues, anxiety or drowsiness. However, participants indicated they would not take their medication as prescribed if symptoms disappeared, or felt their medication was a hassle to take, or could not drink alcohol while on their medication.

27

We also found that there was a significant association between certain barriers and low adherence. Participants who could not afford their medication were significantly less likely to adhere to their medication. This finding is indicative of this college student population. Participants were less likely to be adherent towards their medication if the price of their medication was high. As mentioned, the high cost of medication can be a common reason individuals do not take their medication (Osterberg & Blaschke, 2005). Most students are living on a limited income while in school, and affordability can play a major role in whether students buy their medication or reduce their prescribed amount of medication to prolong the amount of medication for an extended period of time.

Furthermore, participants indicated that if they felt their medication did not work they would be less likely to adhere to their medication. Additionally, if participants felt that their symptoms were dissipating and their health was getting better, they were less likely to take their medication. This could be in alignment with the medication causing immediate beneficial psychological and physiological effects. As a result, the participants may be more adherent for a period of time and then begin to stop taking their medication when adverse symptoms disappear thus showing low adherence scores. However, the effect of time on adherence was not measured in this survey.

Finally, if participants felt that their medication was a hassle to take or caused them to feel anxious or jittery; they were more likely to be nonadherent towards their medication. As mentioned by Vermeire and colleagues (2001), nonadherence towards medication could be due to the adverse side effects from the medication. As a result, individuals stop taking their medication (Vermeire et al., 2001).

Research Question 1:

Is there a significant difference in medication adherence for college students with and without a psychological disorder in?

Our hypothesis that participants who demonstrated symptoms of a psychological disorder would have lower medication adherence was not supported. There were no significant differences in medication adherence scores between those with or without the symptoms of a psychological disorder. As mentioned, past research has shown that individuals, diagnosed with depression and anxiety, are more likely to be nonadherent towards their medication regimen (Stein et al., 2006). However, our study did not find significant results in low medication adherence for those with symptoms of the four types of psychological disorders that were measured (depression, somatization, anxiety and panic). This could be due to the fact that the majority of participants did not show symptoms of a psychological disorder.

Prior research has demonstrated that college students are more likely to show symptoms of a mental health condition. In fact, the percentage of diagnosed mental disorders has increased from 10% to 14.9% since 2000 according to the American College Health Association (ACHA) (ACHA, 2009). Therefore, these results could have been due to the fact that the majority of participants were correctly diagnosed and treated through either taking a medication for the mental health condition or undergoing counseling or both. This is confirmed based on prior research by the American College Health Association which reported that 35.6% of the students diagnosed with depression were currently taking medication for depression (ACHA, 2009).

As Table 2 indicates, the majority of non-depressed participants were either taking a medication to treat a mental or physical health condition. This could have influenced the results because participants that were on a mental health medication were more likely to be taking an antidepressant or an anti-anxiety medication. Therefore, they may have been previously diagnosed with a psychological disorder, such as depression or general anxiety, but were not showing symptoms during the time of the survey because of the type of medication they were taking. This was also found for those without symptoms of a somatization disorder and panic disorder. Participants without symptoms of a somatization disorder or panic disorder were significantly more likely to be taking medication for a mental health condition. This finding further shows that this type of medication is effective in treating psychological disorders and participants were not showing symptoms.

Another reason for these results could be due to the mental health medications being effective and reducing the participants' symptoms of a psychological disorder. As a result, they may be more adherent to their medication because of the immediate physiological and psychological benefits of this type of medication.

Research Question 2:

Is there a significant difference in physical and mental health-related quality of life for those with and without a psychological disorder?

As mentioned by Jana and colleagues (2014), renal transplant patients with depression and anxiety symptoms were more likely to have a lower quality of life. A similar result was found in our study. Participants who had symptoms of a psychological disorder were significantly more likely to have a lower mental and physical health-related

quality of life. It is documented that mental health conditions affect such quality of life aspects as fatigue, social functioning, and physical functioning, among others. Thus, this finding is not surprising, This is the first study we are aware of that demonstrates that any symptoms of a psychological disorder can affect mental and physical health-related quality of life in college students with a wide variety of chronic illnesses.

Research Question 3:

Is there a significant difference in barriers to medication adherence for those with and without a psychological disorder?

Two barriers were significantly associated with symptoms of a psychological disorder. Participants with symptoms of a psychological disorder were more likely to indicate that feeling that their medication did not work or made them feel drowsy, dizzy or lightheaded made them less likely to take their medication. As mentioned by Grenard and colleagues (2011), individuals with depression were more likely to be nonadherent towards their treatment regimen (i.e., medication) due to changes in cognition or beliefs about their medication's benefits or feelings of hopelessness (Grenard et al., 2011). Although we measured those with and without symptoms of the four types of psychological disorders, participants may have depression symptoms and feel hopeless towards their medication. As a result, participants may indicate that they felt their medication did not work. This shows that psychological distress can affect an individual's well-being and health outcomes through not adhering towards their medication.

Research Question 4:

Did adherence relate to mental and physical health related quality of life?

As Hays and colleagues (1995) mentioned, the effectiveness of treatments for chronic conditions can be predicted by measuring individuals' quality of life (Hays, Sherbourne & Mazel, 1995). Thus, we wanted to test whether low adherence was related to lower mental and physical well-being in participants. However, our results indicated there was not a significant relationship between quality of life and medication adherence. This could be a result of the majority of participants having medium or high adherence scores.

<div align="center">Limitations</div>

There are some limitations to this study that would guide further research in this area. First, the generalizability of these results is limited due to the data being collected from college students at Texas State University. Results from this study cannot be generalized due to the sample population of college students.   College students experience different health resources and environments than the general population. Furthermore, only one adherence scale was utilized to measure medication adherence. In future studies, the use of various treatment adherence measures would enhance the understanding of adherence behavior and related results. In addition to self-reports and questionnaires, the use of pill counts or implementing electronic medication monitors, as mentioned by Osterberg and Blaschke (2005), would provide more accurate results in measuring adherence for future studies.

Also the use of contraceptives is a limitation to this study. Twenty-six participants were reporting on their adherence to contraceptives before and during the time of the survey. This is a limitation to the study due to the intended use of contraceptives as a means to prevent pregnancy and not as a treatment for a chronic illness. The motivation

towards taking contraceptives differs from taking medication for a chronic illness. Therefore, this could have affected our results in terms of the degree of adherence found in this sample.

Furthermore, the study of various chronic illnesses could be seen as a limitation to this study as well. Treatment plans and medication vary according to different illnesses. In addition, the side effects of medication for specific types of conditions vary. This study was unable to focus on one type or category of chronic illness due to our limited population of college students. Therefore, future studies should ideally focus on one chronic disease.

Our study also did not measure other forms of treatment such as counseling or cognitive behavioral therapy for psychological disorders. This is a limitation as receiving counseling could have affected whether participants demonstrated symptoms of a psychological disorder. Therefore, future studies should consider asking whether participants are undergoing other alternative forms of mental health treatment.

Additionally, due to the social stigma of mental health conditions, it is possible some participants were not honest in reporting their mental well-being which could have influenced our results. This study also did not control for the duration these participants were taking their medication which could have influenced our results. Adherence behaviors may differ between participants who had been taking their medication for years versus months. The majority of the participants were on mental health medication which could have affected our results as they may not have been experiencing symptoms due to their illness being controlled. Future studies should focus on individuals who are not on a mental health medication.

Additionally, this study was also part of an intervention study measuring other variables and an intervention-based app measuring adherence. As a result, this could have influenced our findings by encouraging participants to be more adherent towards their medication before the survey until they arrived for the baseline appointment to take the survey such as 'white-coat adherence' as mentioned by Vermeire and colleagues (2001).

Furthermore, while our results showed an association between health-related quality of life and the presence of a psychological disorder, this does not imply causality. This is a limitation to our study because other factors that were not measured that may have influenced this association. Finally, the means of locating participants could have affected our results as well. Participants were recruited through in-class advertisements for psychology courses, flyers around campus and advertisements at the Student Health Center. These means of recruitment could have limited our participants to certain demographic groups. On the other hand, this study provides a start towards investigating the relationship between psychological disorders and medication adherence in a young adult population, in order to identify the barriers towards adherence for various treatment regimens agreed upon by patients and physicians.

<u>Conclusion and Implications for Future Research</u>

Results from the current study provide a foundation for better understanding the relationship between psychological disorders and adherence in college students. As results indicated, there was not a significant relationship between psychological disorders and medication adherence. However, it can be inferred that those who are taking medication for a mental health condition were less likely to show symptoms of their condition. Therefore, mental health medications are effective. The presence of a

psychological disorder is associated with lower mental and physical health-related quality of life, confirming previous research showing associations between negative experiences of chronic illness and treatment and lower health-related quality of life. Furthermore, the relationship between barriers towards nonadherence for those with symptoms of a psychological disorder confirms past research in showing adverse side effects can influence an individual to not adhere to their medication regimen, and an individual's beliefs about their medication can cause them to cease taking their medication.

These results could aid research in developing and implementing future interventions directed towards young adults with chronic health conditions who show symptoms of a psychological disorder. As the results demonstrate, medications directed towards treating a mental health condition are effective at alleviating symptoms and potentially improving adherence due to the immediate psychological and physiological benefits. Furthermore, utilizing the results from this study, it may be helpful to study and intervene to promote adherence in young adults taking mental health medications. Based on our results, physicians could assess the individual's physical and mental well-being throughout their treatment plan in order to promote better adherence towards their medication and better health outcomes for chronic conditions.

Table 1.

Sample Characteristics

Variable	n (%)
Gender	
Male	14 (7.8)
Female	165 (92.2)
Ethnicity	
African American	7 (3.9)
Asian	5 (2.8)
White/Caucasian	117 (65.7)
Hispanic	43 (24.2)
Pacific Islander	1 (.6)
Other	5 (2.8)
Marital Status	
Single	175 (97.2)
Married	4 (2.2)
Divorced	1 (.6)
Type of Medication	
Contraceptive	26 (14.5)
Mental Health	65 (36.3)
Physical Health	63 (35.2)
ADHD	25 (14)
Adherence (MMAS)	
Low Adherence	52 (30.4)
Medium Adherence	88 (51.5)
High Adherence	31 (18.1)
Presence of Psychological Disorder*	
Yes	76 (44.7)
No	94 (55.5)
Presence of a Somatization Disorder	
Yes	32 (18.7)
No	139 (81.3)
Presence of Any type of Depression	
Yes	33 (19.3)
No	138 (80.7)

Table 1.-Continued

Sample Characteristics

Presence of an Anxiety Disorder	
Yes	24 (14.1)
No	146 (85.9)
Presence of a Panic Disorder	
Yes	23 (13.5)
No	148 (86.5)

*This includes the presence of one or various symptoms of: somatization disorder, any type of depression, anxiety disorder and panic disorder. Some participants met criteria for more than one disorder (e.g., depression and anxiety).

Table 2.

Crosstabulation of the Type of Psychological Disorder and the Type of Medication

Type of Psychological Disorder		Type of Medication				χ^2	Contin. Coefficient	p
		Contraceptive n(%)	Mental Health n(%)	Physical Health n(%)	ADHD n(%)			
Depression	Yes	1 (3.1)	18 (56.3)	10 (31.3)	3 (9.4)	6.79	0.196	NS
	No	19 (13.8)	47 (34.1)	50 (36.2)	22 (15.9)			
Anxiety	Yes	1 (4.3)	10 (43.5)	8 (34.8)	4 (17.4)	1.56	0.096	NS
	No	19 (13)	55 (37.7)	51 (34.9)	21 (14.4)			
Somatization	Yes	2 (6.3)	8 (25)	20 (62.5)	2 (6.3)	13.01	0.267	p=.005
	No	18 (13)	57 (41.3)	40 (29)	23 (16.7)			
Panic	Yes	1 (4.3)	17 (73.9)	3 (13)	2 (8.7)	14.48	0.280	p=.002
	No	19 (12.9)	48 (32.7)	57 (38.8)	23 (15.6)			

NS: Not Significant

Table 3.

Independent Samples T Tests Illustrating the Differences in Health-related Quality of Life

for those With and Without a Psychological Disorder

Variable	n (%)	Mean	SD	Statistical Comparison p value
Presence of a Psychological Disorder-Mental Health-Related Quality of Life				
Yes	75 (44.6)	32.7	11.0	t=5.71 p=.000
No	93 (55.4)	44.2	14.5	Cohen's d= -.89
Presence of a Psychological Disorder-Physical Health-Related Quality of Life				
Yes	75 (44.6)	52.0	10.9	t=2.53 p=.013
No	93 (55.4)	55.5	5.9	Cohen's d= -.40

REFERENCES

Al-Qazaz, H., Hassali, M., Shafie, A., Sulaiman, S., Sundram, S., & Morisky, D. (2010). The eight-item morisky medication adherence scale MMAS. *Diabetes Research & Clinical Practice*, *90*(2), 216-221.

American College Health Association-National College Health Assessment Spring 2008 Reference Group Data Report (ACHA) (Abridged): The American College Health Association. (2009). Journal of American College Health, 57(5), 477-488.

Anxiety and Depression Association of America (ADAA). (2010). Facts and statistics. Retrieved, 2014, from http://www.adaa.org/about-adaa/press-room/facts-statistics

Cruess, D., Kalichman, S., Amaral, C., Swetzes, C., Cherry, C., & Kalichman, M. (2012). Benefits of adherence to psychotropic medications on depressive symptoms and antiretroviral medication adherence among men and women living with HIV/AIDS. *Annals Of Behavioral Medicine*, *43*(2), 189-197.

Cukor, D., Rosenthal, D., Jindal, R., Brown, C., & Kimmel, P. (2009). Depression is an important contributor to low medication adherence in hemodialyzed patients and transplant recipients. *Kidney International*, *75*(11), 1223-1229.

DiMatteo, M. (2004). Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. *Medical care*, *42*(3), 200-209.

DiMatteo, M., Giordani, P., Lepper, H., & Croghan, T. (2002). Patient adherence and medical treatment outcomes: a meta-analysis. *Medical care*, *40*(9), 794-811.

DiMatteo, M., Haskard-Zolnierek, K., & Martin, L. (2012). Improving patient adherence: A three-factor model to guide practice. *Health Psychology Review*, *6*(1), 74-91.

DiMatteo, R., Lepper, H. & Croghan, T. (2000). Depression is a risk factor for

    Noncompliance with medical treatment. *Archives Of Internal Medicine*, *160*(14),

    2101-2107.

Grenard, J., Munjas, B., Adams, J., Suttorp, M., Maglione, M., McGlynn, E., & Gellad,

    W. (2011). Depression and medication adherence in the treatment of chronic

    diseases in the united states: a meta-analysis. *JGIM: Journal Of General Internal*

    Medicine, *26*(10), 1175-1182.

Hasin, D., Goodwin, R., Stinson, F., & Grant, B. (2005). Epidemiology of major

    depressive disorder. *Archives of General Psychiatry, 62*, 1097-1106.

Haskard-Zolnierek, K. & Williams, S. (2013). Adherence and health behavior change in

    The context of mental health challenges. In Martin, L. & DiMatteo, R. (Ed.), *The*

    oxford handbook of health communication, behavior change, and treatment

    adherence (1st ed., pp. 454-468). New York: Oxford University Press.

Hays, R., Sherbourne, C., & Mazel, R. (1995). User's manual for the medical outcomes

    study (MOS) core measures of health-related quality of life. RAND Corporation.

Hugtenburg, J., Timmers, L., Elders, P., Vervloet, M., & van Dijk, L. (2013). Definitions,

    variants, and causes of nonadherence with medication: a challenge for tailored

    interventions. *Patient Preference & Adherence*, *7*, 675-682.

Jana, A., Sircar, D., Waikhom, R., Praharaj, S., Pandey, R., RayChaudhury, A., &

    Dasgupta, S. (2014). Depression and anxiety as potential correlates of post

    transplantation renal function and quality of life. Indian Journal Of Nephrology,

    24(5), 286-290.

Morisky, D., Green, L. W., & Levine, D. (1986). Concurrent and predictive validity of a

self-reported measure of medication adherence. *Medical care*, *24*(1), 67-74.

Morisky, D., Ang, A., Krousel-Wood, M., & Ward, H. (2008). Predictive Validity of

Medication Adherence Measure in an Outpatient Setting. Journal of Clinical

Hypertension (Greenwich, Conn.), 10(5), 348–354.

Osterberg, L., & Blaschke, T. (2005). Adherence to medication. *New England Journal Of

Medicine*, *353*(5), 487-497.

Patient health questionnaire. (2008). Retrieved December, 2013, from

http://www.apa.org/pi/about/publications/caregivers/practicesettings/assessment/

ools/paient-health.aspx

 Reddy, M. (2010). Depression: The disorder and the burden. *Indian Journal of

Psychological Medicine, 32*(1), 1-2.

Spitzer, R., Kroenke, K., & Williams, J. et al. (1999). Validation and utility of a self

Report version of PRIME-MD the PHQ primary care study. *The Journal of

American Medical Association, 282*(18), 1737-1744.

Stein, M., Cantrell, C., Sokol, M., Eaddy, M., & Shah, M. (2006). Antidepressant

adherence and medical resource use among managed care patients with anxiety

disorders. *Psychiatric Services*, *57*(5), 673-680.

Vermeire, E., Hearnshaw, H., Van Royen, P., & Denekens, J. (2001). Patient

adherence to treatment: three decades of research. A comprehensive review.

Journal Of Clinical Pharmacy & Therapeutics, *26*(5), 331-342.

Ware, J., & Sherbourne, C. (1992). The MOS 36-item short-form health survey (SF-36):

Conceptual framework and item selection. *Medical care*, *30*(6), 473-483.

World Health Organization (WHO). (2003). Adherence to long-term therapies: Evidence

    For action. Retrieved, 2014, from http://www.who.int.libproxy.txstate.edu

    /chp/knowledge/publications/adherence_full_report.pdf?ua=1

World Health Organization (WHO). (2004). Prevention of mental disorders. Retrieved,

    2014, from http://www.who.int.libproxy.txstate.edu/mental_health/evidence/en

    /prevention_of_mental_disorders_sr.pdf

World Health Organization (WHO). (2012). Depression. Retrieved, 2014,

    http://www.who.int/chp/knowledge/publications/adherence_section3.pdf