IMPACT OF SUBSTANCE ABUSE RISK, AGE, GENDER, AND COMORBIDITY STATUS ON BEHAVIORAL HEALTH TREATMENT UTILIZATION AND COST

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ABSTRACT

In the U.S., criteria for a substance abuse or dependence diagnosis were met by approximately 22.2 million in 2008, while managed healthcare covered 176.3 million Americans. This study examined how risk for substance abuse disorders interacted with age, gender, and mental health and medical comorbidity status to affect behavioral health treatment utilization and cost. Individual impacts include risks to physical and psychological well-being. The disruptive behaviors of substance use disorders influence families through both social impairment and an inability to maintain role functions, leading to discord within couples and an increased risk of cognitive, emotional, and behavioral problems in offspring. Substance use disorders affect businesses through absenteeism, reduced productivity, and termination and new-hire costs. Local, state, and federal governments all attempt to minimize the impact of substance use disorders on communities, which significantly affects the workload and fiscal solvency of those governments through public welfare and law enforcement programs. Treatment of substance use disorders has been shown to effectively mitigate the immediate impacts on individuals, families, and businesses; yet, the impact on governments has not been explored, though they may be inferred to receive some benefit through the same mechanisms by which they are negatively influenced. The study sample consisted of 13,417 adult members of a managed behavioral healthcare company who went to at least one outpatient mental health session and reported a significant level of psychological distress on a self-report measure administered at that session. Substance use risk, age, gender, comorbidity status, treatment utilization, and treatment cost for a four-month

period were examined, based on data from that assessment and claims data. Correlations initially ruled out any significant effect of psychological distress on the other predictor variables, indicated that Facility and Other treatment types were highly interrelated, and set the foundation for later multiple regressions. Factor analysis then determined that Facility and Other treatment types were part of a single factor for both treatment utilization and cost; so, these criterion variables were then combined. Multiple regressions then examined the relationships between multiple predictors on each criterion. Results indicated significant relationships for most analyses which was expected given the large sample size, so Cohen's *d* was used to discuss the relative strength of the effects. No relatively weak results were found between all of the predictor and criterion variables. Suggested causes for this pattern of outcomes included methodological flaws in operationalization or minimal relationship between the constructs of interest and the assessment questions aimed at evaluating those constructs. Future research is discussed in terms of improving methodological problems of the current study.

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You blessed me with the powers of unconditional love and dedication to learning.

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CHAPTER 1

INTRODUCTION

Statement of the Problem

Employer-sponsored private insurance covered 176.3 million Americans in 2008 (DeNavas-Walt, Proctor, & Smith, 2009). Of Americans age 12 and over, 22.5 million met criteria for a substance abuse or dependence diagnosis in 2009 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2010). SAMHSA (2007a) also reported that 74.4% of adults in need of substance abuse or dependence treatment had some type of insurance coverage in the year prior to data collection. Thus, there is a large population of Americans with a substance abuse or dependence problem covered by a managed behavioral healthcare plan that mediates treatment. A deeper understanding of the influences managed care and other factors exert on behavioral health treatment use and cost is of serious interest for reasons at several levels. At a national level, recent federal legislation was passed aiming to curtail rapidly increasing healthcare costs. For businesses struggling to survive in the harsh economic environment of the slowly waning recession, healthcare costs come under closer scrutiny as part of cost-containment efforts. The personal lives of individuals with substance abuse or dependence disorders are adversely impacted by the increased burden of treatment costs, especially if they require extended facility-based treatment entailing unpaid leave from work. In light of these issues, the current study seeks a deeper examination of the factors contributing to increased behavioral health treatment and costs among individuals at risk for substance abuse or dependence disorders.

According to the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition, text revision* (*DSM-IV-TR,* 2000), substance abuse and dependence (SA) are the maladaptive behavior patterns that involve use of illegal substances, medications, or toxins that impair function in major life roles, physically endanger the user, cause legal problems, and include physical symptoms of tolerance and withdrawal in substance dependence. As suggested by these criteria, the effects of SA ripple out from an individual to disrupt the lives of family members, employers and co-workers, and incur increasing governmental costs (e.g., through law enforcement and medical costs).

Any discussion of behavioral health treatment must examine the effects of a given treatment in the context of the managed behavioral healthcare company (MBHC), given its prevalence as a primary mediator of such treatment in the United States' healthcare system. DeNavas-Walt, Proctor, and Smith (2009) found that 176.3 million people were covered by employment-based health insurance in 2008. Thus, a large proportion of the current United States population has mental health and substance abuse treatment managed and paid for by a health insurance company. Within that context, however, it is unclear what effect such companies' mediation has on an individual's treatment options and selection of treatment. The cost of services is of serious concern to patients and the managed healthcare companies alike because the costs incurred in the past structure the cost of future coverage established by the MBHC. Therefore, more accurate predictions of service usage based on patients' previous patterns of use could impact the types and costs of products offered by the MBHC.

The current research spans several domains: substance abuse and dependence, managed healthcare, gender-related differences, age-related differences, and utilization

review. Thus, the study is positioned in a unique context that is best clarified through identification of its specific assumptions. The first assumption is that SA exists at such a rate as to require further examination and study to determine how best to treat individuals with these diagnoses. The second assumption is that the population of individuals in the United States with employment-based behavioral healthcare coverage provided by a managed behavioral healthcare company is also large enough to warrant further examination. The third assumption is that significant overlap exists between individuals with SA and those with managed behavioral healthcare, making exploration of their utilization patterns worthwhile. The fourth assumption is that mediation by the MBHC impacts behavioral health treatment utilization and cost.

Prevalence of Substance Abuse and Dependence in the United States

Substance abuse and dependence are widespread in the United States, with the most recent prevalence estimates by the Substance Abuse and Mental Health Services Administration (SAMHSA, 2010 and 2007b). These findings provide a detailed snapshot of the nature of alcohol and drug use in 2009. While the report provides extensive, detailed information about several topics related to SA in the United States, only certain portions of the findings are relevant to this discussion, laying the foundation for the current study. The following topic areas of the SAMHSA report are reviewed in the first two chapters because of their relevance: illicit drug use; alcohol use; substance dependence, abuse, and treatment; prevalence and treatment of mental health problems.

The nine illicit drug categories about which SAMHSA (2010) collected information were cannabis (including hashish), cocaine (including crack), heroin,

hallucinogens (including LSD, PCP, MDMA, etc.), inhalants (including nitrous oxide, amyl nitrate, aerosol sprays, etc.), pain relievers, tranquilizers, stimulants (including methamphetamine), and sedatives. The last four were included only if the use was non-medical, despite being prescription-type drugs. Alcohol use was separated into three categories: current use, binge use, and heavy use. Current use was defined as at least one drink in the last 30 days, including binge and heavy use. Binge use was defined as five or more drinks on the same occasion ("i.e., at the same time or within a couple of hours of each other," p.31) on at least one day in the last 30 days, including heavy use. Heavy use was defined as five or more drinks on the same occasion on five or more days in the last 30 days.

SAMHSA's 2010 report estimated 22.5 million Americans age 12 and over would be classified with SA in the past year based on the *Diagnostic and Statistical Manual of Mental Disorders, 4th edition* (*DSM-IV*) criteria (p. 6). This prevalence was based on the sum of individuals who met criteria for an alcohol abuse or dependence diagnosis (15.4 million), a drug abuse or dependence diagnosis (3.9 million), and both an alcohol and a drug abuse or dependence diagnosis (3.2 million). These estimates 2009 represent a stable level in the number of people with SA diagnoses since the 2002 study found 22.0 million people met the SA criteria at that time.

In 2009, according to the SAMHSA (2010) report, three specific illicit drugs had the highest levels of dependence or abuse in 2009: cannabis at 4.3 million, pain relievers at 1.9 million, and cocaine at 1.1 million. The study also found that 21.8 million people 12 years old and older used illicit drugs in the month prior to survey administration, or approximately 8.7% of the American population in that age group.

For 2009, cannabis was the most commonly used illicit drug, utilized by 76.6% of current illicit drug users and reported as the only drug used by 58.0%, while 18.6% reported using both cannabis and other drugs (SAMHSA, 2010). Illicit drugs other than cannabis were used by 9.2 million individuals over age 12. The majority of these used psychotherapeutic drugs nonmedically, estimated at 7.0 million people. Another 5.3 million people were current users of prescription pain relievers, 2.0 million tranquilizer users, 1.3 million stimulant users, 370,000 sedative users.

The 2009 data presented by SAMHSA (2010) found an estimated 130.6 million Americans age 12 or older (51.9%) reported current use of alcohol, similar to the 2008 rate of 129 million (51.6%) reported. Binge drinking was reported by 59.6 million individuals (23.7%) in 2009. Heavy drinking was reported by 6.8%, or 17.1 million Americans age 12 and over in 2009. The level of alcohol use was also associated with the use of illicit drugs. In 2009, among the 17.1 million heavy drinkers, 33.2% were current illicit drug users. Individuals who were not current alcohol users were less likely to have used illicit substances in the past month than those who reported current use of alcohol, those who met criteria for binge use, and those who met criteria for heavy use.

All of these data indicate that a large segment of the U.S. population uses alcohol and drugs. Such use appears to occur in patterns suggestive of meeting the criteria for a SA diagnosis. In addition, the data reviewed also indicate that many Americans use multiple substances in combination or simultaneously in some cases.

Prevalence of Managed Healthcare in the United States

Treatment of SA disorders falls under the purview of behavioral health, which is often paid for or administered by a managed behavioral healthcare company (MBHC). The most recent information about managed care coverage is provided by the United States Census Bureau's DeNavas-Walt, Proctor, and Smith (2009) article reviewing Americans' income, poverty, and health insurance coverage in 2008. Health insurance coverage was assessed by several questions on the Current Population Survey's Annual Social and Economic Supplement. Individuals were classified with insured status if they reported any type of insurance for all or part of the previous calendar year; otherwise, if no coverage was reported for any part of the previous calendar year, individuals were classified as uninsured. The types of coverage, private or government coverage, were defined as follows:

> Private health insurance is a plan provided through an employer or a union or purchased by an individual from a private company. Government health insurance includes such federal programs as Medicare, Medicaid, and military health care; the Children's Health Insurance Program (CHIP); and individual state health plans. (p. 20)

Accordingly, the study then reported 255.1 million Americans were covered by health insurance in 2008, with 201 million covered by private insurance and 87.4 million covered by government health insurance. Overlap between the populations may be from changes in healthcare coverage during that year, carrying private insurance supplementary to a governmental plan (e.g., Medicare), or reporting error. Employment-based health insurance was reported at 58.5% or 176.3 million people in 2008, while the

total rate for any private insurance coverage was 66.7%. Individuals covered by government health insurance was reported at 29%, with 14.1% or 42.6 million covered by Medicaid and 14.3% or 43 million covered by Medicare. These results, however, are reported with the caveat that health insurance coverage is likely to be underreported on the Current Population Survey for several possible reasons that the U.S. Census Bureau is attempting to address through adapting the methodology.

A second study conducted by the Census Bureau reviewed 1999, 2000, and 2001 data and was reported by Mills in 2002. According to this report, the number of Americans with health insurance coverage in 2001 was 240.9 million or 85.4%, with 62.6% covered by an employment-based health insurance plan. Government health insurance accounted for 25.3% of reported coverage, with Medicare accounting for 13.5%, Medicaid for 11.2%, and military health care for 3.4%. This report did note the existence of overlapping coverage mentioned previously, stating 7.6% of individuals had both private health insurance and Medicare in 2001.

The Census Bureau conducted another study as reported by Bhandari and Mills in 2003, called the Survey of Income and Program Participation. Running from January 1996 to December 1999 on a civilian, non-institutionalized population in the United States, data collection occurred every four months about participants' health insurance status for the previous four months. While the Current Population Survey was noted as being an estimate of coverage at one point during a given year, the Survey of Income and Program Participation was intended to track more dynamic changes in coverage as they occurred over the four-year study period. According to the study results, 78.2% of people were covered for the entire 1996 calendar year, with 80.4% covered for the entire 1999

calendar year. During the entire 48 months of the study, 67.9% of participants had some kind of health insurance, while only 3.3% had no health insurance coverage for the whole period.

As with any longitudinal study, the Survey of Income and Program Participation suffered from attrition over the course of the data collection period, according to a Congressional Budget Office report (2003). That report notes:

> About 25 percent of the original sample in the 1996 SIPP panel was lost through attrition by wave 5, and 34 percent was lost by wave 10. If people who drop out of the sample differ systematically from those who remain with respect to their likelihood of being uninsured or experiencing a long spell without insurance, the SIPP sample may yield biased estimates. (p. 16)

From these reports, it is clear that the majority of Americans have health insurance coverage, with a large number of them covered by private health insurance. Given the breadth of this type of coverage and the extensive nature of SA problems covered in the previous section, it is logical to infer overlap between the two populations. This inference is borne out by a SAMHSA (2007a) report, Health Insurance and Substance Use Treatment Need. Within that report, SAMHSA states that for both 2004 and 2005, an average of 85.4 % of Americans age 18 or older had health insurance coverage in the past year, with 70.5% having private coverage. Interestingly, the report highlights that 74.4% of adults in need of SA treatment had some type of coverage in the last year while 86.6% of those not needing SA treatment had coverage. The need for treatment was defined as meeting criteria for SA or receiving treatment at a specialty facility for SA in the past year, with 21.1 million adults needing treatment on average for

both 2004 and 2005. Of those adults in need of treatment and who also received treatment at a specialty facility, 51.2% reported some type of health insurance coverage paid for that treatment.

Many Americans, according to the literature cited, have some type of health insurance coverage. The impact of a MBHC on an individual's access to and utilization of treatment, therefore, is of significant concern because of the widespread impact of such companies, in both private and public sector insurance coverage.

Purpose of the Study

The current study intends to further expand on the knowledge base regarding individuals with SA and private health insurance coverage. That expansion comes from examining how treatment utilization (TU) and treatment cost (TC), as the criterion variables, differ based on changes in the following predictor variables: SA risk, age, gender, and comorbidity status. Some variables have not been examined in the context of treatment mediated by a MBHC (e.g., gender, medical comorbidity), while others have not been examined at the level of detail provided in the current research (e.g., age, type of mental health comorbidity).

The first portion of the analysis examines how SA risk and gender interact to affect both TU and TC. The next portion examines how SA risk and membership in a more narrowly defined age group affects both TU and TC. The final analysis will examine how SA risk, medical comorbidity, and mental health comorbidity interact to affect both TU and TC.

The results of this study may determine patterns of utilization, cost, or both that could be used to predict which individuals are more likely to necessitate greater treatment based on each person's SA risk, age, gender, and comorbidity status. Specifically, that pattern would identify individuals with a greater likelihood of requiring more frequent sessions or higher levels of care (i.e., facility-based treatment).

From a pragmatic perspective, earlier intervention with this group of people should decrease both treatment utilization and cost, providing cost savings for the MBHC, employers funding insurance coverage, and the individuals themselves who must pay a portion of their treatment costs. From a clinical perspective, this earlier intervention is similar to harm reduction because it should improve outcomes for individuals by increasing support before they reach a threshold beyond which their MH or SA disorder would become more severe. Secondary gains would be expected in families, businesses, and governments from ameliorating the effects of MH and SA disorders earlier in the course of the disorder.

Identifying trends of treatment utilization and cost based on an individual's age would allow for identification of trends for particular age groups based on developmental, generational, or other effects. Further research would be required to clearly dissect trends, identifying the consistency of a trend across specific ages (a developmental trend) or across specific birth years (a generational trend). With such information at hand, specific programs of prevention and treatment could be developed for these at-risk groups in a similar fashion to the SA treatment programs specifically developed for women.

Trends for gender differences in treatment utilization and cost would also be of interest to further tailor programs to each gender's specific treatment needs, modes of entering treatment, and reasons for attrition. Differences in women's and men's utilization of treatment services will be discussed in detail in the literature review.

Trends for an individual's medical and mental health comorbidity status would enable increased care coordination between medical, mental health, and SA treatment providers across domains of service provision. Integration of an individual's various treatments would provide a more congruent experience for patients, who experience symptoms simultaneously. That integration could potentially provide benefits in treatment outcomes through a variety of social, clinical, and financial mechanisms. Integrated care could reduce stigma associated with particular diagnoses, increase monitoring of patients' physical and mental status, and decrease total services utilized across medical, mental health, and SA treatment locations.

Definition of Terms

Age: is a continuous variable, measured at the first administration of the Wellness Assessment (WA, see below). Members under 18 years old were excluded from the study.

Gender: is the number of males and females in the sample, as identified by each member's records with the MBHC.

Global Distress: refers to the Wellness Assessment's (WA, see below) 15-item Global Distress Scale which is designed to measure symptom severity, functional impairment, and self-efficacy. Scores are derived from 15 of the Wellness Assessment's

24 items; participants' scores were above the clinical cutoff (i.e., ≥12) to be included in the current sample.

Managed behavioral health care company (MBHC): is the term used to refer to the company that supplied the dataset for this study. According to its own report, this MBHC is one of the largest behavioral healthcare companies in the U.S., serving over 40 million members across the country.

The term MBHC describes an insurer or third-party administrator that provides behavioral health care coverage at reduced rates through facilities and providers contracted with the company. A variety of mechanisms are used by health maintenance and preferred provider organizations to control or manage the cost of behavioral health treatment. Most behavioral health treatment services are provided within the context of managed behavioral health care.

Medical Comorbidity (MC): is defined by the concurrent presence of a medical disorder when a behavioral health disorder is also diagnosed. Medical comorbidity was identified by a participant's self-report on the Wellness Assessment (WA, see below) at the first session with a clinician. A total of three items ask about physical health and medical conditions. The first item (Question 17) is a general assessment of health developed from the SF-12. On the second item (Question 18), members indicate the presence of one or more comorbid medical conditions: asthma, diabetes, heart disease, back or other chronic pain, and other condition. The third item (Question 19) inquires about the number of doctor visits in the last six months. For this study, medical comorbidity was measured at the initial WA administration by responses of poor health on Question 17 and affirming at least one medical condition on Question 18. Members

were also considered to have a medical comorbidity if they reported six or more doctor's visits in the past six months (question 19).

Mental Health Comorbidity (MHC): was determined from claims data, such that members were considered to have a mental health (MH) diagnosis when 50% or more of claims in the four months up to and including the first session with a clinician included a first, second, or third diagnosis of any non-SA disorder. Two disorder categories were excluded from this group: childhood disorders since this study is focused on the adult population, and EAP diagnoses because these do not adhere to DSM-IV-TR diagnostic criteria and are therefore unspecific and potentially related to SA.

Pre-Period: is the four month period up to and including the first session of outpatient treatment, when the initial Wellness Assessment is completed.

Post-Period: is the four month period after the first session of outpatient treatment.

Substance abuse and dependence (SA): is currently defined by the *DSM-IV-TR* as a pattern of utilization of a given drug of abuse, medication, or toxin that incurs significant impairment or distress in a twelve-month period. The impairment or distress is characterized by recurrent and continued substance use despite inability to fulfill major role functions, physical danger from use, legal problems related to use, or interpersonal problems caused or exacerbated by use (2000). For the purposes of this study, SA risk can be operationalized by participants' endorsement of at least two out of three CAGE items on the Wellness Assessment.

Treatment Cost (TC): refers to the cost of a participant's use of behavioral health treatment. TC refers specifically to the dollar amount of behavioral health treatment services incurred by a participant in the Post-Period.

Treatment Utilization (TU): refers to a participant's use of behavioral health treatment. Utilization in this context is the number of outpatient mental health visits or days of higher level of care treatment (e.g., inpatient detoxification, partial hospitalization program).

Wellness Assessment (WA): refers to the self-report instrument used by a MBHC to assess members at their first session of outpatient treatment with an in-network clinician. WAs are used to measure severity of behavioral health symptoms, functional impairment, self-efficacy, SA risk, and medical comorbidity. The results are also used by the Algorithms for Effective Reporting and Treatment (ALERT®) program, utilizes an outcomes-informed outpatient care advocacy program, to identify targeted clinical risks and coordinate effective interventions with clinicians.

As part of the ALERT program, annual authorizations for behavioral health treatment allow members to see any contracted (in-network) clinician. At the first or second visit, the clinician administers a WA to provide a baseline assessment of the member's perspective on their functioning in several arenas (see detailed description below). The clinician uses this first WA in treatment planning and then sends it to the MBHC. A second WA is administered between the third and fifth visit. A third WA is sent directly to the member at four months after the request for authorization. The clinician may administer a WA at any other time and may be asked to administer another

WA if the member is deemed at high risk for a behavioral health crisis requiring closer contact by the treating clinician or a higher level of care.

CHAPTER 2

REVIEW OF LITERATURE

In the context of the previously reviewed prevalence of substance abuse and dependence (SA) and managed healthcare, an overview of the consequences of SA, the treatment of SA, and its impact on the characteristics of interest is now required. The consequences of SA-related behaviors impact individuals, their partners and children, their workplaces, and their governments. The review then examines treatment effectiveness and how different participant characteristics – age, gender, and the presence of mental health and medical comorbidities – impact treatment and its outcomes.

Impact of Substance Abuse

Substance abuse and dependence significantly impact American society as found by Harwood, Fountain, and Livermore (1998) and Harwood (2000). The initial study by Harwood et al. found that the total cost to society from drug and alcohol abuse was estimated at $246 billion, with alcohol abuse and alcoholism accounting for $148 billion and drug abuse for an estimated $98 billion. The authors reported that the costs of alcohol abuse and dependence remained largely the same over the preceding 20 years, with adjustment for inflation and population growth; however, the estimates of cost for drug abuse showed a steady and strong pattern of increase. Harwood's (2000) follow-up study found that costs from alcohol abuse rose to $185 billion in 1998, an approximately 25% increase in six years or a 3.8% annual increase.

Effects on individuals

The *DSM-IV-TR* (2000) diagnostic criteria outline the detrimental consequences of SA for an individual. A diagnosis of substance abuse can be made when persistent use results in failing to fulfill major role functions at work, school, or home; when it is repeatedly used in physically dangerous situations; when repeated legal problems arise related to substance use; and when use is continual despite interpersonal problems related to substance use. Substance dependence is a more intense and pervasive disorder diagnosed when physical tolerance and withdrawal symptoms are present; when the substance is used in greater quantity or for a greater length of time than intended; when the individual has a persistent desire or made unsuccessful attempts to reduce or end substance use; when large amounts of time are spent acquiring, using, or recovering from the substance; when significant social, occupational, or recreational activities are abandoned or reduced because of substance use; and when use is continued despite knowledge that it causes or contributes to a persistent physical or psychological problem.

The *DSM-IV-TR* also reviews the destructive impact of long-term and habitual use of various substances. Individuals may experience decrements in general health such as malnutrition, cardiac events, cerebrovascular accidents, respiratory arrest, or erosion of the nasal septum. Other potential health risks include exposure to various diseases and infections (e.g., hepatitis, septicemia, human immunodeficiency virus) through use of contaminated needles, unprotected sexual intercourse, or other actions attributable to poor judgment. Accidents and concomitant injury related to substance use disorders are also common (e.g., motor vehicle or industrial accidents), mainly attributable to reduced reaction time, poor coordination, and impaired judgment.

Research also bears out the existence of a relationship between the presence of SA and decreased psychological well-being. SAMHSA's (2007b) study compared SA with serious psychological distress, as measured by a score of 13 or higher on the K6 scale, a short dimensional measure of non-specific psychological distress (Kessler et al. 2002). That study found that among adults with serious psychological distress, 28.8% engaged in binge alcohol use and 9.4% engaged in heavy alcohol use, as opposed to 23.9% and 7.2% respectively among those without serious psychological distress. Further, serious psychological distress among adults in the last year was associated with SA as demonstrated by a rate of 22.3% among those reporting distress versus 7.7% among those who did not report distress. Thus, those with greater psychological distress are more likely to abuse alcohol at risky, subclinical levels as well as meet criteria for a substance use disorder. The comorbidity of SA with other MH disorders will be explicated further toward the end of this chapter.

The nature of SA as a set of chronic conditions, similar to asthma or hypertension, was clearly and concisely argued by McLellan, Lewis, O'Brien, and Kleber (2000), but built on previous work by Hser, Anglin, Grella, Longshore, and Prendergast (1997). Hser et al. reviewed existing literature establishing the foundation for an addiction career and a treatment career for individuals with SA. That work then went on to explicate the ways in which the addiction and treatment careers perspective enhances the discussion of SA by "[enabling] a long-term, multilevel, and comprehensive view that reveals the sometimes subtle but important effects and interactions of individual and social influences on treatment outcomes" (p. 546).

McLellan et al. (2000) add to the discussion by simply comparing and contrasting SA and its treatment to similar chronic medical conditions (i.e., asthma, hypertension, and type 2 diabetes mellitus). The analysis includes all aspects of the disease: diagnosis, heritability, the role of personal responsibility, pathophysiology, treatment response (including untreated individuals, medications, and comparison of treatments for drug dependence and chronic medical conditions). The analogy drawn is striking, especially when comparing similar rates of repeated hospitalization and the challenges of adherence to the prescribed medical regimen. Truly, cultural perception of disease and treatment is a key factor as highlighted by the authors' simple observation the relapse rates for the medical conditions are considered evidence of treatment effectiveness, while the same statistic for drug dependence is considered evidence of that treatment's failure.

Grella, Hser, and Hsieh (2003) also review the chronic nature of SA and the active use, treatment, and relapse cycle. Their addition to this review is in examining literature related to opiate dependence and expanding it by contributing research on cocaine dependence. The authors amply demonstrate that participants in their Drug Abuse Treatment Outcomes Studies have both addiction and treatment careers that vary based on sociocultural and personal characteristics. Grella, Scott, Foss, and Dennis (2008) also discuss SA "as a chronic disorder, requiring long-term management" (p.113) in their discussion of gender differences in the cyclical process of use, treatment, relapse, and recovery.

Thus, SA leads to serious emotional, health-related, personal, work-related, and legal repercussions for individuals with these diagnoses. The literature also suggests a vicious cycle may occur wherein an individual experiencing psychological strain may use

alcohol or drugs as a maladaptive coping mechanism, which in turn leads to greater psychological distress, and further need to rely on alcohol and drugs to cope with this distress.

Effects on families

The *DSM-IV-TR*'s diagnostic criteria for both substance abuse and substance dependence diagnoses include reduction of important social activities and impairment in major role functions; behaviors that adversely and significantly impact an individual's family members. The literature regarding the effects of SA on families is split into two distinct areas. The studies of couples in which one partner has a SA diagnosis will be reviewed first, and then followed by a review of effects on their offspring. Limitations of this body of research, however, must be acknowledged prior to the review. Specifically, the majority of studies focus on heterosexual couples in which the male partner has an alcohol abuse or dependence diagnosis, thus limiting the generalizability of these results.

In a 1995 review of the literature on alcoholic couples (i.e., those with one member who qualifies for a diagnosis of alcohol abuse or dependence), McCrady and Epstein note that communication and response behaviors show consistent differences from other distressed and non-distressed couples. Specifically, they begin with identifying several studies that demonstrate alcoholic men engaged in more responsibility avoidance as demonstrated by responsibility avoiding communication, responsibility avoiding approaches to task-oriented interactions, and externalization of responsibility. In addition, the studies showed the partners exhibited more reciprocal and competitive

responses, increased hostility, and decreased ability to work cooperatively even if it was to their collective benefit.

In that 1995 article, McCrady and Epstein also found interesting comparisons between alcoholic couples and distressed couples (i.e., those couples with a depressed male). As compared to normal couples, both alcoholic and distressed couples displayed similarity in their demonstrations of greater hostility, in their lower percentage of positive behavior, in husbands' responsibility avoiding communication, and the extent of interruptions. Several differences were also found between alcoholic and distressed couples. First, alcoholic husbands report less marital distress than those in distressed couples. Second, alcoholic husbands were less aware of their wives' marital complaints than those in distressed couples. Third, alcoholic husbands were less likely to desire change in the relationship than those in distressed couples, who were as likely as their wives to desire change.

McCrady and Epstein (1995) further summarize the research with findings specific to gender-based behaviors. Husbands tended to deflect or avoid confrontation. Wives tended to be sensitive to their husbands' negative behavior, while acting simultaneously hesitant and skeptical toward their husbands' positive behavior. The authors summarized the problem with the observation that neither partner is willing to cooperate with the other partner's attempts to initiate collaborative problem-solving.

Heterogeneity in alcoholic couples has been identified, as have possible subtypes; however, further research is required to clarify the existence of subtypes. More specifically, McCrady and Epstein (1995) noted a few studies that found certain types of alcoholic couples indicated increased marital satisfaction. They go on to add the caveat

that this area of research developed independently of both the marital typologies and alcoholism subtyping literature, thus lacking a solid grounding in established research and theory. The authors also noted difficulty in comparing study results for their review because of differences in sample selection, methodology, and control groups.

The conflict found in these couples was further supported by Ripley, Cunion, and Noble (2006) in their article proposing a theoretical model for factors contributing to alcohol misuse. The authors report increased disagreements and disputes in alcoholic couples, greater avoidance of effective communication strategies, less effort toward cooperation, and greater levels of physical and verbal violence. Alcohol abusing men were more likely to report dissatisfying sexual relationships, while their spouses more often reported higher levels of psychological distress, health problems, depression, anxiety, and psychosomatic complaints.

In their 1984 study, Moos and Moos examined differences between families of recovered and relapsed individuals two years after residential substance abuse treatment, with comparison to sociodemographically matched community controls. In reviewing domains of family functioning relative to alcohol abuse and dependence, the authors highlight that these couples “are more rigid, show more conflict, engage in more negative and hostile acts, and are less rational in their problem-solving activities.”

Moos and Moos (1984) further state spouses of patients with alcohol abuse or dependence progressively fulfill a greater variety of roles within a family, subsequently requiring role adjustment for all family members upon the patient’s remission. Accordingly, recovered alcoholics and their spouses exhibited differences from community controls: fewer arguments, more joint household tasks performed, and higher

agreement about joint task performance. There were no differences found in cohesion, expressiveness, organization, conflict, proportion of household tasks, and agreement about family functioning and environment. Thus, families of people in recovery from alcohol abuse or dependence may demonstrate a tendency to avoid both topics of conflict or tension and social activities where alcohol may be served. These two difficulties aside, such families can otherwise attain a normal pattern of functioning.

In discussing relapsed patients' family environments, Moos and Moos (1984) further report these families demonstrate continued challenges evidenced by less cohesion, less expressiveness, less active-recreational orientation, less agreement about the family atmosphere, less organization, and more conflict than the families of those patients still in remission and community controls. The family member misusing alcohol also participated in fewer household tasks, with that onus carried by the spouse who took on a greater number of those tasks. Other findings of note include the authors' inability to support the hypothesis that gender was associated with greater dysfunction in these families. They did, however, find some evidence to suggest several other factors predictive of the severity of family dysfunction: amount of alcohol used by a partner in relapse, poorer functioning as defined by MHC or MC, and presence of MHC and MC in both partners.

Many studies have established risks and their mediators to children and adolescents when a parent has a SA problem. This research enumerates the effects of parental alcohol or drug abuse on children as increased risk or vulnerability for cognitive and behavioral difficulties. Many studies look at multiple areas simultaneously; to simplify the discussion, results are presented below in discretionary categories.

Research is at a preliminary stage of development regarding the differences between children whose parents abused alcohol or abused drugs, particularly related to the gender of the parent with SA and the age of the child. Studies of alcohol abuse and dependence focus primarily on male parents and adolescents, while studies of drug abuse and dependence focus on female parents and young children (Fals-Stewart, Kelley, Fincham, Golden, & Logsdon, 2004). Preliminary studies indicate that children of drug-abusing parents are at greater risk for psychosocial impairment and psychopathology (Cooke, Kelley, Fals-Stewart, & Golden, 2004). Further study is required to continue to develop this emerging area of research, to clarify the risks and mediators, develop comprehensive theories, and test those theories.

Two studies are often cited regarding the cognitive deficiencies of children of alcohol-abusing fathers. Ervin, Little and Streissguth (1984) found deficiencies relative to controls; however, Tarter (1984) found no significant differences. Methodological artifacts may be responsible for the discrepancy between these studies, particularly the effect of heterogeneity found in populations of individuals with SA. Research has identified two distinct groups of males with SA problems, those with and without comorbid antisocial personality disorder (Poon et al. 2000).

In a pilot study, Ervin, Little, Streissguth, and Beck (1984) found that children raised by a “caretaking father” (i.e., biological and non-biological) with an alcohol abuse or dependence diagnosis had a seven point lower mean IQ score, with the significant difference extended to both verbal and performance domains. Limitations of the study include use of predominantly White participants, allowing the use of data from biological and non-biological fathers without accounting for this variation, not including fathers’

self-report data, not accounting for “many of the men [being] unavailable, having left their families” (p. 362). Strengths included accounting for child’s sex and birth order, family socioeconomic status, maternal smoking during pregnancy, mother’s age at delivery, and parental education.

Tarter, Hegedus, Goldstein, Shelly, and Alterman (1984) reported findings opposing the aforementioned studies. The results indicated that there were no significant differences on most of the IQ and memory scales; yet, certain subscales showed differences in logical memory, spatial awareness, auditory and visual attention span, and reading comprehension. Given that participants were recruited from clients referred by a juvenile court for a comprehensive neuropsychiatric assessment, it is possible that confounding variables with significant effects on intelligence confounded these results. Specifically, both socioeconomic status and antisocial behavior may have had serious effects on the reported results, as well as use of only White participants.

More recently, Poon, Ellis, Fitzgerald, and Zucker (2000) note that while children of alcoholics (COAs) score in the normal range on IQ measures, most research supports the contention that COAs demonstrate poorer intellectual functioning than their non-COA peers (see also Bennett, Wolin, & Reiss, 1988; Johnson & Rolf, 1988; Puttler, Zucker, Fitzgerald, & Bingham, 1998, for further review). The authors compared children of fathers with both antisocial personality disorder and alcohol abuse or dependence diagnoses against those fathers with only alcohol abuse or dependence and those without any diagnosis. Poon et al. found that children from the first group had the lowest IQ scores and academic achievement as early as first and second grade, when compared to children of alcoholics and controls. The same children also had poorer abstract planning

ability than controls and poorer attention than both controls and children of non-antisocial, alcohol abusing fathers.

Behavioral problems are often divided into subcategories of internalizing and externalizing disorders. The Child Behavior Checklist, or CBCL, is the most frequently used assessment of both externalizing and internalizing behavior in children (Bennett, Wolin, & Reiss, 1988; Fals-Stewart, Kelley, Fincham, Golden, & Logsdon, 2004; Moss, Baron, Hardie, & Vanyukov, 2001; Puttler, Zucker, Fitzgerald, & Bingham, 1998). Most studies used multiple informants (e.g., mother and father, parent and teacher) to resolve issues around the low correlations observed between raters (Moss, Baron, Hardie, & Vanyukov, 2001). Externalizing ratings on the CBCL originate from the Delinquent and Aggressive Behavior scales Internalizing scores derive from Withdrawal, Somatic Complaints, and Anxious/Depressed scales.

Results of these studies have demonstrated that children of parents with SA are at greater risk than their peers for externalizing behaviors, especially when that parent has comorbid antisocial personality disorder (Bennett, Wolin, & Reiss, 1988; Moss, Baron, Hardie, & Vanyukov, 2001; Puttler, Zucker, Fitzgerald, & Bingham, 1998). Some effect for gender was reported by Puttler et al., with boys scoring even higher than girls when exposed to a parent with both SA and antisocial personality disorder. For children of drug-abusing parents compared to alcohol-abusing and non-substance-abusing parents, two partial mediators for children's internalizing behaviors were found by Fals-Stewart et al. (2004): paternal discipline mistakes and interparental conflict. Moss et al. (2001) also found that children of substance dependent, antisocial fathers scored significantly higher

on both internalizing and externalizing behaviors when compared to children of substance-dependent fathers and controls.

Johnson and Leff, in their 1999 literature review, report that children of parents with SA were more frequently diagnosed with attention deficit with hyperactivity disorder, a behavioral disorder, conduct disorder, or an oppositional disorder than their peers whose parent did not have SA. Some studies have corroborated these results while other studies have refuted them, according to the authors. They go on to report several other behavioral problems significantly more likely to affect the children of substance-abusing parents: lack of empathy, insight into relationships, and awareness of one's behavior on others; lower social adequacy and interpersonal adaptability; higher levels of anxiety and depression; low self-esteem; lack of environmental control; higher number of diagnosable disorders; higher rates of oppositional and conduct disorders; no difference in attention deficit disorders; and propensity to engage in delinquent behaviors.

A primary concern for researchers in this field has been the risk for SA in children of individuals with a SA problem. While not all children of substance-abusing parent will develop SA themselves, they are at higher risk for developing SA. Ohannessian et al. (2004, 2005) identified specific relationships between parental gender and offspring psychopathology. The authors studied adolescents age 13 to 17 as part of a larger study on the genetics of alcoholism. In the authors' first article (2004), they found that adolescents who more often avoided their mothers were significantly more likely to be diagnosed with alcohol dependence, conduct disorder, and major depressive disorder. Those adolescents concerned or worried about their mother's SA were significantly more likely to be diagnosed with alcohol dependence and major depressive disorder. Those

whose mothers became angrier when drinking were significantly more likely to be diagnosed with conduct disorder and major depressive disorder; however, maternal anger was also significantly associated with alcohol dependence in female adolescents, but not in males. For fathers, the only significant finding was that adolescents who were more worried about their father's SA were significantly more likely to be diagnosed with alcohol dependence.

In their 2005 article based on the same study population, Ohanessian et al. discuss differential effects of gender on adolescent's psychopathology. The authors reported a significant effect for both paternal alcohol dependence and depression predicting adolescent alcohol dependence, but no effect for maternal psychopathology. They note this finding is consistent with previous research demonstrating a significant genetic component to the development of alcohol dependence.

A number of factors complicate the already intricate relationship between a parent's SA and the impact on a custodial child: genetic heritability of SA, familial environment, socioeconomic status, gender, parents' relationship status (i.e., single or two-parent household), increased levels of interparental violence when at least one person has a SA problem, high comorbidity of antisocial personality disorder or high levels of antisocial behavior, or neonatal exposure to alcohol or drugs (Fals-Stewart, Kelley, Fincham, Golden, & Logsdon, 2004; Ohannessian et al. 2004, 2005). All of these parameters further complicate and obfuscate the relationship between the SA problems of one or both parents and their children.

The research on the effects of an individual's SA on his or her family is split into two categories: effects on couples and effects on offspring (children, adolescent, and

adult). Couples with a member who has a SA diagnosis experience greater conflict and less cooperation. Offspring of a parent with a SA diagnosis are at increased risk for cognitive deficits, behavioral and conduct problems, emotional difficulties, and developing a SA problem themselves.

Effects on businesses

To examine the impact SA has in the workplace, it is first necessary to determine how many workers may use and misuse drugs and alcohol. SAMHSA's National Survey on Drug Use and Health research found that rates of SA for adults was associated with employment status. Among adults 18 and older, full-time employed (9.6%) and part-time employed adults (11.2%) were less likely than unemployed adults (16.6%) to be diagnosed with SA. Most binge and heavy alcohol users were employed in 2009, with 42.7 million (74.4%) of a total 57.4 million adult binge drinkers employed either full or part time and 12.4 million (74.9%) of 16.6 million heavy drinkers were employed (SAMHSA, 2010).

The impact of SA on businesses and employers includes both direct and indirect costs. Direct costs are rather straightforward, as they are incurred by SA treatment obtained through activation of a behavioral health benefit provided by the business. Indirect costs to a business are greater than direct costs when the variety of indirect costs is considered. All of these costs apply to all alcohol and drug use, but were best described by Harwood and Reichman (2000) relative to alcohol use and abuse:

> Employers should be aware of the consequences of alcohol abuse by workers at the firm level, including: increased absenteeism and tardiness; increased insurance

> claims for treatment and services for alcohol abuse and its various sequelae; increased use of worker's compensation and sick leave; developing and implementing a substance abuse policy; testing for alcohol and drugs; development and administration of an employee assistance programme; accidents and damage; theft and fraud; increased turnover and replacement; diverted supervisory, managerial and co-worker time; friction among workers; poor decision-making; damage to a company's public image; and increased liability. (p. 42)

According to Lowe (2004), additional costs associated with termination and replacement of employees can be very costly. Depending upon the position in question, termination costs may potentially run twice as high as the salary of the terminated employee. Added to that termination cost are the costs associated with hiring and training a new employee for the same position. Those costs encompass various tasks associated with hiring a replacement: recruitment, advertising, reviewing applications, interviewing candidates, staff time evaluating and comparing candidates, relocation, and training.

Slaymaker and Owen (2006) examined changes in absenteeism, disciplinary actions, terminations, earnings, and number of days with employment problems among employed adults one year before and after SA treatment. In their article, the authors note the role of drug use as both a predictor and an outcome of work-related problems, the link between alcohol misuse and work absenteeism, and the negative effect of SA on job performance. Their results will be reviewed in detail under the Treatment of Substance Abuse and Dependence section.

In his 2005 national telephone survey, Frone (2006) attempted to establish the prevalence and frequency of alcohol use in the workplace, as opposed to use and impairment in the workforce which captures use away from work and outside work hours. This study examined consumption of alcohol within two hours of starting a shift, during a lunch or other break, and during the performance of work. The author noted that workplace use and impairment may have a greater impact on businesses than workforce use and impairment, an understandable conclusion considering the aforementioned costs elucidated by Harwood and Reichman (2000). Frone's (2006) study found in the 12 months prior to participation that 15.23% of respondents had used alcohol before work, during the workday, were under the influence of alcohol during the workday, or were impaired by a hangover at work at least once in the preceding year, with frequency reported at 70% less than monthly, 19% monthly, and 11% weekly. He reported more detailed information as follows: 1.83% of respondents used alcohol at least once before coming to work, with 71% reporting the occurrence as less than monthly, 25% monthly, and 4% weekly. Another 7.06% used alcohol at least once during the workday, with 62% reporting it less than monthly, 24% monthly, and 14% weekly. Additionally, 1.68% reported working under the influence of alcohol, with 58% reporting the frequency at less than monthly, 24% monthly, and 18% weekly. Another 9.23% reported working with a hangover at least once, with 79% reporting less than monthly frequency, 15% monthly frequency, and 6% weekly frequency. Finally, Frone reported an effect for gender, with the prevalence of alcohol use during work hours being greater among men than among women.

The effects of an individual's SA on his or her workplace are myriad, with some of these costs being hidden or incurred long after the individual's separation from the employer. These costs include increased risk for accidents and fraud related to substance use while working, separation costs if the individual's use or conduct prevents them from retaining employment, and hiring costs for a new employee to replace this individual.

Effects on governments

The Office of National Drug Control Policy (ONDCP) report in 2003 highlights the various areas which drug trafficking and use impacts governments, dividing the discussion into two sections: economic and social consequences. Economic consequences include work, employment, and productivity; prices and income; trade; and finance and investment. Social consequences include family and community; health; education; environment; and crime, corruption, and dangers for civil society. Thus, the impacts of SA on both governments and society in general are widespread and inclusive of issues already covered previously in this discussion. However, further review of these areas will be provided to explicate the how they influence governmental budgets.

When identifying the profound costs of SA to governments, it is important to examine the role of criminal activities associated with SA. The ONDCP (2003) noted an increase in federal prisoners with drug offenses rising from 45% in 1988 to almost 60% in 1994. The report highlights the high proportion of theft and burglary attributable to supporting habitual drug use, as well as subsequent decreases after treatment and "termination of addiction" (p. 37-38). Drug-related law enforcement expenditures by the

U.S. federal government include police, courts, prosecution, and corrections for a total cost of $13.3 billion in 1995. In 1991, state governments spent an additional $8.5 billion on SA treatment. The report also notes the funds generated through drug trafficking have been linked to corruption of police forces, the financing of revolutionary and terrorist groups, and undermining of legitimate political systems in the U.S. and around the world.

Governmental costs are also incurred by a portion of SA treatment, provided by either underwritten or directly funded programs. According to data provided by SAMHSA (2007a) on SA treatment spending, an estimated $21 billion was spent on treatment of SA, with public payments increasing from 68% of expenditures in 1993 to 77% in 2003. Other federal government spending dropped from 17% of total SA expenditures in 1993 to 15% in 2003; however, other state and local government spending increased from 31% to 40% in the same time period, indicating a shift of the burden for SA treatment from federal to state government. The ONDCP (2003) also reported that drug-related emergency room visits in the U.S. rose from 404,000 in 1988 to 532,000 in 1995, an increase of 31.6%. While substance abuse-related mortality is relative low, with estimates varying from 0.07-0.5%, global trends indicate this rate is increasing and subsequently becoming a public policy issue.

Thus, U.S. governments spend increasingly greater amounts to deal with individuals with SA, their families impacted by such behavior, public health initiatives aimed at prevention of SA, and the costs of punishing those individuals who break laws because of their SA. These costs also include government subsidies of health insurance (i.e., public sector coverage such as Medicaid), which is subsequently used to obtain SA treatment. The costs of law enforcement, courts, jails, and prisons continue to escalate as

SA become more widespread and understanding of the issues around SA spread through the public.

Treatment of Substance Abuse and Dependence

Before examining the effects of treatment, it is important to determine what portion of the populace with a SA diagnosis receives treatment. According to the SAMHSA (2010), 23.5 million people aged 12 or older needed treatment for a SA problem. While 2.6 million (11.2% of those needing treatment) received SA treatment at a facility specializing in this particular type of care, 20.9 million persons still needed specialized treatment for SA but did not receive any. In SAMHSA's 2006 survey, 5.6 million adults were found to have both serious psychological distress and a SA diagnosis. Of those adults, 50.8% received mental health or SA treatment at a specialty facility: 39.6% received only mental health treatment, 8.4% received treatment for both mental health problems and SA, and 2.8% received only SA treatment. However, the remaining 49.2% of adults with both serious psychological distress and SA were untreated.

The individual's symptoms that led to a diagnosis of SA will logically be ameliorated through the course of treatment. Legal involvement and withdrawal from important role functions will abate as treatment progresses. Similarly, greater resources in both time and money become available as these are not spent on the acquisition or use of alcohol or drugs. Thus, the impact of SA on individuals is rather easily identified as no longer meeting the DSM-IV-TR criteria for either alcohol or substance abuse or dependence.

The impact of SA treatment on families is not as easily identified. Moos and Moos (1984) note that some evidence exists for alcohol misuse to serve an adaptive function within a family and subsequent cessation can lead to deterioration of family functioning. However, they also note contradictory evidence demonstrating that stably married, recovered alcoholics' families function relatively well and cessation of alcohol misuse may be associated with improved family functioning.

As for the impact on businesses, productivity is not an explicit DSM-IV-TR criterion for SA though it would be considered as part of an individual's role functioning. Slaymaker and Owen (2006) examined data on employed men and women who entered residential SA treatment, collecting data at admission and one year later. The authors noted that 93% of the sample reported the employer's awareness of their entry into treatment, with men being more likely than women to be referred to treatment by the employer. At one year post-treatment, 65% of the total sample continued to work for the same employer though 15% of women and 10% of men were unemployed. Absenteeism decreased from 77.7% in the year prior to treatment to 29.6% in the year after treatment, dropping from a mean rate of 9.19 days to 1.33 days. The number of days during which employment-related problems were reported fell significantly from a mean of 5.20 days to 0.14 of the last 30 days, with disciplinary actions following suit from 22.22% to 6.54%. The percentage of participants reporting their job was in jeopardy also followed that trend, dropping from 18.18% in the year before treatment to 5.19% one year after treatment completion. The number fired from their job during the past 12 months, however, remained at 1.32% at both time points.

Treatment for SA is effective across domains. Individuals reduce psychological distress, social impacts, and health decrements. Conflict in families decreases, with a return toward more normal functioning seen in families without a substance-abusing member. Employment retention, work conflict, and absenteeism all show improvement for individuals with SA who receive treatment. These gains can then be extrapolated to lowering costs for governments through minimizing legal involvement, retaining private insurance coverage, and increased tax revenues.

Age-related differences

Empirical evidence addressing the treatment needs of substance users compared by age groups is minimal. There is a large body of research focusing on the needs of both adolescent and geriatric populations of substance users, with a much smaller area focused on each populations' treatment utilization (TU) and treatment cost (TC). However, studies comparing adults between 18 and 65 years are scant. To assume that no differences exist across adults over this 47 year span is illogical. Direct comparison to determine differences in utilization rates between age groups requires further examination.

In a 2002 article, Lemke and Moos began to address this issue, studying male veterans in treatment for alcohol use disorders among comparison groups of younger (21-39), middle-aged (40-54), and older (55-77) patients. They found that patients in the older cohort being treated in age-integrated programs had good prognoses, received comparable treatment to patients in the other cohorts, and responded similarly to that treatment. The findings were further divided into three categories: prognostic factors,

treatment experiences, and predictors of treatment response. Regarding prognostic factors, the authors found older patients experienced fewer social consequences of drinking and may have consumed less alcohol, but dependence symptoms appeared to be relatively stable across age groups. Older patients received comparable treatment, except they were less likely to have family and problem-solving sessions; they also viewed the program more positively and expressed higher satisfaction with treatment. The authors also specifically noted their research cannot refute previous studies indicating older adults at risk for alcohol misuse are less likely than younger peers to be referred to specialized substance abuse treatment. Unfortunately, no findings specifically addressing treatment utilization or cost were addressed by the authors.

While not a direct comparison between age groups within an adult population, further examination of SAMHSA's data on mental health and substance abuse expenditures shows the data parsed by age group (Mark, Harwood, McKusick, King, Vandivort-Warren, & Buck, 2008). The authors examined three groups: children and adolescents (younger than 18 years), young and middle-age adults (18-64), and older adults (65 and over). Their findings note youth accounted for 17% of services used, young and middle-age adults accounted for 68%, and older adults accounted for 15% of the total $100 billion spent on mental health care in 2003. For substance abuse treatment in 2003, youth accounted for 9%, young and middle-age adults for 86%, and older adults for 5% of the $21 billion total expenditure.

Mark et al. (2008) then further parsed the data by provider types. For young and middle-age adults in SA treatment, total expenditures came to $17.8 billion. Spending variance by provider showed 42% was spent on specialty substance abuse centers, 22%

on outpatient treatment, 21% at all non-specialty general hospitals, 5% on mental health specialty organizations (described as “freestanding MH specialty providers other than hospitals, such as clinics and residential centers (p. 281).”), and 3% at specialty hospitals. The remainder was spent on prescription medications, insurance administration, and free-standing nursing homes. Older adults’ total SA treatment expenditures for 2003 came to $1 billion, with 50% going to non-specialty general hospitals, 21% to free-standing nursing homes, 11% to outpatient treatment providers, 8% to specialty substance abuse centers. The remainder went to specialty hospitals, mental health specialty organizations, prescription medications, and insurance administration.

Age differences in SA treatment have been explored only as it relates to adolescent and geriatric populations. Little data is available on differences between adults in different age groups. So-called “middle-age” adults, from approximately 18-65 years old, account for the greatest total percentage of individuals receiving treatment; however, it is unknown if there are any differences within that 47 year range.

Gender-related differences

A large body of research exists examining the effects of gender on SA treatment; however, Green observed, in her 2006 literature review, the research focuses on treatment-seeking, access to care, retention in care, and treatment outcomes. Therefore, treatment utilization is examined somewhat indirectly, while treatment cost does not represent a significant portion of the research on the effect on gender on SA treatment. Research first directed attention to issues of gender and SA treatment in the 1970s and 1980s when the dearth of research about women with SA problems was first noted. Green

also reports the development of this body of research was paralleled by three other important changes: treatment programs began to focus on women and their unique needs, profound social changes were occurring in women's roles, and public awareness of SA problems and treatment was increasing. Based on these changes over time, Green posits that it is "difficult to know whether findings from earlier research are still applicable in current settings" (p.56).

Given that consideration, research has established that men and women are known to utilize SA treatment services at different rates (Green, 2006; Hser, Y.-I., Huang, D., Teruya, C., & Anglin, M. D., 2003; Timko, C. Moos, R.H., Finney, J. W., & Connell, E. G., 2002; Toray, T. Coughlin, C. Vuchinich, & S. Patricelli, P., 1991). Specifically, women utilize medical and mental health services at higher rates than men, but men utilize SA treatment more frequently than women. When entering treatment, women report more societal stigma, more severe problems from substance use, disruption of more life domains from those problems, and more health-related consequences of substance use than their male counterparts (Green, 2006). In one intriguing study, Polish researchers established that women have longer inpatient stays than men, a finding that is consistent with the aforementioned findings (Wojnar, M., Wasilewski, D., Matsumoto, H., & Cedro, A., 1997).

Other relevant findings on gender differences in SA treatment are related to the type of treatment provider and referral methods. Timko et al. (2002) noted women and men were equally likely to seek help for alcohol misuse in the past year, but women were less likely to seek help specifically for SA. Among people with an alcohol use disorder referred to mental health services, women were less likely than men to have previous

outpatient SA treatment. Men were more likely to be referred to SA treatment by criminal justices agencies, health care providers, employers, or schools; whereas, women were most often referred by child protective services, family members, friends, or word of mouth (Green, 2006; Hser, Y.-I. et al. 2003; Timko et al. 2002; Toray, et al., 1991).

Thus, it appears that women utilized SA treatment at a lower rate than expected in previous decades, given their higher utilization of medical and mental health treatment. This trend appears to have shifted after research conducted in the 1980s and 1990s into the differential experiences and needs of women seeking or using SA treatment. Recent research has shown no difference between genders in utilization of SA treatment, while women's utilization of medical and mental health treatment continues to outpace men's utilization of the same services. This comparison suggests that some barriers may still exist for women in accessing or adhering to SA treatment.

Mental health comorbidities

Research into SA and MHC has focused primarily on severe mental illness diagnoses, which are primarily described as diagnoses that result in serious functional impairments in one or more of the following: basic daily living skills (e.g., eating, bathing); instrumental living skills (e.g., managing money); and functioning in social, family, and vocational or educational contexts (Center for Substance Abuse Treatment, 1998; Mangrum, Spence, & Steinley-Bumgarner, 2006).

Research examining SA and MHC in other populations, where individuals may suffer from less severe psychiatric disorders, has been conducted through community surveys, also known as epidemiologic studies. Conway, Montoya, and Compton (2007)

reviewed the three large epidemiological studies conducted in the last thirty years: the Epidemiologic Catchment Area (ECA) study, data collected 1980-1984; the National Comorbidity Survey, data collected 1990-1992; and the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), data collected 2001-2002. The authors reported that significant results were found among all three studies for comorbidity between drug abuse and dependence and the following mental health disorders: antisocial personality disorder, mood disorders generally, major depressive disorder, dysthymia, anxiety disorders generally.

Compton, Thomas, Stinson, and Grant (2007) investigated the comorbidity of mental health disorders and drug abuse and dependence as part of a larger scale survey, the NESARC. This research found that controlling for other psychiatric disorders is extremely important to any investigation into SA and mental health comorbidity because mental health disorders are highly comorbid with each another. Their findings included strong and significant associations between drug use disorders and mood, anxiety, and personality disorders which persisted to some degree when the comorbid effects of other mental health disorders were controlled. The most significant relationships existed for drug abuse and dependence with alcohol use disorder,

In reporting results from the ECA study of community and institutional populations, Regier et al. (1990) found prevalence rates for lifetime occurrence of a mental disorder (i.e., not SA) of 22.5% of the U.S. population, with subgroups of only MH disorders at 16.2%, MH and alcohol disorders at 3.1%, MH and other drug disorders at 1.5%, and the combination of MH, alcohol, and drug disorders at 1.7%. The authors then report that 28.9% of individuals with any lifetime MH disorder diagnosis also had a

lifetime history of alcohol or drug misuse, 22.3% had a lifetime history of alcohol misuse only, and 14.7% had a lifetime history of misuse of other drugs only. The findings indicate that “a lifetime mental disorder is associated with more than twice the risk of having an alcohol disorder and over four times the risk of having another drug abuse disorder” (p. 2514).

According to the same analysis of ECA data by Regier et al. (1990), 36.6% of individuals with alcohol disorders had at least one other lifetime mental disorder and 21.5% had a lifetime diagnosis of another drug disorder. These rates place individuals who misuse alcohol at twice the risk for mental disorders and almost six times the risk for another drug misuse disorder. Finally, among those with a lifetime history of a drug misuse disorder, 53.1% had at least one other lifetime mental disorder, placing them at four times the risk for such a disorder; and 47.3% will have a lifetime history of an alcohol misuse disorder.

Research into the behavioral characteristics of individuals with dual SA and MHC indicates that comorbidity influences prognosis, course of treatment, and treatment outcomes. These individuals are known to continue abusing substances while hospitalized for MH treatment, be non-compliant with their MH treatment, be less likely to sustain remission of SA, generate higher costs to the MH system, be hospitalized at an earlier age, and be admitted more often (Kay, Kalathara, & Meinzer, 1989; Lyons & McGovern, 1989).

Kay, Kalathara, and Meinzer (1989) note that substance abusing inpatients tended to be more suicidal, homicidal, destructive, irresponsible, less functionally impaired, less psychotically impaired, hospitalized for briefer periods, more likely to have a personality

disorder diagnosis, and less likely to be schizophrenic. Lyons and McGovern (1989) reported a significantly shorter length of hospital stay in patients with dual diagnoses even when accounting for symptom severity. Ninety days later, dually diagnosed individuals were also rehospitalized for significantly longer periods of time than those individuals with only MH diagnoses. The authors note that reporting on a single episode of hospitalization should not lead to generalizations that this population is less expensive to treat. Given the study was published in 1989, it is also possible that integration of MH and SA treatment was less common, thus accounting for the shorter stays of dually diagnosed individuals who were unable to have all their treatment needs met during a single hospitalization.

Osher and Kofoed (1989) note that dually diagnosed individuals have increased rates of hospitalization and acute care services, greater housing instability and homelessness, poor medication compliance, and poor response to traditional SA treatment, and are often excluded from treatment settings. The authors also note other factors that may affect treatment and prognosis: polysubstance abuse is frequently reported by individuals with both MH and SA disorders; relatively low levels of alcohol and drug use can have negative consequences on treatment and prognosis; and though individuals with both MH and alcohol misuse diagnoses are more likely to seek treatment, they are no more likely to discuss their alcohol misuse with a treating clinician.

In a separate analysis of the Epidemiological Catchment Area data noted previously, Narrow, Regier, Rae, Manderscheid, & Lock (1993) reported on utilization of a variety of outpatient and inpatient treatment services, including those used by individuals with subclinical psychiatric symptoms, in a variety of settings: specialty

mental health and addictive services, general medical services, human services, and voluntary support networks (e.g., family, friends, Alcoholics Anonymous meetings). The analysis found “1.9 million persons with comorbid mental and addictive disorders who used ambulatory mental health/addictive services, with 35.1 million visits in a 1-year period” (p. 97). Over 62% of visits by individuals with SA also had a comorbid MH disorder. Those individuals with exclusively MH (4.2%) or SA (5.4%) diagnoses were significantly more likely than those with comorbid SA and MH disorders (1.6%) to visit alcohol and drug outpatient clinics; however, between these same groups, no significant differences were found in the average number of visits per year. Regarding use of inpatient services, the authors reported that 45.2% of admissions were to a general hospital, 25.1% to state and county mental hospitals, 15.2% to Veteran’s Administration psychiatric units, 13.1% to alcohol or drug treatment units.

SA and MH disorders co-occur regularly, a finding consistent with the DSM-IV-TR diagnostic criteria that require psychological dysfunction for the diagnosis; thus, some correlation is to be expected. However, treatment for such individuals appears to continue to lack coordination for comorbid diagnoses.

Medical comorbidities

Wadland and Ferenchick’s 2004 review of literature on MCs in SA covered the most frequently misused substances: alcohol, amphetamines, cocaine, opiates, and tobacco. Tobacco is not considered a substance of abuse by the DSMIV-TR; therefore, it is out of the scope of the current discourse. The authors noted the paradoxical relationship in current research about the risks and benefits of alcohol use and

acknowledged that clarifying the relationship to patients can increase the complexity of the issue. They also note that different definitions of “moderate drinking” further complicate synthesizing the available research findings.

Regarding alcohol specifically, Wadland and Ferenchick (2004) “identified 60 prospective studies suggesting an inverse association between moderate alcohol consumption and the development of coronary heart disease” (p. 678); however, they go on to note the correlational nature of the association that preempts any discussion of causation. In men, alcohol consumption at a moderate level was found to lower risk of developing diabetes, while heavy consumption was associated with a 43% increase in that risk. In women, one to two drinks daily reduced incidence of diabetes compared to abstinence, but increased again for more than two drinks daily.

Wadland and Ferenchick (2004) report that women’s hypertension shows a J-shaped curve relative to their alcohol consumption, with 0.25-0.5 drinks daily associated with a 14% lower risk for developing chronic hypertension than abstinence, while two drinks daily was associated with a 30% increase in that risk. Regulation of alcohol consumption has been recognized as an effective treatment for hypertension by the Seventh Joint National Committee on Hypertension.

Cardiac dysfunction is evidenced in 30% of alcohol dependent patients according to Wadland and Ferenchick’s 2004 review. Reduced risk of coronary heart disease is seen with moderate drinking, reducing risk of myocardial infarction in 35% of men drinking 3-7 days per week when compared with those drinking less than once weekly, with similar results noted in women. Binge drinking, however, is associated with an increased relative risk of coronary heart disease and total mortality two to six times greater. Interestingly,

the authors also noted that middle-aged men beginning regular drinking have both a lower risk of cardiovascular events and an increase in total mortality.

Acute coronary syndrome and cardiac arrhythmias, per Wadland and Ferenchick (2004), are common to emergency room patients reporting chest pain after methamphetamine use. These patients also require close supervision and serial cardiac enzyme testing to rule out acute coronary syndrome because it cannot be ruled out by a normal electrocardiograph. Research also demonstrates methamphetamine is a risk factor for stroke and massive intracerebral hemorrhage, even in young people, likely because of associated elevations in blood pressure, vasculitis, and vasoconstriction. In combination with HIV medications, there is some evidence that methamphetamine can cause neurotoxicity and fatalities.

According to Wadland and Ferenchick (2004), cocaine use has been associated with myocardial infarction, cardiomyopathy, and sudden death, likely through its powerful sympathomimetic effects. Myocardial infarction is 24 times more likely within 60 minutes of cocaine use in otherwise healthy individuals. In a related finding, between 7% and 25% of emergency room patients with chest pain have used cocaine, with 6% of those patients sustaining a myocardial infarction, half of which have no evidence of atherosclerotic coronary artery disease. Cocaine use has also been associated with 11 different cardiac arrhythmias, with more frequent occurrence in patients with pre-existing myocardial infarction, ischemia, cardiomyopathy, or hypertrophy.

In either prescription or illegal forms, opiate use leads to risk for major adverse events such as respiratory arrests, aspiration pneumonia, and rhabdomyolysis, a serious condition in which skeletal muscle cells burst and create a toxic environment that kills off

further tissues and possibly leads to renal failure. Opiate use is also associated with comorbid psychopathology, especially anxiety and other substance misuse disorders. Even when in methadone maintenance treatment, comorbid opiate and cocaine users are at increased risk for HIV and sexual activity with multiple partners. The authors report that approximately 85% of patients on methadone maintenance treatment have comorbid diagnoses of hepatitis C virus, of whom 20% may progress to chronic cirrhosis, with 20% of those requiring liver transplants. Interferon treatment for hepatitis C in patients on methadone maintenance treatment may also increase the known risk for depression, psychosis, and suicidality (Wadland & Ferenchick, 2004).

Forsythe, Griffiths, and Reiff (1982) conducted a study to examine medical treatment utilization by patients with alcohol abuse or dependence diagnoses relative to matched peers without lifetime alcohol abuse or dependence diagnoses. The study examined claims data to determine utilization trends for members referred to a clinic for alcohol abuse and dependence, who were eligible for a continuous 4-year period. In the two years prior to referral, the referred members cost $325 per year more than their non-referred matches 12 months prior to referral, then their costs rose sharply to $1484 per year more at 6 months prior to referral. The post-referral period began a pattern of decline in medical utilization for referred members, but they were still incurring $1079 per year in higher costs during the first 6-month period and $649 more at two years, compared to the non-referred group. The authors also note that while patients with alcohol abuse and dependence who participate in treatment tend to incur greater costs in outpatient treatment, the overall expense is lower than the costs associated with those patients not participating in SA treatment.

As demonstrated by the previous research, MC is clearly associated with increased risk for SA, though that relationship is also palpably complex. The use of maladaptive coping skills like misuse of alcohol or drugs is more understandable given the psychological distress inherent with physical illness and disease states, especially chronic disorders. Medical disorders can even provide the gateway for SA, for example, as patients are prescribed opioids for pain management. The costs of treating multiple disorders are also substantially greater.

One last, noteworthy point must be made in regard to the basis for the current study. Very little research is available on the aforementioned differences in SA treatment paid for by MBHCs. This dearth may be partially accounted for by public funds paying for 77% of SA treatment while only 10% was paid for by private insurance, according to SAMHSA's 2007a findings. Regardless of those data, it is unclear how care mediated by a MBHC may differ based on age, gender, and comorbidity status.

In conclusion, substance abuse is known to be a widespread behavioral health issue in the U.S., as identified by the maladaptive patterns of use of drugs of abuse, medications, or toxins that interfere with one's ability to fulfill the major roles in life. An individual's struggle with a SA diagnosis then subsequently spreads harmful consequences on to their families, the businesses that employ them, and the governments and societies in which they participate. These effects include health risks such as car accidents and the spread of disease, loss of money through decreased productivity and employee turnover, and increases in both medical and behavioral health costs. Human services providers need to know about SA treatment utilization and treatment cost within the managed behavioral healthcare context, yet differences between different genders,

age groups, and combinations of comorbid MH and medical conditions are not clearly delineated. Examining each group's utilization and cost associated with behavioral health treatment is important to understand given our nation's current debate over health care reform.

CHAPTER 3

METHODS

The questions driving this study are presented below to clarify the specific nature of the inquiry in this dissertation. Secondarily, it will also order the presentation of findings and discussion throughout ensuing chapters. The study seeks to answer the following questions:

1. Are SA risk and age associated with members' behavioral health treatment utilization (TU) and treatment cost (TC)?
2. Are SA risk and gender associated with members' behavioral health TU and TC?
3. Are SA risk and participants' mental health and medical comorbidity status associated with behavioral health TU and TC?
4. Would the combination of SA risk, age, gender, and comorbidity status be related to an individual's behavioral health TU and TC?

Those questions are addressed through testing the following hypotheses:

H1. SA risk and age group will be associated with TU and TC, decreasing as a function of age.

H2. SA risk and gender will not be associated with increased TU and TC.

H3. SA risk and multiple comorbidities will be associated with increased TU and TC.

H4. SA risk, age, gender, and comorbidity status will be associated with increased TU and TC.

Research Design

Using a retrospective design, the current inquiry focuses on MBHC members who completed both an initial Wellness Assessment (WA; administered during the first outpatient MH session) and another WA four months after his or her initial request for authorization (mailed directly to members). The study examines the WA data from the first WA administration. Claims data were used to measure behavioral health TU and TC over the four months after the first session of outpatient treatment, but does not include that first session when the WA is administered.

Participants

The study sample consists of 13,417 adult members of a MBHC who met four criteria: (1) completed a WA during their first visit with a contracted clinician between July 1, 2007 and August 30, 2008; (2) subsequently completed a follow-up WA at approximately four months after the initial authorization request; (3) scored at or above the clinical cutoff on global distress; and (4) were continuously eligible for the entire Pre-Period and Post-Period. Members were excluded if they had incorrect identifying data on the WA that prevented matching them to corresponding behavioral health claims data or if the follow-up WA was returned more than six months after the initial WA was completed.

Age was initially handled as a continuous variable; then a secondary variable creating 15 age groups was used for further analysis, with the following distribution of participants: 18-19 (N = 234), 20-24 (N = 677), 25-29 (N = 1110), 30-34 (N = 1380), 35-39 (N = 1639), 40-44 (N = 1778), 45-49 (N = 1874), 50-54 (N = 1928), 55-59 (N = 1479), 60-64 (N = 911), 65-69 (N = 229), 70-74 (N = 91), 75-79 (N = 48), 80-84 (N = 30), 85-89 (N = 9). Participants included 9850 women and 3567 men. Table 1 separates the participants by medical and mental health comorbidity categories, listing the number of participants in each category.

Table 1. Number of Participants by Presence of Comorbid Medical Condition and Mental Health Disorder Category*

	Comorbid Medical Condition	
	Yes	No
Adjustment Disorders		
Yes	1379	2114
No	4584	4542
Anxiety Disorders		
Yes	1242	1348
No	4721	5308
Eating Disorders		
Yes	47	52
No	5916	6604
Mood Disorders		
Yes	3228	2871
No	2735	3785
Schizophrenia Disorders		
Yes	46	25
No	5917	6631

*Medical condition is based on self-report data from the Wellness Assessment. Mental health disorder category is based on a diagnosis being listed on at least 50% of claims filed in the Post-Period.

Instrumentation

The instrument used in this study, the Wellness Assessment (WA), is a psychometrically validated (Doucette, McCulloch, & Azocar, 2008) self-report instrument developed by the MBHC for its proprietary use, composed of items from three well-validated, public domain scales: Symptom Checklist-90, CAGE-AID, and SF-12 (MBHC, n.d. a). The remaining questions were developed internally by the MBHC.

On the WA, questions 1-6 are taken from the Symptom Checklist-90 (SCL-90), with the response scale changed from 5 to 4 points. The SCL-90 is a 90-item self-report symptom inventory designed primarily to reflect the psychological symptom patterns of psychiatric and medical patients. Each item is a simple description of a physical or psychological symptom. Answers are rated on a 5-point scale to describe the level of discomfort from "not at all" to "extremely" (Derogatis, Rickels, & Rock, 1976). Scale reliability is reported as α=.87 (n=606) (MBHC, n.d. a). The WA's first six items ask about the following symptoms: nervousness or shakiness, feeling sad or blue, feeling hopeless about the future, feeling everything is an effort, feeling no interest in things, and your heart pounding or racing. These six questions are included in the WA's 15-item Global Distress Scale, designed to measure "behavioral health symptom severity, functional impairment, and self-efficacy."

Only one item from the SF-12 is used on the WA (question 17) and measures perception of general health on a 5-point scale from "poor" to "excellent". The SF-12 is a twelve-question short-form health survey developed by Ware, Kosinski, and Keller (1996). The MBHC notes that scale reliability is not applicable because only a single item is used to ascertain an individual's perception of their overall health status (MBHC, n.d. a).

The WA uses the CAGE for assessment of potential substance abuse and dependence (SA) in questions 22-24, altered to include drug use since the original version only addressed alcohol use. The CAGE is a four-question brief screening for potential alcohol misuse, named for key words in each of the four questions: "Have you ever felt you should *cut* down on your drinking?" "Have people *annoyed* you by criticizing your

drinking?" "Have you ever felt bad or *guilty* about your drinking?" "Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hang-over (*eye-opener*)?" (Mayfield, McLeod, & Hall, 1974). The CAGE's final question about the eye-opener was "omitted [from the WA] due to [sic] evidence of extremely low rates of affirmative response." The MBHC reports the scale's reliability as α=.749 (n=3111) (MBHC, n.d. a).

Procedures

The assessment data were acquired from the administration of the WA at the first session of outpatient mental health treatment. Treatment utilization and cost data were retrieved from claims information during the Post-Period (i.e., the four month period after the first outpatient treatment). Claims data were extracted after a minimum four-month lapse after the Post-Period ended. This choice was made by the MBHC staff to ensure that providers had enough time to submit claims for the dates of service in question. The dataset was subsequently anonymized and all data not directly relevant to this inquiry were removed before being given to the researcher for this current study. SPSS (version 16) statistical analysis software was used to conduct all statistical analyses. The significance level for each hypothesis was set at the .05 level.

Operationalization of Variables

Identification of predictor and criterion variables had to be determined from those available in the dataset prior to analysis. For some constructs, such decisions were made based on logic; however, other constructs required statistical analysis of the available

variables to determine which was the most appropriate. The following paragraphs will describe the logic and statistical analysis for these variable choices.

Risk for SA was determined by responses to the CAGE-AID questions on the WA. If at least two of the three questions were affirmed, then the participant was considered positive for risk.

Global Distress was operationalized by raw scores on the WA at Time 1. Another potential variable grouped scores into categories: Low (≤11, excluded from the original dataset), Moderate (12-24), Severe (25-38), and Very Severe (≥39). Given the loss of specificity with using the grouped variable data, the logical choice for analysis was the continuous variable data.

Age was utilized as a continuous measure to retain as much data as possible in the analysis despite the availability of age groups. However, age groups were created later to explore the potential of a non-linear relationship between age and TU or TC. Gender is a dichotomous variable determined from participants' records.

Mental health comorbidity was determined by the use of several specific variables in the dataset referring to specific classes of DSM-IV-TR diagnoses. All adjustment disorders were grouped together; however, Adjustment Reaction diagnoses were grouped with anxiety diagnoses. Anxiety Disorders included Generalized Anxiety Disorder, all phobias, Posttraumatic Stress Disorder, and Obsessive Compulsive Disorder. All eating disorder diagnoses were a separate group (i.e., Anorexia Nervosa, Bulimia Nervosa, and Eating Disorder NOS). Mood Disorders grouped Major Depressive Disorder, Bipolar Disorder I and II, Affective Personality Disorder, Cyclothymic Disorder, and Affective Psychoses among others. Schizophrenia Disorders included all Schizophrenia diagnoses,

most psychotic disorder diagnoses (except the Affective Psychoses), Delusional Disorder, and Schizoaffective Disorder among others. A participant was considered positive for mental health comorbidity in one of the aforementioned categories if that person had 50% or more of claims in the Post-Period with a diagnosis code in that category.

Medical comorbidity status was determined by participants' self-report of one or more serious or chronic medical conditions. The WA gives five possible categories for responses: Asthma, Diabetes, Heart Disease, Back Pain or Other Chronic Pain, and Other Condition. A participant was considered positive for medical comorbidity if he or she affirmed at least one serious or chronic medical condition. Two other variables were briefly considered but found lacking in methodological rigor. The first candidate, from the SCL-90, asked the participant to rank their general health on a five point, Likert-type scale. The second candidate was the total number of doctor visits in the last six months, with possible responses of None, 1, 2-3, 4-5, and 6+. Both questions lacked the focus on chronic or serious medical conditions and were subsequently eliminated.

The criterion variables, TU and TC, were not as easily defined. Operationalization required analysis to clarify the relationship between potential variables that could operationalize each construct. The rationale for choosing particular variables to define TU and TC will be reviewed next.

Effect Size versus Meaning

The consequence of the study's large number of participants must be reviewed because it impacts the interpretation of all analyses conducted. The large study population affected all statistical analyses in such a way as to make most analyses

significant at a very high level ($p<.001$). The recognition of this impact on statistical significance has led to the development of effect size measures that are not dependent on sample size for interpretation. These measures of effect size are based on the work of Cohen (1988). Cohen's original work used the two-group case as the model. Specifically, Cohen's definition of effect size was based on the following formula:

> Effect Size = Mean of the Treatment Group minus the Mean of the Control Group divided by the standard deviation of the control group.

As such, Cohen's metric, which he called '*d*', is based on a standard deviation metric. In his original work, Cohen established the benchmarks for interpretation with a *d* of .2 called small, a *d* of .5 called medium, and a *d* of .8 called large.

In most current usages, Cohen's *d* has been replaced by a statistic based on the correlation. The following shows the relationship between these correlational-based measures of effect size and Cohen's *d*.

Table 2. Cohen's *d* Standard

	d	*r*	r^2
	1.0	0.447	0.200
	0.9	0.410	0.168
Large	0.8	0.371	0.138
	0.7	0.330	0.109
	0.6	0.287	0.083
Medium	0.5	0.243	0.059
	0.4	0.196	0.038
	0.3	0.148	0.022
Small	0.2	0.100	0.010
	0.1	0.050	0.002
	0.0	0.000	0.000

The table shows the relationship between Cohen's *d*, *r*, and r^2 metrics for multiple regression.

Cohen's system will be used in the current study to discuss the meaning of effect sizes of statistically significant of the correlations. That is, correlations that are statistically significant in the .01 to .1 range will be termed "small"; correlations between .101 and .243 will be termed "medium" and any correlation larger than .243 will be termed "large".

Correlational Procedures

Clarification of the treatment utilization (TU) and treatment cost (TC) criterion variables required statistical analysis, which is presented with the rationale for the variables chosen. Next, Global Distress (i.e., self-reported psychological dysfunction and behavioral impairment) was analyzed as a potential confound to the study's findings.

Finally, predictor and criterion variables were correlated to get an initial sense of any relationships between variables.

Operationalizing TU and TC

TU was defined by number of sessions used in the Post-Period; however, it was divided into three types of treatment: Outpatient, Facility, and Other. TC was defined by claims submitted for dates of service in the Post-Period and also divided into Outpatient, Facility, and Other categories. Outpatient treatment includes psychotherapy, medication management, and intensive outpatient program services. Facility treatment is any treatment based at a facility, including residential, partial hospitalization, and inpatient treatment. Other treatment includes professional and ancillary services. Professional services are consultations provided by outpatient MH providers while a patient is in facility-based care. Ancillary services groups a wide variety of other services that may be provided, such as injections of psychotropic medications, drug and alcohol toxin screening, or psychological evaluation provided on an emergency basis (e.g., in an emergency room).

Pearson correlations were run to determine the relationship between Outpatient, Facility, and Other Treatment categories. Outpatient units were minimally correlated with Facility ($r = .057$, $p<.01$) and Other ($r = .043$, $p<.01$) units. Facility units had a medium positive correlation with Other units ($r = .213$, $p<.01$). This correlation is expected because professional services are included in the Other units variable.

Several candidates were present in the dataset that could operationalize the TC construct, including Outpatient, Facility, Other, and Total Costs. The same descriptions

for the unit categories apply to these cost categories, with Total Cost being the sum of Outpatient, Facility, and Other Costs. Examination of the correlations between these variables indicated relationships between some variables. Outpatient costs showed small positive relationships with Facility ($r = .091$, $p<.01$) and Other ($r = .089$, $p<.01$) costs, but a medium positive relationship with Total costs ($r = .313$, $p<.01$). Facility costs had a medium positive correlation with Other costs ($r = .392$, $p<.01$), which is logical given the above explanation. Facility costs, however, have a very large positive correlation with Total costs ($r = .972$, $p<.01$). This finding is logical given the expense of facility-based treatments since room, board, and the professional services of psychiatrists, therapists, and nurses are included in the Facility costs. Other costs had a large positive correlation with Total costs ($r = .451$, $p<.01$). This finding is logical per the aforementioned correlation of Other and Facility costs, as well as the inclusion of professional services rendered at facilities. Based on the strength of the correlational relationships between Facility and Other costs with Total costs, the Total costs variable was eliminated from further calculations. This choice also prevents loss of detail in the dataset, which may prove valuable in later analyses.

Elimination of Potential Confounds

The next step in the analysis was to ensure each variable was discreet, without confounding by another factor. Global Distress was compared against substance abuse and dependence (SA) risk, age, and gender to determine if self-reported dysfunction was associated closely with any of the predictor variables. If such a relationship was found

between variables, then the analysis could not be conducted as planned since it would have to account for Global Distress being closely associated with a predictor variable.

No relationship was found between these variables after analysis using Pearson correlations. Global Distress and SA risk were found to have a very weak relationship, with $r = .057$ ($p<.01$). A similar relationship was found between Global Distress and age ($r = .048$, $p<.01$) as well as Global Distress and gender ($r = .053$, $p<.01$).

The next analysis compared SA risk with age and gender to see if there was any relationship between these variables for which later analyses may have to account. SA risk and age had a very weak relationship, with $r = -.069$ ($p<.01$), as did SA risk and gender, with $r = -.109$ ($p<.01$).

Correlations between Predictor and Criterion Variables

The first stage of analysis concluded with correlations run between the predictor and criterion variables to determine the next step of the data analysis. Three separate correlations were run to specifically examine relationships as related to the study questions. Table 2 shows specific values between all of the variables of interest in the study.

Table 3. SA Risk, Age, and Criterion Variable Correlations

		SA Risk	Age	Outpatient Units	Facility Units	Other Units	Outpatient Cost	Facility Cost	Other Cost
SA Risk	*r*	1	**-0.069	**0.040	**0.088	**0.032	**0.035	**0.053	**0.042
	Sig.		0.000	0.000	0.000	0.000	0.000	0.000	0.000
Age	*r*		1	**-0.027	-0.007	0.003	**-0.030	0.001	-0.009
	Sig.			0.002	0.425	0.771	0.001	0.879	0.273
Outpatient Units	*r*			1	**0.057	0.043	**0.901	**0.061	**0.070
	Sig.				0.000	0.000	0.000	0.000	0.000
Facility Units	*r*				1	**0.213	**0.087	**0.540	**0.321
	Sig.					0.000	0.000	0.000	0.000
Other Units	*r*					1	**0.049	**0.251	**0.681
	Sig.						0.000	0.000	0.000
Outpatient Cost	*r*						1	**0.091	**0.089
	Sig.							0.000	0.000
Facility Cost	*r*							1	**0.392
	Sig.								0.000
Other Cost	*r*								1
	Sig.								

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4. SA Risk, Gender, and Criterion Variable Correlations

		SA Risk	Gender	Outpatient Units	Facility Units	Other Units	Outpatient Cost	Facility Cost	Other Cost
SA Risk	*r*	1	**-0.109	**0.040	**0.088	**0.032	**0.035	**0.053	**0.042
	Sig.		0.000	0.000	0.000	0.000	0.000	0.000	0.000
Gender	*r*		1	*-0.021	-0.013	0.009	-0.017	-0.013	0.016
	Sig.			0.018	0.127	0.314	0.051	0.131	0.068
Outpatient Units	*r*			1	**0.057	**0.043	**0.901	**0.061	**0.070
	Sig.				0.000	0.000	0.000	0.000	0.000
Facility Units	*r*				1	**0.213	**0.087	**0.540	**0.321
	Sig.					0.000	0.000	0.000	0.000
Other Units	*r*					1	**0.049	**0.251	**0.681
	Sig.						0.000	0.000	0.000
Outpatient Cost	*r*						1	**0.091	**0.089
	Sig.							0.000	0.000
Facility Cost	*r*							1	**0.392
	Sig.								0.000
Other Cost	*r*								1
	Sig.								

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5. SA Risk, Comorbidity, and Criterion Variable Correlations

		SA Risk	Medical Comorbidity	Adjustment Disorder	Anxiety Disorder	Eating Disorder	Mood Disorder
SA Risk	*r*	1.000	-0.016	**-0.047	**-0.031	-0.011	0.007
	Sig.		0.086	0.000	0.001	0.260	0.424
Medical Comorbidity	*r*		1.000	**-0.096	0.007	0.000	**0.110
	Sig.			0.000	0.424	0.965	0.000
Adjustment Disorder	*r*			1.000	**-0.278	**-0.047	**-0.548
	Sig.				0.000	0.000	0.000
Anxiety Disorder	*r*				1.000	-0.010	**-0.197
	Sig.					0.281	0.000
Eating Disorder	*r*					1.000	*-0.019
	Sig.						0.028
Mood Disorder	*r*						1.000
	Sig.						
Schizophrenia Disorder	*r*						
	Sig.						
Outpatient Units	*r*						
	Sig.						
Facility Units	*r*						
	Sig.						
Other Units	*r*						
	Sig.						
Outpatient Cost	*r*						
	Sig.						
Facility Cost	*r*						
	Sig.						
Other Cost	*r*						
	Sig.						

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 5. (continued)

		Schizophrenia Disorder	Outpatient Units	Facility Units	Other Units	Outpatient Cost	Facility Cost	Other Cost
SA Risk	*r*	0.005	**0.040	**0.088	**0.032	**0.035	**0.053	**0.042
	Sig.	0.559	0.000	0.000	0.000	0.000	0.000	0.000
Medical Comorbidity	*r*	**0.026	**0.030	**0.026	*0.018	**0.035	**0.025	*0.022
	Sig.	0.003	0.000	0.002	0.040	0.000	0.003	0.012
Adjustment Disorder	*r*	**-0.042	**-0.079	**-0.056	**-0.038	**-0.092	**-0.049	**-0.050
	Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Anxiety Disorder	*r*	**-0.028	**0.048	*-0.021	*-0.019	**0.057	-0.015	*-0.019
	Sig.	0.002	0.000	0.020	0.036	0.000	0.089	0.034
Eating Disorder	*r*	-0.007	0.013	*0.018	-0.001	**0.020	**0.046	0.000
	Sig.	0.452	0.145	0.043	0.925	0.022	0.000	0.977
Mood Disorder	*r*	**-0.052	**0.109	**0.026	*0.020	**0.124	**0.041	**0.044
	Sig.	0.000	0.000	0.004	0.025	0.000	0.000	0.000
Schizophrenia Disorder	*r*	1.000	*0.021	**0.039	0.015	**0.039	**0.051	**0.040
	Sig.		0.019	0.000	0.100	0.000	0.000	0.000
Outpatient Units	*r*		1.000	**0.057	**0.043	**0.901	**0.061	**0.070
	Sig.			0.000	0.000	0.000	0.000	0.000
Facility Units	*r*			1.000	**0.213	**0.087	**0.540	**0.321
	Sig.				0.000	0.000	0.000	0.000
Other Units	*r*				1.000	**0.049	**0.251	**0.681
	Sig.					0.000	0.000	0.000
Outpatient Cost	*r*					1.000	**0.091	**0.089
	Sig.						0.000	0.000
Facility Cost	*r*						1.000	**0.392
	Sig.							0.000
Other Cost	*r*							1.000
	Sig.							

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

In running the correlations for these variables, a number of interesting correlations were noted. Utilization and cost for each type of treatment were found to have large positive correlations: Outpatient ($r = .901$, $p<.01$), Facility ($r = .540$, $p<.01$), Other ($r = .681$, $p<.01$). These results were expected as a logical extension of the relationship between utilization of a service and the cost of that same service.

However, the most notable result of these correlations was the relationship between Facility Units and Other Units ($r = .213$, $p<.01$) and Facility Cost and Other Cost ($r = .392$, $p<.01$). These findings, shown in Table 5, suggested a moderate to large relationship between these variables which indicated these variables may not be discreet.

Factor Analytic Procedures

Factor analysis was conducted to determine if the predictor and criterion variables were discreet or part of an underlying construct. These analyses were performed for each hypothesis, based on the variables operationalizing each construct. Thus, for example, one factor analysis examined SA risk × age × TU; a second examined SA risk × age × TC. This process was repeated for gender and each of the five variables that operationalized the MHC variable (i.e., Adjustment, Anxiety, Mood, Eating, and Schizophrenia). Thus, an example of the factor analysis for one of the comorbidity variables is SA risk × medical comorbidity × mood disorder × TU, with a secondary factor analysis of SA risk × medical comorbidity × mood disorder × TC.

After these different factor analyses were completed, one unified component was identified for both Facility and Other TUs in all the analyses conducted. Facility and Other TCs were also a single component in all factor analyses performed. Table 6 shows the rotated component matrix scores for each variable, location of service, and unit/cost.

Table 6. Rotated Component Matrix Scores for Treatment Utilization and Cost by Age, Gender, and Mental Health Comorbidity

	Age	Gender	Adjustment	Anxiety	Eating	Mood	Schizophrenia
Treatment Utilization							
Outpatient	0.212	0.276	0.400	0.318	0.341	0.463	0.341
Facility	0.727	0.729	0.623	0.715	0.714	0.605	0.707
Other	0.742	0.743	0.540	0.642	0.640	0.536	0.622
Treatment Cost							
Outpatient	0.308	0.336	0.392	0.348	0.356	0.417	0.359
Facility	0.799	0.792	0.740	0.782	0.782	0.736	0.768
Other	0.795	0.795	0.733	0.775	0.772	0.730	0.759

This table lists the *r* values for each rotated component matrix computed for each predictor variable separated into Facility and Other treatment types, then separated by treatment units or treatment costs.

Two new variables were constructed for TU and TC containing both Facility and Other components. The new Facility/Other variable required transforming the data into standard scores which could then be combined for a total Facility/Other score, one for TU and the second score for TC. Facility TU ($\overline{x}$ = 0.42, SD = 4.530) and Other TU ($\overline{x}$ = 0.15, SD = 2.341) were standardized to make them equivalent. The process was repeated for Facility TC ($\overline{x}$ = 150.43, SD = 1820.738) and Other TC ($\overline{x}$ = 11.51, SD = 135.670). After these transformations, a correlation was run to examine the relationship between Facility/Other TU and Facility/Other TC, with $r = .690$, $p<.01$, which indicated retention of the relationship between TU and TC in the new Facility/Other variables. These two

new variables were then used in multiple regressions to address the study's research questions.

In summary, this chapter laid out the methodological groundwork for the primary analyses to follow. The hypotheses that form the foundation of this research were initially established, with decreased TU and TC expected with increasing age of the participants, no difference in TU and TC by gender, and increased TU and TC with increasing medical and mental health comorbidities. Next, the procedures for the study were reviewed: demographic information about the participants, how they were included in the study, the assessment instrument used, and the context and frequency of administration of the assessment. Operationalization of the predictor variables of SA risk, age, gender, and comorbidity status followed, along with discussion of the criterion variables, with detailed review of the logic and methodology applied in selection of each variable. Given the large number of study participants and the subsequent impact on the significance of analyses, Cohen's *d* was introduced to provide a measure of effect size beyond significance. Correlations between each of the predictor and criterion variables were reviewed, which led to factor analysis and the ensuing consolidation of the criterion variables from three into two levels of care: Outpatient TU, Facility/Other TU, Outpatient TC, and Facility/Other TC. With the predictor and criterion variables clearly defined and established as separate constructs from each other, Chapter 4 will address the primary analyses that test the hypotheses established at the beginning of this chapter.

CHAPTER 4

RESULTS

The findings of the multiple regressions for each hypothesis are reported in the previously established order. First, the relationship between SA risk and age is reported in relation to the effects on TU and TC. Second, the effects of SA risk and gender on TU and TC are detailed. Next, the relationship of SA risk and comorbidity status on TU and TC is reviewed. The final section of the chapter details the multiple regressions that included all predictor variables (i.e., SA risk, age, gender, medical comorbidity, and each mental health disorder category) for each criterion variable (i.e., Outpatient Units, Facility/Other Units, Outpatient Costs, Facility/Other Costs).

Multiple Regression Procedures

The adjusted R^2 values for each multiple regression performed and reported throughout this section were significant at $p<.001$.

SA Risk and Age

The hypothesis for this portion of the analysis is that SA risk and age group will be associated with TU and TC, decreasing as a function of age. Multiple regressions were used to examine the relationship between the predictor variables - SA Risk and age - and the criterion variables - TU and TC. For Outpatient TU, a significant model emerged using the enter method with SA risk ß = 0.039 ($p<.001$), age ß = -0.021 ($p<.05$), and an Adjusted R^2 = .002. Outpatient TC was similarly significant, with SA risk ß = 0.034 ($p<.001$), age ß = -0.025 ($p<.01$), and an Adjusted R^2 = .002. Facility/Other TU was also

significant with SA risk ß = 0.078 (p<.001) and an Adjusted R^2 = .006; however, the age ß was not significant. Facility/Other TC was significant with SA risk ß = 0.058 (p<.001) and an Adjusted R^2 = .003; however, the age ß was not significant. Therefore, neither SA risk nor age proved to be meaningful predictors for TU or TC at any level of care, since they each account for less than 1% of the variance in the model.

Table 7. Multiple Regression Findings for SA Risk × Age

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.039	**0.078	**0.034	**0.058
Age	-0.021	†-0.002	*-0.025	†-0.002
Adjusted R2	0.002	0.006	0.002	0.003

**. Significant at the 0.001 level.
*. Significant at the 0.01 level.
†. Not significant.

A secondary analysis was conducted on the age-related data to determine if a curvilinear relationship might exist. Correlation and multiple regression attempt to determine the line that describes the majority of points in a dataset, but cannot describe any curvilinear relationship. Thus, a secondary variable from age was used for this analysis that broke age up into 15 groups: 18-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85-89.

With use of these ordinal data, a one-way ANOVA was conducted to determine if any non-linear relationships existed in the age group data, with an ANOVA conducted for

each of the four criterion variables. For Outpatient Units, a significant effect was found for the unweighted linear term, $F(14, 13402) = 15.859$, and the unweighted quadratic term, $F(14, 13402) = 5.282$. A significant effect was found for Outpatient Costs in the unweighted linear term, $F(14, 13402) = 13.248$, and the unweighted quadratic term, $F(14, 13402) = 4.059$. Facility/Other Units had a non-significant effect in the unweighted linear term, $F(14, 13402) = 0.115$, and the unweighted quadratic term, $F(14, 13402) = 0.473$. A non-significant effect was found for Facility/Other Costs in the unweighted linear term, $F(14, 13402) = 0.371$, and the unweighted quadratic term, $F(14, 13402) = 0.361$. The figures below demonstrate the differences in means between the age groups, as determined by the ANOVA computation for each criterion variable.

The comparison of means for Outpatient Units in Figure 1 suggests the presence of a non-linear relationship. Specifically, adults age 65 or older utilized fewer outpatient mental health treatment sessions than their younger peers. In Figure 2, the comparison of means for Outpatient Costs, similar to Outpatient Units, suggests a trend in declining costs for adults age 65 and older. Figures 3 and 4 indicate no relationship between age and either treatment utilization or treatment costs.

Figure 1. Comparison of Age Group means for Outpatient Units

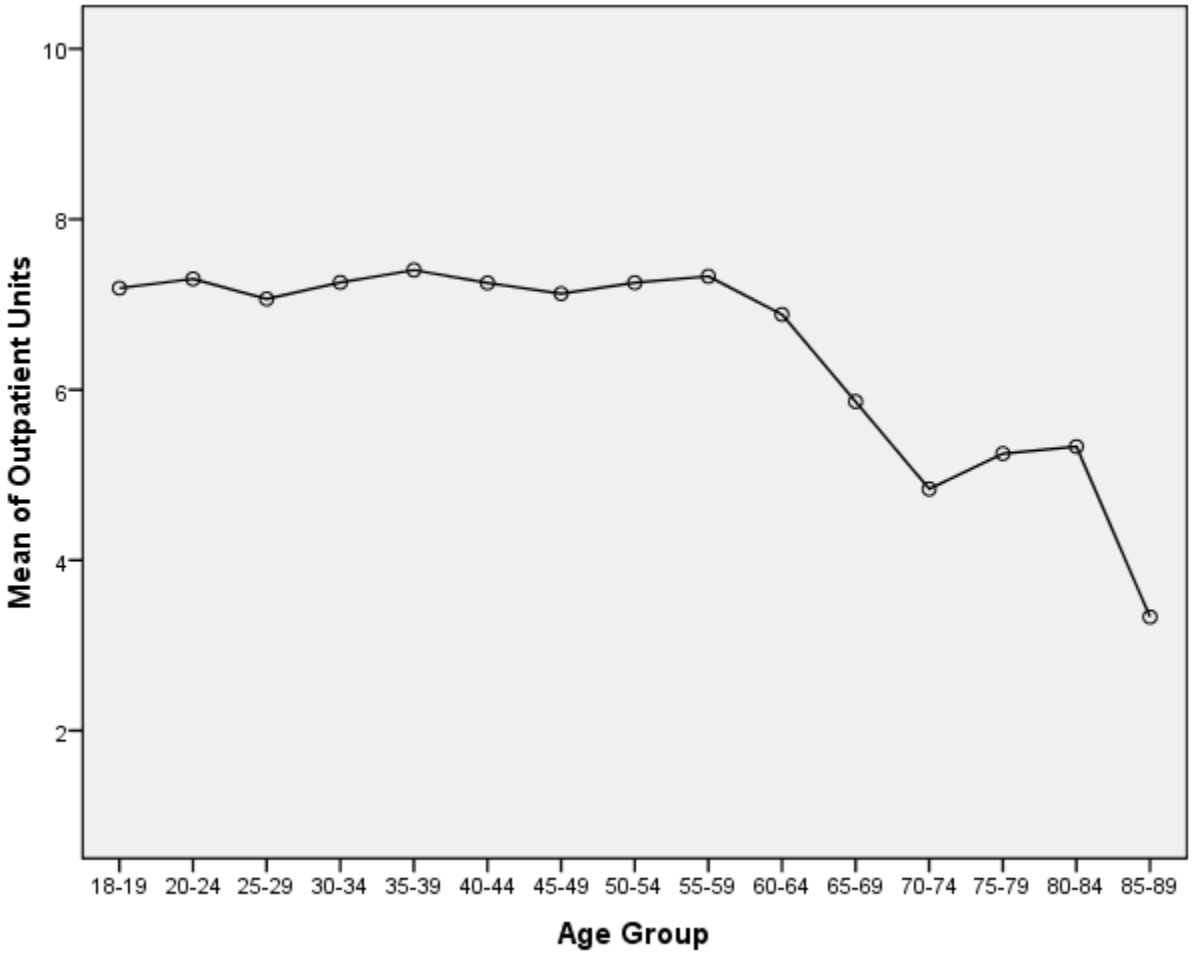

Figure 1 supports the hypothesis that a trend occurs in which treatment utilization decreases as a function of age, but only for outpatient care.

Figure 2. Comparison of Age Group means for Outpatient Costs

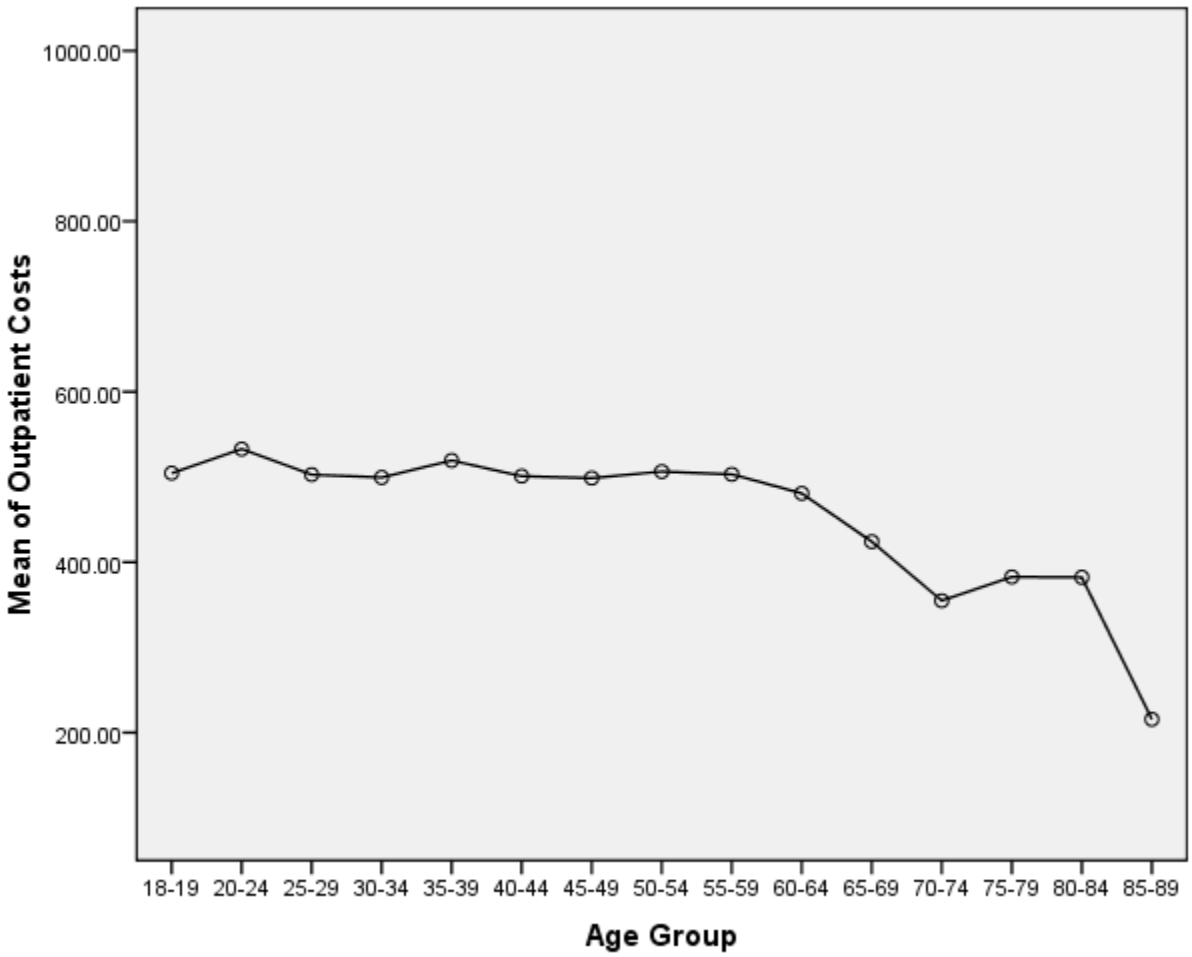

Figure 2 supports the hypothesis that a trend occurs in which treatment costs decrease as a function of age, but only for outpatient care.

Figure 3. Comparison of Age Group means for Facility/Other Units

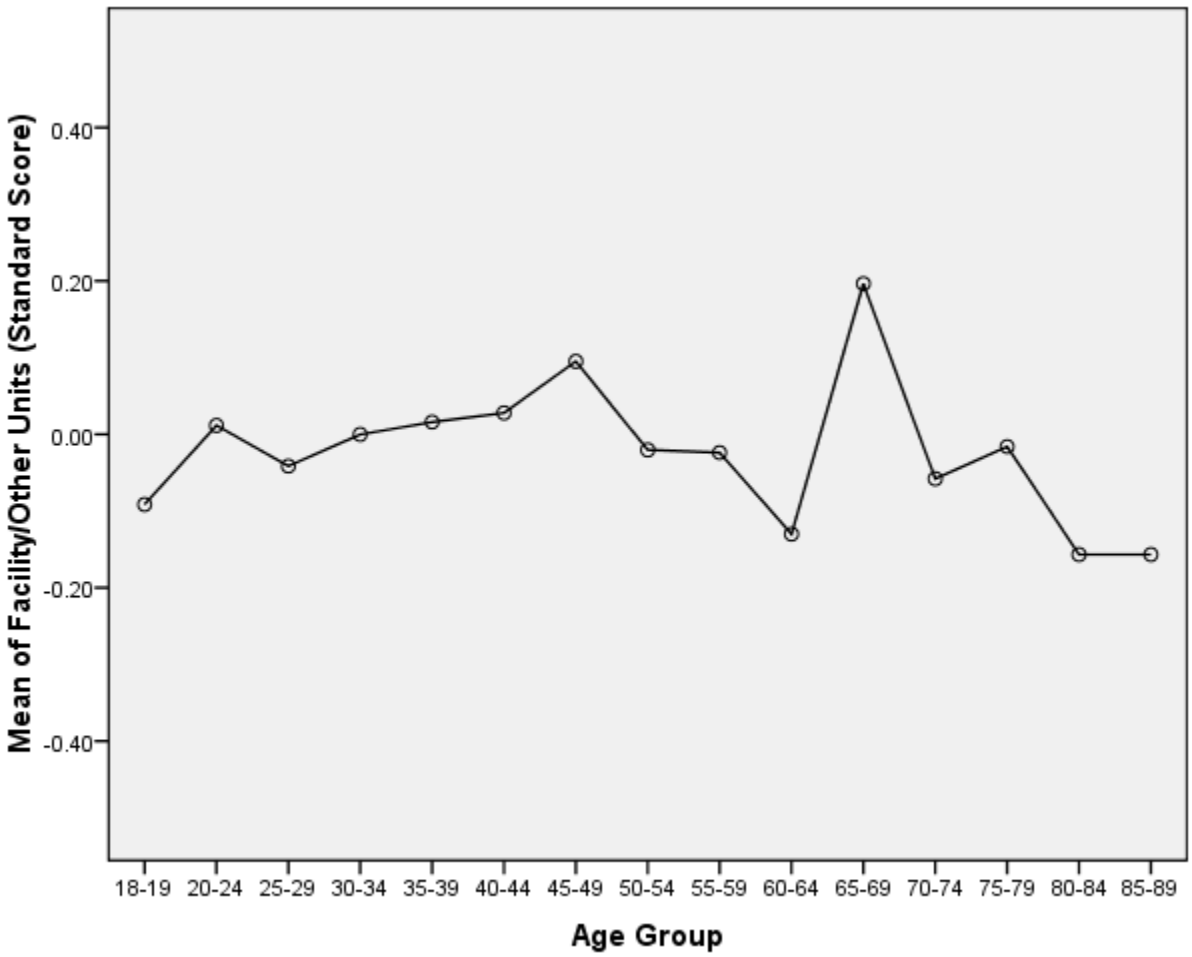

Figure 3 refutes the hypothesis that a trend occurs in which treatment utilization decreases as a function of age in the case of Facility/Other types of care. However, the figure is suggestive of possible generational or developmental effects.

Figure 4. Comparison of Age Group means for Facility/Other Costs

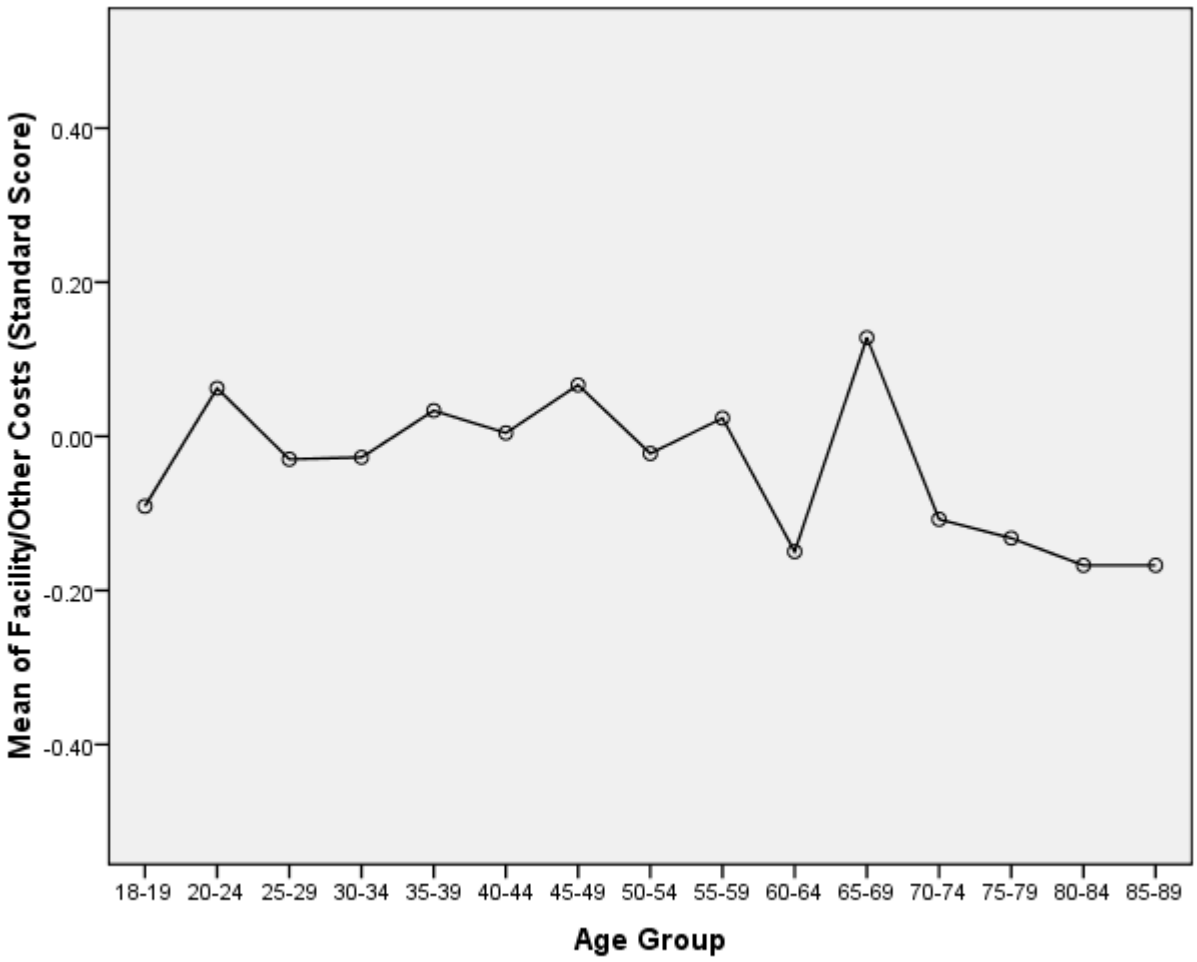

Figure 4 refutes the hypothesis that a trend occurs in which treatment costs decrease as a function of age in the case of Facility/Other types of care. However, the figure is suggestive of possible generational or developmental effects.

SA Risk and Gender

The hypothesis for the second portion of the analysis is that SA risk and gender will not be associated with increased TU and TC. The SA Risk and gender predictor

variables were examined with multiple regressions to determine any relationship to the criterion variables, TU and TC. A significant model emerged for Outpatient TU, using the enter method, with SA risk ß = 0.038 (p<.001), gender ß = -0.018 (p<.05), and an Adjusted R^2 = .002. Outpatient TC was significant, with SA risk ß = 0.034 (p<.001) and an Adjusted R^2 = .001; however, the gender ß was not significant. Facility/Other TU was also significant, with SA risk ß = 0.078 (p<.001) and an Adjusted R^2 =.006, but the gender ß was not significant. Facility/Other TC was significant with SA risk ß = 0.059 (p<.001) and an Adjusted R^2 = .003; however, the gender ß was not significant. Therefore, neither SA risk nor gender proved to be meaningful predictors for TU or TC at any level of care, since they each account for less than 1% of the variance in the model, which is consistent with the hypothesis for these analyses.

Table 8. Multiple Regression Findings for SA Risk × Gender

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.038	**0.078	**0.034	**0.059
Gender	-0.018	†0.000	†-0.014	†0.003
Adjusted R2	0.002	0.006	0.001	0.003

**. Significant at the 0.001 level.

*. Significant at the 0.01 level.

†. Not significant.

SA Risk and Comorbidity Status

The hypothesis for this third set of analyses is that SA risk and higher levels of medical and mental health comorbidity will be associated with increased TU and TC. These multiple regressions compared SA Risk and the various MC and MHC predictor variables against the TU and TC criterion variables. These results will be grouped by MHC diagnostic group: Adjustment Disorders, Anxiety Disorders, Eating Disorders, Mood Disorders, and Schizophrenia and Similar Disorders.

SA Risk, medical comorbidity, and Adjustment Disorders were the predictor variables for the first multiple regressions for the third hypothesis. For Outpatient TU, a significant model emerged using the enter method, with SA risk ß = 0.039 ($p<.001$), medical comorbidity ß = 0.029 ($p<.01$), Adjustment Disorders ß = -0.080 ($p<.001$), and an Adjusted $R^2 = .009$. Outpatient TC was similarly significant, with SA risk ß = 0.032 ($p<.001$), medical comorbidity ß = 0.033 ($p<.001$), Adjustment Disorders ß = -0.091 ($p<.001$), and an Adjusted $R^2 = .011$. Facility/Other TU was also significant, with SA risk ß = 0.078 ($p<.001$), medical comorbidity ß = 0.025 ($p<.01$), Adjustment Disorders ß = -0.054 ($p<.001$), and an Adjusted $R^2 = .010$. Facility/Other TC was also significant with SA risk ß = 0.058 ($p<.001$), medical comorbidity ß = 0.020 ($p<.05$), Adjustment Disorders ß = -0.054 ($p<.001$), and an Adjusted $R^2 = .007$. Therefore, SA risk, medical comorbidity, and Adjustment Disorders proved not to be meaningful predictors for TU or TC at any level of care, since they each account for 1% or less of the variance in the model.

Table 9. Multiple Regression Findings for SA Risk × Medical Comorbidity × Adjustment Disorder

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.039	**0.078	**0.032	**0.058
Medical Comorbidity	*0.029	*0.025	**0.033	0.020
Adjustment	**-0.080	**-0.054	**-0.091	**-0.054
Adjusted R2	0.009	0.010	0.011	0.007

**. Significant at the 0.001 level.

*. Significant at the 0.01 level.

†. Not significant.

SA Risk, medical comorbidity, and Anxiety Disorders were the predictor variables for the next multiple regressions. A significant model emerged for Outpatient TU, using the enter method, with SA risk ß = 0.044 ($p<.001$), medical comorbidity ß = 0.037 ($p<.001$), Anxiety Disorders ß = 0.051 ($p<.001$), and an Adjusted $R^2 = .005$. Outpatient TC was similarly significant with SA risk ß = 0.039 ($p<.001$), medical comorbidity ß = 0.042 ($p<.001$), Anxiety Disorders ß = 0.057 ($p<.001$), and an Adjusted $R^2 = .006$. Facility/Other TU was also significant, with SA risk ß = 0.080 ($p<.001$), medical comorbidity ß = 0.031 ($p<.001$), Anxiety Disorders ß = -0.024 ($p<.05$), and an Adjusted $R^2 = .008$. Facility/Other TC was also significant, with SA risk ß = 0.060 ($p<.001$), medical comorbidity ß = 0.026 ($p<.01$), Anxiety Disorders ß = -0.023 ($p<.05$), and an Adjusted $R^2 = .005$. Therefore, SA risk, medical comorbidity, and Anxiety Disorders proved not to be meaningful predictors for TU or TC at any level of care, since they each account for less than 1% of the variance in the model.

Table 10. Multiple Regression Findings for SA Risk × Medical Comorbidity × Anxiety Disorder

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.044	**0.080	**0.039	**0.060
Medical Comorbidity	**0.037	**0.031	**0.042	*0.026
Anxiety	**0.051	-0.024	**0.057	-0.023
Adjusted R2	0.005	0.008	0.006	0.005

**. Significant at the 0.001 level.

*. Significant at the 0.01 level.

†. Not significant.

SA Risk, medical comorbidity, and Eating Disorders were the next set of predictor variables examined by multiple regression for any relationship to the TU and TC criterion variables. For Outpatient TU, a significant model emerged using the enter method, with SA risk ß = 0.043 ($p<.001$), medical comorbidity ß = 0.037 ($p<.001$), and an Adjusted $R^2 = .003$; but, Eating Disorders ß was not significant. Outpatient TC was similarly significant, with SA risk ß = 0.037 ($p<.001$), medical comorbidity ß = 0.043 ($p<.001$), Eating Disorders ß = 0.021 ($p<.05$), and an Adjusted $R^2 = .003$. Facility/Other TU was also significant, with SA risk ß = 0.081 ($p<.001$), medical comorbidity ß = 0.030 ($p<.001$), and an Adjusted $R^2 = .007$; however, the Eating Disorders ß was not significant. Facility/Other TC was significant, with SA risk ß = 0.060 ($p<.001$), medical comorbidity ß = 0.026 ($p<.01$), and an Adjusted $R^2 = .004$; however, the Eating Disorders ß was not significant. Therefore, SA risk, medical comorbidity, and Eating Disorders

proved not to be meaningful predictors for TU or TC at any level of care, since they each account for less than 1% of the variance in the model.

Table 11. Multiple Regression Findings for SA Risk × Medical Comorbidity × Eating Disorder

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.043	**0.081	**0.037	**0.060
Medical Comorbidity	**0.037	**0.030	**0.043	*0.026
Eating	†0.014	†0.006	0.021	†0.017
Adjusted R2	0.003	0.007	0.003	0.004

**. Significant at the 0.001 level.
*. Significant at the 0.01 level.
†. Not significant.

The next multiple regressions examined SA Risk, medical comorbidity, and Mood Disorders for the relationship to the four TU and TC criterion variables. For Outpatient TU, a significant model emerged using the enter method, with SA risk ß = 0.041 ($p<.001$), medical comorbidity ß = 0.024 ($p<.01$), Mood Disorders ß = 0.114 ($p<.001$), and an Adjusted $R^2 = .016$. Outpatient TC was similarly significant, with SA risk ß = 0.036 ($p<.001$), medical comorbidity ß = 0.028 ($p<.01$), Mood Disorders ß = 0.128 ($p<.001$), and an Adjusted $R^2 = .019$. Facility/Other TU was also significant, with SA risk ß = 0.081 ($p<.001$), medical comorbidity ß = 0.029 ($p<.01$), and an Adjusted $R^2 = .007$; however, the Mood Disorders ß was not significant. Facility/Other TC was significant,

with SA risk ß = 0.060 (p<.001), medical comorbidity ß = 0.021 (p<.05), Mood Disorders ß = 0.043 (p<.001), and an Adjusted R^2 = .006. Therefore, SA risk, medical comorbidity, and Mood Disorders proved not to be meaningful predictors for TU or TC at any level of care, since they each account for less than 2% of the variance in the model.

Table 12. Multiple Regression Findings for SA Risk × Medical Comorbidity × Mood Disorder

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.041	**0.081	**0.036	**0.06
Medical Comorbidity	*0.024	*0.029	*0.028	0.021
Mood	**0.114	0.016	**0.128	**0.043
Adjusted R2	0.016	0.007	0.019	0.006

**. Significant at the 0.001 level.

*. Significant at the 0.01 level.

†. Not significant.

The last multiple regressions examined SA Risk, medical comorbidity, and Schizophrenia and Similar Disorders for any relationship to the TU and TC criterion variables. A significant model emerged for Outpatient TU, using the enter method, with SA risk ß = 0.042 (p<.001), medical comorbidity ß = 0.037 (p<.001), Schizophrenia and Similar Disorders ß = 0.022 (p<.05), and an Adjusted R^2 = .003. Outpatient TC was similarly significant, with SA risk ß = 0.037 (p<.001), medical comorbidity ß = 0.042 (p<.001), Schizophrenia and Similar Disorders ß = 0.044 (p<.001), and an Adjusted R^2 =

.005. Facility/Other TU was also significant, with SA risk ß = 0.081 (p<.001), medical comorbidity ß = 0.029 (p<.01), Schizophrenia and Similar Disorders ß = 0.042 (p<.001), and an Adjusted R^2 = .009. Facility/Other TC was significant, with SA risk ß = 0.060 (p<.001), medical comorbidity ß = 0.02 (p<.01), Schizophrenia and Similar Disorders ß = 0.066 (p<.001), and an Adjusted R^2 = .008. Therefore, SA risk, medical comorbidity, and Schizophrenia and Similar Disorders proved not to be meaningful predictors for TU or TC at any level of care, since they each account for less than 1% of the variance in the model.

Table 13. Multiple Regression Findings for SA Risk × Medical Comorbidity × Schizophrenia Disorder

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.042	**0.081	**0.037	**0.060
Medical Comorbidity	**0.037	*0.029	**0.042	*0.024
Schizophrenia	0.022	**0.042	**0.044	**0.066
Adjusted R2	0.003	0.009	0.005	0.008

**. Significant at the 0.001 level.

*. Significant at the 0.01 level.

†. Not significant.

SA Risk, Age, Gender, and Comorbidity Status

The hypothesis for this last step in the analysis is that SA risk, age, gender, and comorbidity status will be associated with increased TU and TC. This analysis was used

to determine how all of the predictor variables may simultaneously affect each criterion variable through multiple regression. Thus, four separate multiple regressions were performed for all predictor variables (i.e., SA risk, age, gender, MC, Adjustment Disorders, Anxiety Disorders, Eating Disorders, Mood Disorders, and Schizophrenia and Similar Disorders) against each criterion variable: Outpatient TU, Outpatient TC, Facility/Other TU, and Facility/Other TC.

Table 14. Multiple Regression Findings for SA Risk × Age × Gender × Medical Comorbidity × All Mental Health Comorbidities

	Treatment Utilization		Treatment Cost	
	Outpatient	Facility/Other	Outpatient	Facility/Other
SA Risk	**0.039	**0.074	**0.034	**0.056
Age	**-0.033	†-0.010	**-0.038	†-0.009
Gender	**-0.035	†0.000	**-0.031	†0.001
Medical Comorbidity	*0.030	*0.028	**0.034	0.020
Adjustment	0.028	**-0.093	*0.033	**-0.057
Anxiety	**0.088	**-0.058	**0.100	**0.036
Eating	0.019	†0.000	*0.027	†0.014
Mood	**0.151	**-0.044	**0.172	†0.008
Schizophrenia	**0.032	**0.035	**0.055	**0.063
Adjusted R2	0.024	0.014	0.032	0.012

**. Significant at the 0.001 level.

*. Significant at the 0.01 level.

†. Not significant.

For Outpatient TU, a significant model emerged using the enter method with an Adjusted R^2 = .024. A significant model also emerged for Outpatient TC with an Adjusted R^2 = .032. Facility/Other TU also had a significant model emerge using the enter method with an Adjusted R^2 = .014. Finally, a significant model emerged for Facility/Other TC using the enter method with an Adjusted R^2 = .012. Similar to the previously reported results, none of the independent variables (i.e., SA risk, age, gender, medical comorbidity, and Schizophrenia and Similar Disorders) proved not to be meaningful predictors for TU or TC at any level of care, since they each account for less than 4% of the variance in the model.

CHAPTER 5

DISCUSSION

The findings related in the previous chapter will be reviewed as they relate to the hypotheses established earlier in this paper. Given the lack of any meaningful finding across predictor and criterion variables, this review will also establish why such a pattern is itself meaningful and explicate possible reasons this pattern would occur.

As previously discussed, all analyses provided statistically significant results because of the large sample population. The large number of data points ensures that the effect of chance is very low in creating artificial results or trends. However, such significant results do not mean that the findings are meaningful. The meaning of the analysis comes from the strength of the relationships or the amount of variance in outcomes that were described by the analysis.

Review of Study Hypotheses

Substance Abuse and Dependence (SA) Risk and Age

The initial question posited in this study was whether or not a relationship existed between SA risk and age that would affect treatment utilization (TU) and treatment cost (TC). The hypothesis, developed from that initial question and the literature review, was that SA risk and age would be associated with TU and TC, both of which would decrease as a function of age. The results of the multiple regressions utilizing age yielded statistically significant results that SA risk and age risk account for little of the variance in TU and TC outcomes for Outpatient and Facility/Other care.

This question was then taken a step further by investigating the potential for a curvilinear relationship within the data. A secondary age variable was used that split this continuous variable into 15 groups: 18-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, 85-89. This secondary Age Group variable was then compared against the criterion variables through an ANOVA. This further analysis demonstrated there was no non-linear relationship for Outpatient or Facility/Other utilization or cost.

Thus, the findings from this study did not support the original hypothesis that a relationship between SA risk and age would lead to decreased TU and TC because only a trend was noted for the Outpatient level of care when results were graphed. These results are inconsistent with SAMHSA's study suggesting that utilization of behavioral health treatment decreases across the lifespan (Mark et. al. 2008).

Of interest, however, are the possible trends that appear in the graphs of the ANOVA results. Examination of the Figures 1 and 2, for Outpatient Units and Costs respectively, shows a rapid decrease in utilization and cost of treatment for behavioral health services at age 65. This trend could be seen for one of several reasons. First, Medicare becomes the primary insurance coverage for most Americans at age 65; therefore the individuals represented in the study may be those who do not have Medicare coverage or are utilizing a secondary benefit managed by the MBHC. Such individuals, then, would not be necessarily representative of all American adults in that age range. Attrition at and above age 65 may also occur because individuals are channeled into the medical care system, where a primary care physician may prescribe psychotropic medications or individuals' mental health symptoms may not be diagnosed as a mental

health disorder or may be misdiagnosed as a related medical condition. Attrition may also occur as individuals move from independent living situations into structured care settings, where their physical and mental health care are managed as part of a flat rate for the level of service provided. Mortality also may affect utilization, and thereby cost. As an individual ages, or physically declines, there may be little practical concern by family, medical providers, other caregivers, or even the individual themselves for their mental health status and needs. A similar trend can be found in Facility/Other levels of care (Figures 3 and 4) among participants age 70 and older.

Figures 3 and 4, addressing TU and TC for Facility/Other levels of care, show even more interesting trends that may be related to both developmental and generational factors. The 18-19 age group shows much lower TU and TC than the range exhibited by adults 20-59. This pattern may be related to increased drug experimentation in adolescents and young adults, to fewer consequences to drug use behaviors as required by DSM diagnostic criteria, to clinicians' unwillingness to label a young adult with a SA diagnosis or admit that person to facility-based care without an extensive history of use and previous outpatient treatment, or some combination of those factors. Another noteworthy trend is in the 60-64 and 65-69 age groups. These two age groups show roughly equivalent deviation from the range exhibited among the 20-59 groups, but in opposite directions. Two factors may be in action at this time period. First, this effect may be a generational one, since these groups represent people born between 1941 and 1950. That would make these groups part of the Baby Boomer generation, placing them in their late adolescence or early adulthood during the American cultural shift of the 1960s and 1970s which was characterized by events like Woodstock and the Vietnam

War. In addition to pushing the cultural boundaries around race relations and women's roles, this generation is also known for an increase in drug experimentation and use. The downward trend in the 60-64 age group, therefore, may reflect a certain laissez faire attitude or unwillingness to pathologize alcohol and drug use. That perspective, in turn, could lead to fewer social consequences to alcohol and drug use behaviors that may pressure individuals into treatment and qualify them for specific DSM diagnoses. This viewpoint that may lead to TU and TC decreases could also interact with the costs of Facility/Other treatment, which is generally more expensive because it is primarily facility-based (i.e., occurs in a hospital or specialty treatment center). However, once an individual qualifies for Medicare at age 65, much of the costs of treatment are covered, with additional coverage available through secondary plans provided by employers. This change in insurance coverage could account for increased TU and TC. To summarize this explanation, it is possible that Baby Boomers are at increased risk for MH and SA problems but do not utilize treatment until they are eligible for Medicare at age 65.

SA Risk and Gender

The second question posited in this study was whether or not a relationship existed between SA risk and gender that subsequently affected TU and TC. The hypothesis, developed from that second question and the literature review, was that SA risk and gender would not be associated with TU and TC. More thorough background is necessary to understand both the hypothesis and to interpret these results. When initial investigations into women's SA treatment utilization were conducted in the 1970s and

1980s, research found the women utilized SA treatment at much lower rates than men. This finding was noteworthy because women utilized comparable medical and mental health treatment at much higher levels than men. More recent investigations into women's utilization suggest that women's and men's utilization of SA treatment is nearing or approximately equivalent (Green, 2006; Hser, et al. 2003; Timko et al. 2002; Toray et al. 1991). This research, then, was the basis for the hypothesis that men's and women's utilization would no significantly differ from one another. Yet, that equivalence would still indicate underutilization of SA treatment, given women's higher utilization of medical and mental health treatment than men.

The results of the multiple regressions concerning gender yielded statistically significant but meaningless results, indicating SA risk and gender account for little of the variance in TU and TC outcomes for Outpatient and Facility/Other care. Thus, the findings from this study support the second hypothesis that no relationship would be found between SA risk and gender on TU and TC. These results are consistent with recent literature suggesting that women's utilization of SA treatment is now equal to men's utilization but still represents underutilization since women utilize comparable services at higher rates than men (Green, 2006; Hser, et al. 2003; Timko et al. 2002; Toray et al. 1991).

SA Risk and Comorbidity Status

The third question posited in this study was whether or not a relationship existed between SA risk and participants' mental health and medical comorbidity status that would affect TU and TC. The hypothesis, developed from that third question and the

literature review, was that SA risk and participants' comorbidity status would not be associated with TU and TC. The results of the multiple regressions involving comorbidity status yielded statistically significant results that comorbidity status and SA risk account for a very small portion of the variance in TU and TC outcomes for Outpatient and Facility/Other care. Thus, the findings from this study did not support the third hypothesis that a relationship between SA risk and comorbidity status would lead to increased TU and TC. These results are inconsistent with recent literature suggesting that utilization of behavioral health treatment increases for individual's with either comorbid mental health or medical comorbidities (Forsythe, Griffiths, & Reiff, 1982; Kay, Kalathara, & Meinzer, 1989; Lyons & McGovern, 1989; Osher & Kofoed; 1989; Wadland & Ferenchick, 2004).

One possible reason for this finding is that previous research has primarily focused on severe mental illness, while the participants in this study were not specifically diagnosed with severe mental illnesses (Center for Substance Abuse Treatment, 1998; Mangrum, Spence, & Steinley-Bumgarner, 2006). That is, the clinical severity of participants' symptoms may have been too low for changes in their TU and TC to have become apparent. Similarly, if a far larger proportion of participants had levels of dysfunction that just met criteria for a diagnosis, then they may have masked significant effects on TU and TC of participants who met most or all of the criteria for a diagnosis.

Another potential complication is this study's findings regarding comorbidity status is that even subclinical levels of drinking or drug use have deleterious effects on the behavioral health treatment (Osher & Kofoed; 1989). This finding underscores the difficulty in clearly defining SA. In the case of the current study, groups of SA risk

versus no SA risk may be subject to a similar challenge, with enough false positives and false negatives to impact the analysis of TU and TC trends.

SA Risk, Age, Gender, and Comorbidity Status

The final analysis aimed at answering the final question posited in this study: would the combination of SA risk, age, gender, and comorbidity status affect TU and TC? The hypothesis developed from the prior three hypotheses was that the amalgam of SA risk, age, gender, and comorbidity status would be associated with increased TU and TC. This increase was expected because the research on usage and costs differences by age suggested a moderate decrease in TU and TC, the research on usage and costs differences by gender suggested no difference in TU and TC, and the research on usage and costs differences by comorbidity status suggested a very strong increase for medical and mental health comorbidities separately (Forsythe, Griffiths, & Reiff, 1982; Green, 2006; Hser, et al. 2003; Lyons & McGovern, 1989; Mark, Harwood, McKusick, King, Vandivort-Warren, & Buck, 2008; Osher & Kofoed, 1989; Timko et al. 2002; Toray et al. 1991; Wadland & Ferenchick, 2004).

The result of this multiple regression linking all predictor variables yielded statistically significant results, indicating the predictor variables account for only a small portion of the variance in TU and TC outcomes for Outpatient and Facility/Other care. This finding also appears inconsistent with the aforementioned literature, given the strength of findings supporting increased TU and TC in the presence of comorbidities.

Pattern of Study Results

This section will review a possible pattern that may be determined from the results. First, an exploration of the predictor variables will begin the foundation for this pattern to exist. The criterion variables will then be compared to establish the importance of a lack of meaningful findings. The pattern itself will be elucidated once these basic premises have been identified, providing the foundation on which to establish the argument for a meaningful pattern among meaningless results. Finally, possible sources of that pattern will be reviewed.

Lack of meaning between age, gender, and comorbidity status

Predictor variables with varying hypothesized effects were investigated. Age was expected to show an associated decrease in TU and TC. Gender was expected to have no effect on TU and TC. Comorbidity status was expected to show an increase in TU and TC. However, no meaningful relationships were found for any of the predictor variables in this study.

The lack of a meaningful result for age is of concern because of established literature indicating older adults' TU is less than their young and middle-aged adult counterparts. Gender was not expected to show a meaningful relationship with TU and TC; so, this finding appears consistent with recent literature. Of greatest concern is the lack of meaningful relationships between SA risk and comorbidity status. Significant bodies of literature exist documenting the increased TU and TC associated with treating individuals with multiple behavioral and medical diagnoses. In that context, the lack of meaningful relationship for gender then becomes suspect as perhaps consistent with

limitations of the study, rather than increased equality between genders in use of behavioral health services.

Lack of meaning for both TU and TC

TU and TC were defined by four variables: Outpatient Units, Outpatient Costs, Facility/Other Units, and Facility/Other Costs. TU consists of non-negative integers; whereas, TC can be any positive or negative value, out to two decimal places. This information is critical in considering the data analyzed relative to the results of the analyses.

Specifically, if TC can be a negative value, then MBHC received funds instead of disbursed funds. This payment to MBHC means that the company initially paid out too much for a given service, which would result in the participant or his/her clinician paying money back to MBHC for those services. An example of this situation might be if a claim was processed at the in-network or contracted rate, then service was later determined to have been provided out-of-network and the claim reprocessed. The in-network rate would result in a higher level of cost for MBHC; therefore, when MBHC's financial liability was determined to be lower, the participant or provider would then be responsible for returning the amount of overpayment back to MBHC. Other situations may exist that would lead to this same situation wherein a participant or provider had to pay MBHC directly.

This overpayment-reimbursement conclusion could also be made for any low, positive costs as well (e.g., $0.07 in one participant's case). The argument for these small, positive TCs is that such costs could only be incurred if positive TC (cost of

services) were only slightly greater than negative TC (payments to MBHC) over the Post-Period. Some participants with zero TC would likely also fall into this category for the same reason, but their positive and negative TCs were exactly equal.

Further support for this conclusion comes from the correlational results between utilization and cost for Outpatient, Facility, and Other types of care. While highly correlated at a high level of significance, those r values for Facility and Other treatment did not equal 1.000, though Outpatient treatment came very close to the r value's upper limit. The relationship between utilization and cost, especially for Facility and Other treatment, can then be inferred to experience kind of interference. Certainly, it is important to consider the overlap between Facility and Other treatment as indicated by the factor analysis. Correlational comparison of the Facility/Other TU and Facility/Other TC variables, however, still found an imperfect relationship between utilization and cost. That finding underscores the potential for costs incurred by dates of service outside of the Post-Period to be included in the Post-Period data, thereby influencing the results of each analysis.

The question now is what importance do these details about TU and TC mean for the data analysis? It means that TU and TC examine different characteristics of treatment, leaving them susceptible to different limitations. TU quite clearly either occurred in the Post-Period or it did not, a fact established by the date of service. However, TC may be subject to forces that TU is not, including data for dates of service outside the Post-Period. Claims can be submitted long after a date of service; for example, some claims may be submitted up to eighteen months after the date of service. Additionally, claims often require reprocessing for any of a myriad of reasons. These issues can affect the

overall TC in the Post-Period without being related to any date of service within the Post-Period.

According to information provided by the MBHC to the researcher, claims were linked to dates of service within the Post-Period, which should eliminate these concerns. That information, however, also stated that claims data was extracted from the MBHC's systems at least four months after the date of service. Thus, TC appears to potentially exclude claims data that were submitted for payment after the four-month timeframe allowed prior to extraction. The existence of any missing data cannot be confirmed, nor is it known how many participants would be affected by this challenge. Conversely, waiting for an extended period of time to elapse before extracting the claims data would mean pushing back the period of time for which data were analyzed (i.e., pushing back the dates for which data were selected). Moving the time period for which data were analyzed would then be of concern because of relevance to current systems and procedures.

With these serious concerns about TC, it would then be logical to find results that indicate meaningful relationships between predictor variables and TU, but not between those predictors and TC. That situation did not occur with these results, which means further investigation is required into the lack of meaningful relationships across all variables.

The pattern of results

Based on the aforementioned considerations of both predictor and criterion variables, a pattern of results emerges in the analyses conducted. That pattern consists of

statistically significant yet meaningless relationships between the variables investigated. With various types of findings expected – decreased TU and TC, no change, and increased TU and TC – the lack of meaningful results then becomes noteworthy and suggests that problems may have existed within the study that prohibited the isolation of meaningful relationships among various groups of individuals and their TU and TC.

Possible reasons for the pattern of results

This pattern of statistically significant yet meaningless relationships between all the predictor and criterion variables could most likely result from problems with the relationship of the data to the constructs under examination. That is, the data do not capture a large enough percentage of the variance of a given construct to demonstrate that construct's relationship to other constructs through their constituent data.

Two similar scenarios exist for this situation in which the data are minimally related to the construct to which they supposedly adhere. The first scenario is that the WA questions are inadequately related to the constructs of interest. The second scenario is that the variables used to operationalize the constructs were inadequately related to those constructs. These scenarios are quite similar; therefore, greater explanation of each is now required.

The first possible explanation for the data to be minimally related to the constructs is that the WA questions do not adequately relate to the construct being examined. That is, the questions adhere to some construct, but not the one to which they are assumed to belong. One example of this issue would be SA risk. As discussed at the beginning of this dissertation, SA is a complex issue characterized by diverse behaviors

and effects. Risk for SA is equally complex, perhaps more so given the literature reviewed about the impact of family environment, mental health comorbidity, and medical comorbidity on SA. In the WA, three CAGE questions are related to alcohol and drug use, with one more question examining number of alcohol drinks consumed in the past week. In this study, SA risk was defined as at least two questions affirmed of the three CAGE items. While these questions may indicate that a clinician should investigate a person's use of alcohol or drugs, it does not necessarily provide the most accurate assessment of a person's likelihood to have or develop a SA problem.

The second explanation is that the variables used to operationalize the constructs of interest were only minimally related to those constructs. In this case, it would not be the questions on the WA that were not related to the construct, but rather that the variables chosen to represent the construct were chosen in error. For ease of comparison, the example of SA risk will be examined again. In this case, the problem would not lie with the CAGE questions being only minimally related to the construct of SA risk, but in the choice to use those questions as the only means of defining SA risk.

Further Research

Given the previous discussion of the results, the potential pattern of those results, and interpretations of that pattern's meaning, suggestions for future research are severely restricted. Methodological issues form the primary focus of the suggestions for future research, to clearly establish the relationship between a construct and its operationalization by a specific variable.

SA risk is difficult to operationalize, especially when limited to answers provided on a brief questionnaire aimed at establishing general psychological dysfunction and distress. Any replication of this research should work to establish more precisely the presence of risk for SA, perhaps choosing instead to use SA diagnosis rather than risk.

Comorbidity may have also suffered from challenges related to their operationalization, similar to SA risk. Medical comorbidity was operationalized by the answer to one question on the WA. Thus, medical comorbidity may have been assessed in too limited a form and would be more clearly established through the use of medical claims information. Mental health comorbidity was operationalized by a minimum of 50% of claims in the previous four months reporting a diagnosis in one of five discreet categories. Therefore, the participant must have previously been in treatment to qualify for a diagnosis. This requirement automatically creates a false negative for an individual with a current diagnosis, but who was not previously in treatment. That requirement also creates a false positive for someone who previously had a diagnosis, but whose diagnosis has changed over the course of treatment.

Clarification of TC would be of primary interest in any replication of this study. Limiting TC to those incurred by dates of service falling in the time period under review is critical. Extraneous costs may otherwise be included and skew the data, which may have been an issue in the current study.

Conclusion

This research provided a unique snapshot of the cultural and historical effects at work in the United States in 2009-2010, in respect to the insurance industry and mental

health care parity. Health care reform legislation was a contentious political and cultural event, with the legislation being signed into law during the process of this investigation. Federal Mental Health Parity laws also took effect, and compliance with the Interim Final Rules was effective July 1, 2010. This volatile atmosphere of significant changes to the insurance industry, but most especially for those companies providing behavioral health care coverage.

Significant challenges existed in conducting this research in the aforementioned context, and should be taken into consideration by researchers interested in replicating this study or conducting similar research. Certainly, the sociopolitical context will have changed; however, remaining aware of and sensitive to that context can inform and impact the research process. Advantages exist to using this data. There is an extremely large sample to be obtained with relatively little effort, as a great deal of information is obtained through the MBHC's clinical, administrative, and business procedures. While this pool of information is vast, there are distinct limits to its depth.

This research was bound by a non-disclosure agreement which led to challenges for the exchange and release of information between the author and committee members. The author could not release the dataset itself, which was anonymized prior to release to the author, to the statistical advisor on the committee. Only the results of the analyses conducted could be released to the statistical advisor after the analysis was vetted by the MBHC and approved for release. The apparent argument for this protocol, though never clearly articulated, was the current interpretation of the Health Insurance Portability and Accountability Act necessitating informed consent from all 13,417 members included in

the study, if the anonymized dataset were released to someone outside the MBHC even though a non-disclosure agreement was in place.

Another challenge to research in collaboration with an MBHC, is that administrative data exists simply in its present form and cannot be altered. Further questions cannot be asked; protocols cannot be altered, nor further data obtained. For example, this current research used data extracted from behavioral health claims and clinical databases, which seems quite reasonable and promising on the surface. However, when attempting to generalize the study results to other populations, difficult questions arise with no clear or definitive answers. What is the total population of members from which these participants are derived or chosen? Do these participants differ from the overall member pool? What biases are created simply through the use of exclusionary criteria when extracting the data? How representative are the participants of people with health insurance managed by an MBHC? How representative are they of the general population?

Additionally, challenges are created by the insurance products themselves. Benefits often include deductibles, maximums, and limits that will influence the costs incurred. A brief explanation of these terms is necessary to understand the effects they could have on the data. A deductible is the amount of contracted services paid for by the member before the insurance begins to split the cost of treatment. A maximum or limit artificially caps the dollar amount or number of services covered. For example, some plans have a lifetime maximum of two courses of SA treatment; thus, a third episode of treatment necessitated by the chronic, relapsing nature of SA would not be covered by the insurance company. Another example would be a limit on the number of days of inpatient

mental health or substance abuse treatment to thirty days per calendar year, which could be used up rapidly when inpatient treatment counts as a full day but intermediate levels of care also accumulate toward that limit at a certain ratio (e.g., partial hospitalization may account for 7/10 of one day). Lifetime and out-of-pocket maximums also exist. The former limits the amount of money paid for all behavioral health treatment to a certain amount (usually $1-$5 million), while the later limits the members' financial liability for behavioral health treatment costs for a plan year (e.g., once the member has paid $2000 in the plan year, the insurance covers further treatment at 100%). Out-of-pocket maximums often range from $1000-$4000 and are usually met only if facility-based treatment is required during that year.

The way that these maximums and limits affect TU and TC is by creating floor and ceiling effects that do not adequately reflect the true costs of services. A deductible creates a floor effect by not counting the member's initial $500-$5000 of behavioral health treatment because it was paid by the member, not the insurance. A maximum number of days of inpatient treatment per year creates a ceiling effect, whereby those members will never go above 30 days of treatment in a calendar year according to the MBHC's records because those claims would simply be denied because the benefit was already consumed in its entirety. The data provided by the MBHC did not clearly define how those deductibles, maximums, and limits affected the claims data provided. Also, the MBHC would not know how those deductibles, maximums, and limits influenced an individual in choosing to begin, continue, alter, or end any behavioral health treatment.

The potential exists for a replication of this study to yield informative results. The current examination, however, appears to have suffered from either methodological error

created by operationalization of the constructs or limitations of the dataset itself. Future research that resolved or limited the potential for these methodological problems would likely generate useful findings. Those findings could elaborate the relationship between SA risk, age, gender, and comorbidity status on TU and TC within an environment in which a MBHC performed a critical role in paying for treatment. In light of the federal mental health parity legislation enacted and recently effected, that role is one that will only expand, necessitating further explication of that role.

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APPENDIX A

ALERT® Wellness Assessment - Adult

Completing this brief questionnaire will help us provide services that meet your needs. Answer each question as best you can and then review your responses with your clinician. Please shade circles like this ●

Client Last Name , First Name Date of Birth: (mm/dd/yy) / /

Subscriber ID Authorization #

Clinician Last Name , First Name Today's Date: (mm/dd/yy) / /

Clinician ID/Tax ID Clinician Phone - State

MRef ○

Visit #: ○ 1 or 2 ○ 3 to 5 ○ Other

For questions 1-16, please think about your experience in the past week.

How much did the following problems bother you?	*Not at All*	*A Little*	*Somewhat*	*A Lot*
1. Nervousness or shakiness	○	○	○	○
2. Feeling sad or blue	○	○	○	○
3. Feeling hopeless about the future	○	○	○	○
4. Feeling everything is an effort	○	○	○	○
5. Feeling no interest in things	○	○	○	○
6. Your heart pounding or racing	○	○	○	○
7. Trouble sleeping	○	○	○	○
8. Feeling fearful or afraid	○	○	○	○
9. Difficulty at home	○	○	○	○
10. Difficulty socially	○	○	○	○
11. Difficulty at work or school	○	○	○	○

How much do you agree with the following?	*Strongly Agree*	*Agree*	*Disagree*	*Strongly Disagree*
12. I feel good about myself	○	○	○	○
13. I can deal with my problems	○	○	○	○
14. I am able to accomplish the things I want	○	○	○	○
15. I have friends or family that I can count on for help	○	○	○	○

16. In the past week, approximately how many drinks of alcohol did you have? ☐☐ Drinks

Please answer the following questions only if this is your first time completing this questionnaire.

17. In general, would you say your health is: ○ Excellent ○ Very Good ○ Good ○ Fair ○ Poor
18. Please indicate if you have a serious or chronic medical condition:
    ○ Asthma ○ Diabetes ○ Heart Disease ○ Back Pain or Other Chronic Pain ○ Other Condition
19. In the past 6 months, how many times did you visit a medical doctor? ○ None ○ 1 ○ 2-3 ○ 4-5 ○ 6+
20. In the past month, how many days were you unable to work because of your physical or mental health? *(answer only if employed)* ☐☐ Days
21. In the past month, how many days were you able to work but had to cut back on how much you got done because of your physical or mental health? *(answer only if employed)* ☐☐ Days
22. In the past month have you ever felt you ought to cut down on your drinking or drug use? ○ Yes ○ No
23. In the past month have you ever felt annoyed by people criticizing your drinking or drug use? ○ Yes ○ No
24. In the past month have you felt bad or guilty about your drinking or drug use? ○ Yes ○ No

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Clinician: Please fax to (800) 985-6894 Rev. 2007