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CO-OCCURRING DISORDERS:
AN OUTPATIENT LATENT CLASS ANALYSIS

A Dissertation
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ABSTRACT

Over the past 20 years researchers and health care practitioners have come to realize in addition to high prevalence rates, individuals with co-occurring disorders did not represent a homogeneous group (Drake, et al., 1998: 2001; Lehman, et al., 1994: 2000; Mueser, et al., 2000). It is essential to consider the heterogeneity of co-occurring disorders when considering new treatment modalities. Thus, it becomes pivotal to identify these differences for treatment approaches and program goals. Research shows that heterogeneity of treatment populations can be reduced through empirically-derived homogeneous groups based on multivariate analysis (Ries, et al., 1993; Lehman et al., 2000; Mueser, et al., 2000).

The purpose of the current study was to address a significant void in knowledge on the heterogeneity of co-occurring disorders by determining if homogeneous subgroups exist within an outpatient population presenting for treatment and if so how many groups exist and what makes up group membership. Identification of subgroups can provide a mechanism to better understand the interrelationships between determinants that contribute to the etiology and problem severity at an individual and group level. Secondly, in an effort to improve service delivery, empirically-derived subgroups hold important clinical implications for treatment models.

The exploratory research was conducted through a retrospective analysis seeking a parsimonious model of subgroups made up of individuals with co-occurring disorders entering an outpatient program using a latent class analysis (LCA). The best fitting statistical model in the latent class analysis was one in which the overall sample was composed of three (3) subgroups. The three-class model that included alcohol use, illegal drug use, education level and serious depression was identified as best fitting the data.

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CHAPTER I

INTRODUCTION

Description and Background of the Problem

The U.S. Department of Health and Human Services (1999) reported on the difficulty the co-occurring population faces in seeking and receiving diagnostic and treatment services, even though, separately, these disorders are often assessed and temporarily treated successfully. For clinicians, the greatest challenge serving consumers with co-occurring disorders is deciding on the most appropriate locus of their care. Consumers with co-occurring disorders represent a widely diverse population who are broadly distinct in terms of their service needs. Co-occurring disorders are not a unitary construct, bur rather a disease concept that represents a distinct population (Luke, Mowbray, Klump, Herman, and Boots Miller, 1996). Such a population can not be treated with a single approach (Minkoff, 2000), but rather by consumer-specific plans of care. Consumers presenting for treatment have different service needs and varying degrees of functioning abilities and motivation to participate in treatment. The very nature of providing care for individuals with co-occurring disorders is a treatment approach that is flexible and based on the specific needs and realities of an individual.

The heterogeneity of this population can be partially explained by the interaction of substance abuse and psychiatric symptoms and how that interaction affects an individual's ability to care for self. Although each individual is unique, there is a potential benefit in identifying subgroups for needs assessment and treatment planning. There is considerable evidence that disease management, a managed care initiative, has been successful in utilizing subgroups to identify, prevent and treat chronic illness, such as diabetes, cancers, coronary heart disease and asthma (Cousins & Liu, 2003; Lorig, Sobel, Ritter, & Laurent, 2001;.Buchner, Butt, DeStefano, Edgren, Suarex & Evans, 1998; Gillespie, 2002; Minkoff & Cline, 2003).

Prevalence of Co-occurring Disorders

Current epidemiologic studies have clearly established the high occurrence and significant impact of co-occurring disorders within the general population (Reiger, et al, 1990; Anthony et al. 1994; Anthony & Kessler, 2000). Recent incidence rate studies estimate the prevalence of co-occurring disorders affecting adults in the United States to be somewhere between 7 million to 10 million (Mueser, et al. 2001; USDHHS, 1999b). Furthermore, the number is expected to double in the next 30 years to a minimum of 15 million (NFCMH, 2003). A report by National Household Survey on Drug Abuse (NHSDA, 2000), estimated 14.8 million adults (7.3 % of all adults) 18 or older suffered from a serious mental illness (SMI) disorder. Of those with SMI, 6.9 million reported receiving some form of mental health treatment within a 12 month period, and 4.3 million reported a dependency on alcohol or illicit drugs

According to the Epidemiologic Catchment Area (ECA), a random survey of more than 20,000 Americans (diagnosed with a co-occurring disorder) taken from five geographical areas living in the community and in various institutional settings, found a 22.5% lifetime prevalence of mental disorders and a third of those who had a mental disorder (29%) also had a co-occurring disorder. Among those with an alcohol disorder, 39.6% had comorbid disorders (Reiger, et al, 1990). The most prevalent mental disorder in conjunction with an alcohol disorder was: anxiety disorders (19%), antisocial personality disorders (14%), effective disorders (13%) and schizophrenia (4%). The ECA examined data collected between 1980 and 1984, and was the first quantitative information on co-occurring disorders.

Furthermore, a National Comorbidity Survey (NCS) administered a similar study between 1990 and 1992, conducting a face to face household survey based on a stratified, multistage area probability study of people 15 to 54 years in a non-institutionalized population. The study supported the high prevalence rates found in the ECA survey. The NCS survey found that individuals with severe mental disorders were at significant risk for developing a substance abuse disorder; in particular 47% of individuals with schizophrenia also had a substance abuse disorder (more than four times the general

population) and 61% of individuals with bi-polar disorders had a substance abuse disorder (more than five times the general population).

Perspectives on Co-occurring Disorders

Researchers have offered three explanations for the prevalence rate for co-occurring disorders: (1) the disorders may arise independent of each other; (2) the mental disorders (e.g., schizophrenia and mood disorders) may place the individual at greater risk for substance abuse disorders; and finally (3) drug abuse intoxication or withdrawal may result in temporary mental disorder syndromes. Research has shown that an individual with a mental disorder is at increased risk for developing a substance abuse disorder, and conversely, that a person with a substance abuse disorder is at increased risk for developing a mental disorder. The four models that best synthesize current knowledge in the field regarding the etiology of co-occurring disorders are illustrated in the following table (Anthony, 1991; Kosten & Ziedonis, 1997; Kushner & Mueser, 1993; Weiss & Collins, 1992) (See Appendix A).

Mueser and colleagues (1998) tested these theories of increased co-morbidity and found the evidence suggests a connection between antisocial personality disorders and increased morbidity (example of the common factor model). In the second model, (secondary substance abuse disorder) there is evidence supporting a super sensitivity concept assuming a person with a mental disorder is biologically vulnerable to develop a substance abuse disorder if they use even small amounts of alcohol or other drugs. In the third model, Schuckit (1996) examined the relationship between lifelong alcoholism and anxiety disorders, and found anxious people believe they drink to relieve symptoms of nervousness or sadness. Regardless, there was insignificant evidence supporting the contention that depression or anxiety disorders are the usual cause of alcoholism. Researchers have concluded that high rates of comorbidity for anxiety and alcoholism may reflect a link between anxiety disorders and temporary substance-induced anxiety syndromes that are generally mild to moderate rather than severe (Schuckit & Hesselbrock, 1994). In the fourth and final model, bidirectional models have not been systematically examined. The bi-directional model proposes that having one disorder

increases the vulnerability to other disorders. Despite the fifteen years of research, and model formation, little is known about the etiology and temporal ordering of co-occurring disorders and for this reason researchers and clinicians should consider all disorders as primary and treat them as such (Ridgely, et al, 1987; Minkoff, 1991; Drake, McLaughlin et al., 1991; Osher and Kofoed, 1989).

Statement of the Problem

It was not until the early 1980s that a population of "young adult chronic patients" attempting to cope with mental illnesses and drug abuse disorders in their communities came to clinical researchers' attention (Drake & Wallach, 2000). In the late 1980s, social researchers began to investigate assessment and treatment approaches for persons with co-occurring disorders. During this time, observers realized administrative, financial, organizational and clinical barriers this population encountered when seeking services for both their mental health and drug abuse disorders.

Between 1986 -1990 Hospital and Community Psychiatry published a number of research articles on the growing numbers of homeless persons with mental illness (Roth & Bean, 1986: Morrissey & Levine, 1987), public concern about violence associated with mental illnesses (Fisher, 1988; Swanson, et al, 1990), incarcerations of persons with psychiatric disorders (Jamelka, et al, 1989; McFarland, et al, 1989), high utilization of services and costs for chronic mental illnesses (Surber, et al, 1987; Surles, & McGurrin, 1987), treatment non-compliance (Green, 1988; Corrigan, et al, 1990), and the risk of HIV infection in the seriously mental ill population (Cournos, et al, 1989: Lauer-Listhaus & Watterson, 1988). Surprisingly, there was no discussion on the interactions between problems nor was the role of substance abuse ever mentioned or explored.

It was not until the mid 1990's that researchers studied the links between substance abuse and mental health disorders. Literature and research began to address the necessity for public funds to combat substance abuse by persons receiving disability payments (Rosenheck, 1997), to examine the role of trauma in the lives of individuals with co-occurring disorders (Goodman, et al, 1997), and to better understand the relationship between co-occurring disorders and serious infectious diseases (Rosenberg,

2001). Such studies revealed the lack of a national healthcare infrastructure capable of prevention, diagnosis, and treatment of co-occurring disorders. Today researchers, practitioners and advocates are asking the question *"How do we develop a plan for an optimal system of care and connect the dots from the current system to the desired system?"*(Levin, Petrila, & Hennessy, 2004). In summary, consumers with co-occurring disorders are challenging our current delivery system, not only with their diverse service needs, public health concerns, high utilization and associated costs but moreover, forcing the treatment industry and governmental funding sources to identify and implement efficacious prevention and treatment strategies.

Significance of the Study

The purpose of the study is to address a significant void in knowledge on the heterogeneity of co-occurring disorders and the effect these differences have on treatment. The long-term objective of the research study is to identify subgroups within a targeted outpatient population based on their distinctiveness from one another toward the eventual goal of predicting utilization needs, outcomes and costs as well as matching consumer needs with appropriate treatment approaches. Although, many treatment programs claim to individualize interventions, most do not. The latter is most likely due to the scarcity of empirically-derived research, and the integration of research knowledge into practice. To effectively treat heterogeneous populations, researchers must identify empirically-derived homogeneous groups based on multiple determinants including, biological, behavioral, developmental, psychosocial, symptom severity and level of care needed. Subgroups identified in this research are not intended to depict classifications of consumers, rather; they display the universe of individual constellations with co-occurring disorders (Minkoff, 2001).

The overarching goal of this research is to identify homogenous subgroups with co-occurring disorders for the purpose of exploring existing managed care strategies to determine if such strategies could benefit the advancement of treating co-occurring disorders. Identification of subgroups will provide a mechanism to better understand the interrelationships between determinants that contribute to the etiology and problem

severity at an individual and group level. Secondly, in an effort to improve service delivery, empirically-derived subgroups hold important clinical implications for treatment models. In fact, the poor treatment outcomes consistently reported in literature for individuals with co-occurring disorders, may have more to do with the goodness of fit between the person and the treatment approach rather than the population itself. Studies, such as this, can provide a theoretical basis and background information from which to improve our understanding of how best to serve heterogeneous populations. Finally, the conceptual framework behind identifying mutually exclusive subgroups, like those found in managed care, are based on the premise that the level of resources necessary for delivering quality care is directly correlated with knowing and understanding the multiple domains of an illness or disorder.

Research Questions

The literature suggests that individuals with co-occurring disorders differ greatly in symptomology, problem severity, service utilization, and level of functioning. However, the heterogeneity of this population has not been explored based on their unobserved distinctiveness from one another. Thus, the present study is exploratory and is designed to answer questions relating to the heterogeneity of co-occurring disorders for the purpose of identifying homogeneous subgroups and the clinical utility of such groups on treatment planning. This study will provide possible answers to the following principle research questions:

1. Do homogenous subgroups exist in the sample of adult individuals entering an outpatient program for co-occurring disorders?
2. How many homogeneous subgroups exist?
3. How well does the model fit the data?
4. What are the size and nature of the homogeneous subgroups?
5. What are the psychosocial variables associated with subgroup membership?
6. If no subgroups exist, what other research attempts should be made to explore the heterogeneity of co-occurring disorders.

Study Limitations

The central limitation of the present study is the use of retrospective data that was collected and recorded for reasons other than for the present research objectives. One issue resides in the sampling distribution during the original grant. Intake staff determined, through appropriate assessment procedures, if an individual would be better served by a community-based program, a residential program or a community-based program with case management. The purposive sampling technique could have been biased by staff's decision on most appropriate locus of care. Such sampling bias in the original study could potentially effect the identification and number of subgroups by overrepresentation. The number of subgroups may be reduced because the sampling process may have inadvertently pre-determined homogeneous characteristics as part of program selection or assignment. Since the present study is examining the heterogeneity of a sample entering a community-based program, within group differences may be underrepresented. Such sampling errors may present a threat to the internal validity of the study and cause the sample not to be representative of the larger population. Thus, generalization of the findings for the present study cannot be assumed.

Another weakness of the current study is the researcher will not re-examine participant's co-occurring disorders to eliminate diagnostic uncertainty. Multiple diagnoses for an individual are a major concern among clinicians for the reason that symptoms seen in the early stages of psychotic disorders are often times unclear and result in misdiagnosis (Shaner, 1999). Shaner studied diagnostic uncertainty in a cohort of cocaine abusers with chronic psychosis. A baseline assessment of 165 males, presenting for re-hospitalization, was diagnosed as having co-occurring disorders. The same cohort was re-assessed 18 months later using the same measurement instruments. At the end of the study, researchers were able to make definitive diagnosis in only 25% (41) of the cases.

Diagnoses of co-occurring disorders are especially problematic when patients present for treatment with psychological symptoms and when asked about substance use, the patient often times under report their use. Literature suggests that abuse of stimulants and amphetamines can cause psychiatric symptoms that resemble schizophrenia among

patients without a history of psychosis (Satel, Southwick & Gawin, 1991; Sherer, 1988). Because co-occurring disorders can cause a wide range of psychosocial symptoms, the clinician may misdiagnose a consumer with either a false positive or a false negative diagnosis of schizophrenia. Misdiagnosis leads to mistreatment, inappropriately prolonged use of antipsychotic medication or a failure to prescribe necessary medication (Shaner, Roberts, Eckman, Racenstein, Tucker, Tsuang, & Mintz, 1998). Uncertainty of diagnosis may be a contributing factor as to why many of consumers are non-compliant with treatment and medication programs. For the current study, a high rate of misdiagnosis among the sample population could seriously render the results unreliable if strict protocols are not adhered to during the initial clinical assessment.

Definition of Terms

Co-occurring Disorders/Dual Diagnosis

In the mid 1980's there was an increase and attention to individuals reporting the co-occurrence of a mental health and alcohol or drug problem (SAMHSA). The term co-occurring disorders have been referred to over the years as, mentally ill chemically addicted (MICA); chemically abusing mentally ill (CAMI); mentally ill substance abuser (MISA); substance abusing mentally ill (SAMI); mentally ill chemically dependent (MICD); co-occurring addictive and mental disorders (COAMD); individuals with co-occurring psychiatric and substance disorders (ICOPSD); addiction and co-occurring disorders (ACD); dually disordered and dually diagnosed. Recent literature utilizes the term dual diagnosis most frequently. However, Drake and Wallach (2000a), argue that this term is an "unfortunate misnomer" and the term tends to overlook the board range of psychosocial issues associated with "multiple interacting disorders and disadvantages." Throughout the paper, co-occurring disorders will be defined in accordance with Substance Abuse and Mental Health Service Administration's (SAMHSA) revised Treatment Protocol (TIP). According to SAMHSA, people with co-occurring disorders are.

> *"individuals who have at least one mental disorder as well as an alcohol or drug use disorder. While these disorders may interact differently in*

any one person (e.g., an episode of depression may trigger a relapse into alcohol abuse, or cocaine use may exacerbate schizophrenic symptoms), at least one disorder of each type can be diagnosed independently of the other.

Co-occurring disorders vary between individuals depending on the severity, chronicity and degree of impairment in functioning (CSAT, 1994). There is no single combination of substance abuse and mental health that constitutes co-occurring disorders but rather a wide variability of disorders and symptoms that are commonplace in this population.

Consumer versus Client/Patient

Terminology is diverse when referring to users of mental health services and is largely contextually determined. Historically, sociologists have had concern with professional-client relationships, particularly the doctor-consumer relationship (Freidson, 1961; Bloom, 1963; and Wilson, 1963). Bloom (1963) and Wilson (1963) suggest the consumer-professional relationship is constructed on the assumption that patients take on a passive role and are denied the power and freedom to participate in treatment decisions. In a recent study conducted by Sharma, Whitney, Kazarian, and Manchanda (2000), proponents of the patient paradigm, considered the term to appropriately imply the need for psychiatric services or medical care. These same proponents prefer the term patient rather than client or consumer because such terms imply human interaction in a business context rather than a healing context. Whereas, opponents argue the term patient, implies stigmas associated with sickness, disabilities, authoritarianism, and paternalism (Sharma, 2000).

A 1994 U.S. study of preferred terms for users of mental health services revealed a growing tendency of replacing the term patient with client (Sharma, et al. 2000). Proponents of the client paradigm suggest the term connotes a less passive, more collaborative relationship between service providers and service users. Over the last five years the term client has been replaced by consumer in funding arenas, such as SAMHSA, for co-occurring disorders. As well, under the paradigm of managed care, the term consumer is used most often when describing the various populations seeking

mental health and substance abuse treatment For the purpose of this paper, the term consumer will be used in place of client or patient in support of moving client-practitioner relationships to consumer-provider social relationships that accelerate the ombudsman format to mediate differences between consumers (purchasers of services) and service providers (health care professionals).

Managed Care

Managed care is an overarching concept that combines methods of organizing health care service delivery and reimbursement. A common business strategy in managed care is to maximize outcomes at the lowest possible cost. The term managed care holds multiple meanings to different audiences. The American Medical Association (AMA)defines managed care as "those processes or techniques used by any entity that delivers, administers and/or assumes risk for health care services in order to control or influence the quality, accessibility, utilization or costs and prices or outcomes of such services provided to a defined enrollee population" (Bazelon Center, 2000). The Health Insurance Association of America defines managed care as "systems that integrate the financing and delivery of appropriate health care services to covered individuals through the use of four elements: arrangements with selected providers to furnish a defined set of health care services to members; explicit standards for choosing those providers; formal programs for ongoing quality assurance and utilization review; and significant financial incentives for members to use the plan's providers and procedures" (Bazelon Center, 2000).

Acute Care

The American Medical Association (AMA) defines the term acute care as a pattern of health care in which a consumer is treated for an acute (immediate and severe) episode of illness, for the subsequent treatment of injuries related to an accident or other trauma, or during recovery from surgery (Bazelon Center, 2000). Specialized personnel using complex and sophisticated technical equipment and materials usually give acute

care in a hospital. Unlike chronic care, acute care is often necessary for only a short time (Kongstvedt, 1996).

Burden of Illness

The burden of illness refers to the total consequences associated with an illness or disorder across all stakeholders. Wells, Miranda, and Gonzalez (2002) defines stakeholders as consumers and their families, health care providers, payers and society and defines consequences as reduced health status, quality of life, costs of care, and social consequences. The American Medical Association (AMA) suggest the term burden of illness typically includes: incidence and prevalence of the disease by severity; impact of the disease on clinical and other health outcomes, including quality of life, functional status, and productivity; impact of the disease on medical resource utilization and cost; and other individual, family, and societal impacts.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Over the past 20 years researchers and health care practitioners have come to realize, in addition to high prevalence rates, individuals with co-occurring disorders did not represent a homogeneous group. Treatment offered to one consumer would not necessarily be appropriate for another consumer. As the concept of dual diagnoses evolved, treatment facilities began to understand the need to re-address existing treatment programs that had been traditionally separated between substance abuse and mental health services. In the late 1980's the National Institute for Mental Health (NIMH) recommended that all co-occurring disorders be treated concurrently. As a result, initially, three treatment approaches were identified and implemented: sequential, parallel and integrated model of treatment.

With the growth of managed care and its cost containment philosophy, integrated treatment programs were seen as a way, in the 1990's, to hold down rising healthcare cost and improve the quality of care associated with mental health and substance abuse treatment services. Despite original efforts to improve quality of care and reduce cost, managed care gained a reputation for managing costs and benefits rather than patient care (Robinson, et al. 2004). In the following sections, there will be a discussion on the emergence and impact of managed care on substance abuse and mental health systems.

As managed care becomes a permanent part of social service delivery landscape in the United States, social researchers and clinicians must place a greater emphasis on chronic behavioral care versus acute care models (Berkman, 1996; Keigher, 1995; Rosenberg, 1998; Rosenberg & Holden, 1997). Furthermore, by thoroughly understanding the limitations and benefits of managed care, the more likely managed care initiatives will not become yet another problem in providing care for co-occurring disorders. When considering new treatment modalities for co-occurring disorders within a behavioral health system, it is beneficial to compare similar populations and their treatment under existing managed care programs. Three overarching managed care

strategies, used in three predictive models, will be explored for clinical utility in treating co-occurring disorders.

It is essential to consider the heterogeneity of co-occurring disorders when considering new treatment modalities. Thus, it becomes pivotal to identify these differences for treatment approaches and goals. Research shows that heterogeneity of treatment populations can be reduced through empirically-derived homogeneous groups based on multivariate analysis.

Treatment Modalities for Co-Occurring Disorders

During the past two decades, the challenge has been providing effective treatment to individuals with co-occurring psychiatric and substance disorders. From an economic perspective this consumer group has significantly higher overall health and societal costs than those with a single disorder (Hoff & Rosenheck, 1998; 1999). From a health care provider viewpoint, dually diagnosed consumers present a unique challenge for clinical staff and administrators because they are generally experienced as "system misfits" at every level of the service system (Minkoff, 2003). Minkoff suggests that clinicians and administrators contort individuals with co-occurring disorders to fit traditional interventions, as well as contorting their skills to treat consumers either as a mental health or substance abuse clinician but not both. Substance Abuse and Mental Health Service Administration (SAMHSA) identified variations in treatment models and approaches unnecessarily create barriers to recovery and required consumers to navigate through a complicated and often contradictory treatment system.

This following section will examine the long tradition of separate mental health and substance abuse systems and how these two systems have failed in providing a comprehensive treatment approach. However, an increasing number of evidence-based interventions and programs have demonstrated the efficacy of an integrated treatment approach that combines methods and skills derived from both psychiatric and addiction treatment practices to treat co-occurring disorders in a single setting, with a single staff (Drake, et al 1997; Ho et al. 1999; Minkoff 1989; Osher, 1996).

Sequential Treatment Approach

Historically, the first treatment approach for this complex population was considered sequential. Consumers were treated by one system (addiction or mental illness) and then the other, depending upon prioritization of disorders. Consumers enrolled in this treatment approach frequently received conflicting therapeutic messages from separate systems. Compounding this system fragmentation, consumers were likely to bounce back and forth between mental health and substance abuse service systems all the while increasing their risk for other serious medical problems, suicide, criminalization, unemployment, homelessness, and separation from families and communities. Additionally, differences in insurance coverage and in funding mechanisms between the two systems continued to fuel system disconnect (Minkoff, 2000).

Parallel Treatment Approach

The second treatment model and the standard of treatment for decades, for co-occurring disorders, is a simultaneous (parallel) treatment approach providing consumers with both mental health and addiction treatment. The consumer receives separate mental health and substance abuse services from two separate agencies. Typically, parallel treatment does not provide coordination of care between the two systems and inevitably burdens the consumer to navigate themselves through non-responsive and fragmented systems (Drake, et al, 1996). SAMHSA's Report to Congress (2000) found that providers of parallel care often proposed activities or goals that contradicted or were incompatible with those of the other. Other treatment problems cited by the SAMHSA report were the contraindications associated with two very different pharmacological treatment philosophies.

Research Literature Review

Both sequential and parallel treatment models have serious limitations for optimal treatment for co-occurring disorders, compounded by low program retention rates (Drake, et al, 1996). Ries (1993) points out the chief concerns with sequential and parallel treatment approaches are that they promote fragmentation of services and failures of

referral and coordination of care. Early research on the course of co-occurring disorders, consumers receiving traditional sequential and parallel services showed increased rates of hospitalizations over a 1 year period for psychiatric symptoms (Drake, et al, 1989; Osher et al. 1994). Longitudinal research on the earlier treatment approaches indicated a very slow rate of recovery, with usually less than 5 percent becoming abstinent each year (Mueser, et al. 1997).

Integrated Treatment Approach

As a result of the service gaps, poor outcomes, and redundancy in treating co-occurring disorders, administrators, clinicians, researchers, and consumers realized the need for an integrated care system where mental health and substance abuse treatment are provided by the same clinician or group of clinicians (Drake, et al. 1995; Mueser, et al. 1997). SAMHSA (2000) currently endorses an integrated treatment model for co-occurring disorders that provides a unified and comprehensive treatment program for the consumer. Both disorders are treated as primary and consumers receive simultaneous treatment under one roof. All services are typically provided through a multidisciplinary team that has received specialized training in co-occurring disorders. An integrated treatment approach alleviates consumer's responsibility for coordinating their own care and transfers that responsibility back to the professionals.

Critical components of an integrated program have been outlined (Minkoff, 1991; Drake, et al, 2001) and include staged interventions; assertive outreach, motivational interventions; simultaneous interventions; risk reduction; tailored mental health treatment; tailored substance abuse treatment; counseling; social support interventions; comprehensiveness; a long-term perspective of remission and recovery; and cultural sensitivity and competence. Ideally, integrated programs combine and build upon existing programs wherever possible. Despite, federal and local government awareness, many communities lack the range of services, specialized staffing resources and funding to offer a continuum of care approach which is embedded in an integrated treatment approach.

Research Literature Review

Integrated treatments are touted as being more effective than parallel or sequential mental health and substance abuse treatments delivered in separate settings or by separate programs (Drake, 2001), and by contrast, evidence continues to demonstrate that individuals who receive non-integrated services have poorer outcomes (Hoff, 1999). In the 2002 Report to Congress, integrated treatment was said to be successful in reducing substance abuse disorders, and symptoms of mental disorders (pg. 6). Prior to the Report to Congress (2002), Drake and colleagues (1998) studied the effectiveness of integrated treatment by reviewing 36 research studies. In determining the "comprehensiveness" of the programs each had to have at least three of the aforementioned components. A cross section of the 36 studies conducted by Drake and colleagues has been chosen for further review and discussion.

Between 1993 and 1997, five pretest-posttest open trails with follow-up intervals ranging from 18 months to seven years reported variable improvement in rates of hospitalization and severity of substance use (Durrel, et al, 1993; Meisler, et al, 1997; Drake, et al, 1993; Bartels, et al, 1996; Godley, et al, 1994). Durrel and colleagues (1993) reported 66 percent of their chronically mental ill participants had significantly reduced their substance use at 18 months. The other studies reported that 41 to 61 percent of their subjects had reduction in their substance use. Mueser's (1997) study also stressed an improvement in housing outcomes. In the pilot study executed by Drake, et al (1993), 18 schizophrenic outpatients' diagnosed with alcohol dependency achieved a stable remission from alcoholism (61.1%) with a mean duration of remission at 26.5 months. Godley and associates ((1994) demonstrated a reduction in substance use and hospitalizations.

Two quasi-experimental studies compared integrated treatment with non-integrated treatment (Drake, et al, 1997; Drake, Mercer-McFadden, et al, 1998) outcomes. Data for outcomes were taken from an 18-month follow-up interview for 158 homeless, seriously mentally ill addicted subjects and compared with those of 59 similar subjects receiving parallel treatment services. The integrated treatment group spent significantly more days in a stable housing arrangement and less time in an institutional

setting than those in the parallel treatment. Additionally, those in the integrated program achieved significantly greater improvement in alcohol abuse at follow-up than those in the parallel group.

Other studies comparing integrated treatment with other forms of treatment for co-occurring disorders generally support the proposition that integrated treatment has a positive effect on individuals across a number of different types of outcome measures (e.g., substance abuse, psychopathology and general functioning) (Drake et al., 1998, Jerrell & Ridgely 1995a; Carroll & McGinley 1998; French et al., 1999; Jerrell & Ridgely, 1995b; Barrowclough et al., 2001). The majority of studies on integrated treatment have been directed toward outpatient subjects, with positive, outcomes (Barrowclough, et al, 2001; Carmichael, et al, 1998; Drake, et al, 1998; Drake, et al, 1997; Godley, et al, 1994; Jerrell & Ridgley, 1995). However, only a few of these studies have found statistically significant effects (Greenberg, 2002). Mueser (1997) suggest many of these studies have provided a reason for "cautious optimism" in part due to small samples and the fact that most of the participants were homeless (RachBeisel, 1999).

Two randomized controlled trials have recently demonstrated that an integrated treatment approach was effective in producing positive benefits on a number of outcomes (Haddock, Barrowclough, Moring, Tarrier, & Lewis, 2002; Bartels, Coakley, Zubritsky, Ware, Miles, Arean, Chen, Oslin, Liorente, Costantino, Quijano, McIntyre, Linkins, Oxamn, Maxwell, & Levoff, 2004). In the multisite randomized trail, researchers sought to determine if integrated treatment improved program engagement compared to an enhanced referral service to mental health/substance abuse service providers by a primary care physician (Bartels, et al. 2004). Results indicated 71% of consumers in the integrated model remained engaged in services compared to 49% in the enhanced referral model. Overall results suggest that integrated service arrangements improve engagement and access to mental health and substance abuse services when compared to an enhance referral program.

Despite the support that integrated treatment is the method of choice for intervention of co-occurring disorders, according to SAMHSA (2003) there is a lack of

strong evidence for which kinds of integrated interventions work the best. Furthermore, with the advent of managed care and its focus on cost-containment and quality, few managed care initiatives have been implemented to standardize integrated programmatic interventions or cost structures to address poor clinical outcomes and rising health care cost associated with co-occurring disorders (Minkoff & Regner, 1999).

The Emergence of MBHOs

Managed health care is a nebulous concept which in theory represents a system of health care delivery that attempts to manage the cost of health care, the quality of that health care, and access to that care. SAMHSA touts managed care as an opportunity to solve many of the problems of co-occurring disorders by examining its common administrative structure such as non-categorical funding, clinical review of treatment plans based on a criteria which defines appropriate care, improved access to public services, performance standards, and data collection and dissemination, (Ridgely, 1997). Due partially to managed care local, state, and federal governments are discussing parity of benefits and the need to promote collaboration between funding streams and healthcare providers.

To better manage cost and quality, managed care organizations (MCO's) created a bifurcated delivery system by separating physical health from behavioral health through the use of specialized provider contracts. These specialize contracts, also known as carve outs, had mixed results. Under the new framework, mental health and substance abuse providers formed managed behavioral health organizations (MBHO's). The new MBHO's reimbursement structures were based on risk-sharing contracts as opposed to fee-for-service models seen prior to manage care. As MBHO's evolved, financial incentives through risk sharing contracts shifted the risk of health care cost to the MBHO, creating the incentive to reduce cost by aggressively managing care (Sturn & Roland, 1999). However, many of these providers and the healthcare industry at large were unprepared for the major clinical, economic and systems impact from this population. Consumers with co-occurring disorders had higher rates of relapse; rehospitalization; poor program retention; high emergency room visits; noncompliance with treatment and

medications; increased criminal behavior; homelessness; and decreasing daily functioning capabilities. Another growing concern with the separation between physical health and behavioral health systems is that behavioral health care systems continue to function under an acute care model used by physical health systems. This point will be discussed in greater detail throughout the paper.

The Impact of MBHOs on Service Delivery

A critical concern with placing MBHO's at risk, when individuals with complex clinical needs are enrolled in programs designed on acute models of care, is the provider often times had to reduce cost by eliminating services or staffing resources (Robinson, et al. 2004). A study assessing the impact of behavioral managed care from 1988 to 1998, found a disproportionate decline in behavioral health benefits (54.7%) when compared to physical healthcare benefits (11.5%)(Hay Group, 1999). In the same report, the Hay Group found MBHO's imposing limitations on inpatient psychiatric care and annual visit limits on outpatient care. In another study of residential substance abuse programs, the researchers found a decline in number of days in treatment per episode down from 32.1 days in 1988 to 22.5 in 2001, while the average number of annual inpatient admissions rose from 834.7 in 1988 to over 1,033 in 2001 (McMaster, Holleran, Chantus & Kostyk, 2005). The results of a 2002 national survey of substance abuse treatment services that offered programs for co-occurring disorders, determined there was a slight increase in services, if at all, from 1997 (48%) to 2002 (49%) (McFarland & Garbiel, 2004). The impact of declining benefits and governmental funding has raised concern that services may be reduced below desirable levels of care.

MBHOs in the Public Sector

With the emergence of public managed care for mental health and substance abuse treatment programs, states are being challenged to stretch scarce public funds. Unlike the private sector, public mental health and substance abuse funding is disproportionate when compared to public expenditures for the same treatment. Public sector services receive government funding that tends to target sub-populations (mental

illness or substance abuse), making it difficult for community programs to serve a broader and more diverse population. As a result local community service providers are forced to accept categorical funding targeted for specific individuals or for a specific type of treatment. As public payers struggle with diminishing budgets, quality of care is jeopardized for public consumers, who are relatively powerless to voice their concerns or influence policy or funding decisions.

Managed care initiatives have been adopted by some states' largely in response to scarce resources and the high prevalence rate of co-occurring disorders among Medicaid and Supplemental Security Income (SSI) beneficiaries (Bachman, et al. 2004). As a result, the population reporting comorbidity seeking public sector services is significantly greater than the population served by private plans. Furthermore, most public programs are designed around an acute care model, and are not organized to respond to co-occurring disorders. The public mental health system tends to treat individuals with severe and chronic mental health such as schizophrenia, bipolar disorders, major depression, and borderline personalities (Bazelon, 2000). Typically, the system is unable to address substance abuse issues that are concurrent with the individual's mental health status. On the other hand, substance abuse treatment systems are equally unprepared to respond appropriately to mood, anxiety or personality disorders.

Managed Care Initiatives for Co-occurring Disorders

In 1995, SAMHSA sponsored the Managed Care Initiative project by creating a policy and research panel of national experts, consumers, and advocacy members responsible for conducting a literature review. The panel was accountable for developing an annotated bibliography (Managed Care Initiative Panel, 1997) of all published and unpublished material relating to co-occurring treatment. In 1998, the panel reported there were no standards of care for treating co-occurring disorders in any healthcare system.

In 2000 Congress called upon SAMHSA and the Department of Health and Human Services (DHHS) to prepare a report outlining the scope of the issues surrounding the prevalence and treatment of co-occurring disorders. SAMHSA developed a National Advisory Council Subcommittee on Co-occurring Disorders consisting of content

experts: State mental health and substance abuse authorities, researchers, and advocates to offer research, data, and editorial comments. Additional guidance and opinions were solicited from experts in related fields, including homelessness, housing, criminal justice, social services, education, aging, primary care, public and private hospitals, and health plans. The end result was a "Blueprint for Action" addressing co-occurring disorders and all the attendant issues and barriers to access.

As new knowledge surfaced about co-occurring disorders, leading experts denounced the notion there was a single correct intervention and it was MCO's (both private and public) responsibility to individualize treatment by discrete levels of care for each consumer (Minkoff, 2000). From this national discussion, SAMHSA has endorsed managed care initiatives advocating for integrated care, a focus on cost effectiveness and efficient utilization of scarce resources designed to improve the quality and outcome of care for co-occurring disorders (see Appendix B)

Overarching Strategies and Initiatives

Little research has been conducted on the impact of managed care on behavioral health services (Carlson, Gabriel, Deck, Laws, & Ambrosio, 2003) and less is known about the impact of managed care initiatives on co-occurring disorders (Bachman, Drainoni, & Tobias, 2004). Regardless, there is wide agreement among experts and policymakers that managed care initiatives will facilitate service integration and continuity of care (Minkoff, 1997). As managed care experienced higher utilization and cost from complex populations, it was forced to re-examine its acute care model based on episodic care. By shifting focus from a treatment approach that was driven by intensity of services (acute care); to a strategy rooted in continuity of care with a long term perspective towards individualized treatment has proven to be both cost effective and efficacious in primary healthcare settings.

The purpose of this section is threefold. First and most obviously, this section explores the utility and research literature of three overarching managed care strategies used to control and manage quality, service utilization and cost for chronic illnesses. Secondly, this section supports the notion that managed care strategies developed for

chronic illnesses in a primary care setting can be beneficial in treating co-occurring disorders. Lastly and least obvious, the section will begin to build on a new conceptual framework for how classifications or subgroups of co-occurring disorders can facilitate treatment planning. Studies conducted on the three different strategies were selected based on research designs that utilized predictive models that accounted for between-group differences rather than explicitly comparing one group to another. Such differences will be used later to discuss treatment implications for co-occurring disorders.

Adjusted Clinical Groups – ACGs

Currently, MCO's uses a series of mutually exclusive health status categories, for determining medical care plans and cost. The Johns Hopkins University of Hygiene and Public Health Center created these health status categories to examine the relationship between morbidity or burden of illness and health care services utilization among children in managed care settings. These health status categories are defined by morbidity (rate of incidence of disease), age, and gender and referred to in managed care as adjusted clinical groups (ACGs). ACGs are based on the premise that the level of resources necessary for delivering quality care to a given population is correlated with the illness burden (the rate in which an illness/disorder negatively affects multiple domains) of that population. Originally ACGs were designed to predict ambulatory care visits over a one-year period, but expanded to incorporate the prediction of total medical resources necessary over a specific period of time. MCO's have employed ACGs since the mid 1980's in predicting populations past and future health care utilization and cost. The conceptual framework behind ACGs is that the illness burden is a better predictor of needed health service resources than the presence of a specific disease or diagnosis (e. g., co-occurring disorders).

Research Literature Review

A recent study assessed the predictive accuracy of ACGs within Medicaid and poverty related populations in Mississippi, Georgia, and California. (Adams, Bronstein, & Raskind-Hood, 2002). The investigators utilized split-sample method to compare two

non-random groups (high cost versus located in urban poor areas) to assess the efficacy of ACGs predictive accuracy. Data for the analysis was taken from the states 1994 Medicaid enrollment and claims data for Georgia and Mississippi. All enrolled individuals were included in Georgia and Mississippi. Due to the large enrollment in California's Medi-Cal program, data were collected from seven rural and urban counties, representing approximately 58 percent of the state's enrollees. Individuals over the age of 65 were excluded since they are often excluded in States' Medicaid managed care programs. Data extracted from claim information included diagnosis, procedure codes, and medical expenditures. Findings indicated ACGs improved predictive accuracy for high cost conditions in all three states, but only improved predictive accuracy in Georgia's poorest urban areas. A limitation of the study was in part due to Mississippi's and California's high proportion of short term enrollees. Short term enrollees represent higher costs (Schwalbert, 1997) due to the lack of adequate information on health risks over a significant time period (Adams, et al. 2002).

Another study examined the validity and feasibility of applying ACGs to a veteran population (Greaney & Ciesco, 2000). The investigators concluded that ACGs significantly predicted the level of resources and cost necessary to treat a veteran population with high proportions of multiple medical and psychiatric comorbidities. In an earlier study conducted by Fowler & Anderson (1996), ACGs were responsible for increasing the ratio of payments (expected capitation expenditures) for 70 percent of Medicaid children with chronic health conditions.

Accounting for the illness burden of a population, health care providers are more likely to receive adequate payment for recipients of public managed care, and public health consumers are more likely to receive the wrap-around, comprehensive care they need. Replicating strategies associated with ACGs would enable public managed behavioral care systems to prospectively identify and co-ordinate care for consumers with multi-dimensional health care needs

Disease Management

Chronic co-occurring disorders often resemble the course and pattern of chronic physical conditions, such as diabetes, coronary heart disease, asthma, or arthritis (Boyle, White, Loveland, Godley, Corrigan, and Hagen, 2000; Cousins & Liu, 2003). Managed care has addressed long term care for chronic physical conditions through the application of disease management. The Disease Management Association of America (DMAA) defines disease management as a "system of coordinated health care interventions and communications for populations with conditions in which consumers self-care efforts are significant." As we will learn later, self-care and motivation to change are key principles in treating co-occurring disorders. Key treatment principles of disease management are the use of multidisciplinary teams over a long history of care involving consumers and their families (Boyle, 2000). Many of these concepts are represented in recent managed care initiatives for treating co-occurring disorders (see Appendix B).

Research Literature Review

Despite the growing recognition and acceptance of the disease management concept in primary health care settings, behavioral health care is prone to use an acute medical model paradigm to treat chronic co-occurring disorders (Boyle, et al. 2000). In 1996, nearly 54 percent ($42.7 of $79.3 billion) of national expenditures for behavioral health care were spent on short-term inpatient treatment, residential treatment, medical acute care treatment, or nursing home care (Mark, et al. 1998). Acute care models exemplify short-term treatment approaches responsible for under treatment of co-occurring disorders that often exacerbate symptoms, and perpetuates fragmented treatment (Minkoff, 2000).

Disease management programs have shown success in the management of chronic conditions characterized by a high prevalence and expense factor, and the significant role that a consumer's behavior can have on the progression of the condition (Cousins & Lui, 2003). A three-year study to assess the impact of a disease management program on 214 participants concluded the program improved functional status and presented an 85

percent decrease in hospital admission rates compared to a control group (Fonarow, et al. 1997).

In another research, Leveille, et al. (1998) conducted a randomized study to evaluate a 1-year, senior center-based chronic illness self-management and disability prevention program on health, functioning, and health care utilization with the intent to reduce disability risks and improve self-management of chronic illness in frail older people. The trail was in collaboration with two large MCO's. Chronically ill adult seniors (N=201) aged 70 and older were recruited. Results indicate the intervention group showed fewer declines in function, as measured by disability days and lower self-reported scores on a health assessment questionnaire. Reported hospitalizations decreased by 38 percent for the participants enrolled in the program and rose by 69 percent of those in the control group. The total number of inpatient hospital days during program enrollment was significantly less in the intervention group compared with the control group (total days = 33 vs. 116, P = .049). Participants enrolled in the program showed significantly higher levels of physical activity and senior center participation and significant reductions in the use of psychoactive medications.

In a similar study conducted by Lorig et al. (2001), 613 consumers were recruited from various Kaiser Permanente hospitals and clinics to participate in a disease self-management program. Main outcome measures included health behavior, self-efficacy (confidence in ability to deal with health problems), health status, and health care utilization, assessed at baseline and at 12 months by self-administered questionnaires. At 1 year, the program reported statistically significant improvements in health behaviors, self-efficacy, and health status and reported fewer emergency room visits than the control group.

Disease management has shown promise in improving outcomes in a number of medical disorders, but this approach has received limited research in substance dependent individuals (McKay, Lynch, Shepard, Pettinati, 2005) and no such research has yet to be conducted on co-occurring disorders (Cousins, 2004). In spite of the evidence of chronicity, due to high relapse rates associated, with co-occurring disorders, most substance abuse programs are characterized by serial episodes of acute treatment with

aftercare programs limited to passive referrals to self help groups (Dennis, Scott, and Funk, 2003). Substance abuse aftercare treatments and subsequent studies have focused on step down programs as forms of continuing care and have not focused on post-discharge recovery management with the intent of monitoring self-care and early re-intervention (Dennis, 2005).

Consumer-Treatment Matching

Minkoff (2003) emphasizes the need to adopt disease management strategies for individuals with co-occurring disorders. Strategies discussed in disease management such as multidisciplinary teams, self-management and long-term care perspective, and ACG's mutually exclusive health status categories, will assist in the development of practice guidelines that facilitate clinicians in appropriately matching consumer to treatment plans. With the arrival of managed care, clinicians, social workers, health care providers and medical care administrators are focused on the most cost-effective treatment approaches. A proven cost effective approach is matching consumer characteristics to a treatment approach (Gastfriend & McLellan, 1997; Hser, et al, 1999; Longabaugh, et al, 1994; Thronton, et al, 1998). For nearly two decades researchers have studied consumer-treatment matching in order to identify factors that promote optimal treatment outcomes ((Gastfriend & McLellan, 1997; McLellan, et al. 1983). These same researchers have identified two major placement strategies that have been routinely used: (1) match consumers to treatment modality, or (2) match consumers to level of care.

Research Literature Review

As researchers and clinicians continue their quest for predictive utility of treatment approaches, we must consider the findings of Project MATCH (1996). Project MATCH was a multisite, randomized clinical trail that randomly assigned participants to one of three treatment settings; (1)Cognitive Behavioral Coping Skills Therapy (CBT), (2) Motivational Enhancement Therapy (MET), and (3) 12-Step Facilitation Therapy (SFT) for the purpose of determining whether patient-treatment matching improves outcomes. The original Project MATCH research group conducted two parallel but

independent clinical trials in three separate treatment settings (outpatient, aftercare and following a 3 month residential or day hospital treatment program). Subjects in all three settings demonstrated a decrease in frequency and volume of drinking (Project MATCH, 1998). The Project MATCH research group reported few clinically significant outcome differences among the three treatments in either the outpatient or aftercare program (1998). Contrary to prediction, findings were essentially negative with regard to patient-treatment matching (Glaser, 1999). However, findings did suggest psychiatric severity should be considered when assigning consumers to outpatient therapies (Project MATCH, 1998).

Subsequent analyses of the original Project MATCH assessed the benefit of matching alcohol dependent consumers to the same three treatment approaches and research design in the original Project MATCH. Outcome measures were percentage of days abstinent and drinks per day. Findings demonstrated significant posttreatment attributes by treatment interactions: (1) consumers rating high on anger and treated in MET had better post-treatment drinking than in CBT; (2) aftercare clients high in alcohol dependence had better post-treatment outcomes in TSF; low dependence consumers did better in CBT.

The results of the three year Project MATCH follow-up studied 952 consumers in a multisite clinical trial designed to test a priori consumer treatment matching hypotheses, that anger and dependence should be considered when assigning consumers to treatment. As predicted, consumers high in anger had better outcomes in MET than in CBT or SFT. Consumers high in anger treated in MET fared better on average abstinent days (76.4%), whereas their counterparts in CBT and SFT had on average less abstinent days (66%). Conversely, consumers rating low on anger fared better after treatment in CBT and TSF than in MET. In addition, reduction of drinking observed in year one post-treatment was sustained over a 3-year period.

Despite, the failure to find many significant matches between client characteristics and types of treatment settings, Project MATCH made a significant contribution to the way social researchers explain null results (Stockwell, 1999). Even though the general hypothesis that matching would improve treatment outcomes was not

confirmed, Project MATCH did reveal subtle matching effects that could have been lost in the main effect of treatment across all types of consumers (Stockwell, 1999). With this in mind, it is important to compare patient-treatment matching strategies to other areas of health and social care. Broader outcome measures with a research focus on patient-treatment interaction effects rather than on treatment or patient main effects could improve the efficacy and effectiveness of service delivery (Godfrey, 1999).

A recent study evaluated a patient-treatment matching strategy for co-occurring disorders with the intent to examine whether or not matching resulted in better treatment outcomes at discharge and at a four-month follow-up (Timko & Sempel, 2004). The researchers hypothesized that patients' with severe co-occurring disorders would have better treatment outcomes in service-intense hospital-based residential programs, compared to those patients with less severe disorders receiving community-based residential services. A sample of 230 veterans received a 10-point severity rating initial assessment used for treatment planning and program referral. Participants were randomly assigned to one of four treatment groups based on symptom severity: high-severity/high intensity (n=63) or high-severity/low intensity (n=35), and moderate-severity/high intensity (n=47) or moderate-severity/low intensity (n=85). As predicted, matched patients had better overall outcomes than mismatched patients. High-severity participants in high-intensity programs had better outcomes than did high-severity patients in low-intensity programs. Moderate-severity patients showed comparable outcomes between the high and low intensity programs.

The Heterogeneity of Co-occurring Disorders

Despite the extensive attention and documentation of this phenomenon and how best to provide treatment for this population, most research has treated persons with co-occurring disorders as a homogeneous population, while most clinicians continue to treat this population under traditional treatment approaches. Services are being provided on a "one size fits all" basis, ignoring the heterogeneity of individual's with co-occurring disorders (SAMHSA, 2000). Yet, there is a growing consensus among researchers that the etiology for co-occurring disorders is best conceptualized in terms of multiple

determinants including biological, behavioral, developmental, and psychosocial factors (Hester & Miller, 1986). Several inpatient program studies have attempted to differentiate consumers with co-occurring disorders by assigning them to different diagnostic subgroups based on patterns of service use (Kessler, et al. 1999), by defining their main substance of misuse (Miles, et al. 2003), by defining their functional abilities (Luke, et al. 1996), and by defining substance abuse as a primary disorder compared to those with psychoactive substance abuse disorder-induced organic mental disorders (PSUD-induced-OMD) (Lehman, et al. 1994b).

The aforementioned studies illustrate the variance in determinants researched, but have failed to address how these determinants interact and which ones are the most meaningful for treatment planning. Another disadvantage of current research designs are the arbitrary groupings of determinants on some other basis, rather than on direct empirical findings, such as investigator judgment or prior established classification systems. By assigning individuals to arbitrarily designed subgroups, one must question the usefulness and meaningfulness of predetermined subgroups (Borgen, Barnett, 1987). New research in the field of co-occurring disorders should seek structure through subgroup (clustering) exploration versus confirmatory analysis. Once subgroups are empirically defined, researchers need to replicate the study in similar data sets to confirm the viability of the subgroups. When subgroups are empirically defined and replicated, researchers and clinicians can begin to explore antecedents and outcomes associated with homogenous subgroups with the intent to develop evidence-based programs. Cluster analysis is an effective methodology to examine the prevalence of different types of cases or subgroups present in a complex data set.

Co-occurring Disorder Subgroups

The literature review, thus far, has discussed different strategies employed by managed care to assess and treat a population with varying degrees of illnesses (e.g. adjusted clinical groups, disease management, and consumer-treatment matching) and how the “burden of illness” is a better predictor of needed health resources than the presence of a specific disease or disorder. Although, there is no empirical evidence

supporting treatment matching for consumers with co-occurring disorders, there is reason to expect it will prove beneficial and equally useful as found in the MATCH Project (Luke, 1995). The remainder of the paper will explore conceptual frameworks attempting to define and classify co-occurring subgroups, as well as discuss applicable and available literature related to subgroups of individuals with co-occurring disorders. The following teams of researchers and future research identifying subgroups stands to promote additional understanding of the interaction of illness severity, psychosocial factors, and treatment outcomes for co-occurring disorders.

Ries & Miller's (1993)

The identification of subtypes is helpful for determining treatment matching paradigms to consumers' level of care (Ries & Miller, 1993). In a conceptual paper, Ries and Miller (1993) proposed a four-cell model classifying consumers on the basis of an independent assessment of severity in each the mental health and substance abuse domains. The researchers developed the following diagnostic sub-groups: (a) Type I-High-severity psychiatric/high-severity substance; (b) Type II-High severity psychiatric/low severity substance; (c) Type III-Low severity psychiatric/low severity substance; and (d) Type IV-Low severity psychiatric/high severity substance. Ries and Miller have failed to provide empirically validated evidence to support their framework. Their results were later supported by the MATCH Project that discovered useful matching effects and encouraged researchers to focus on patient-treatment interactions effects as well as treatment or patient main effects.

NASMHPD & NASADAD Model (1999)

In 1998, the National Association of State Mental Health Program Directors (NSAMHPD) and the National Association of State Alcohol and Drug Abuse Directors (NASADAD), under the support of SAMHSA, created a task force to explore service barriers to effective treatment for persons with co-occurring disorders. The task force adopted and expanded on New York State Office of Mental Health and the New York State Office of Substance Abuse Services conceptual framework for considering the

needs of the individuals with co-occurring disorders as well as system needs. New York adopted and modified Ries and Miller's (1993) conceptual framework that considers the level of service coordination necessary based on the nature and severity of the individual's disorders.

The underlying assumption of the revised NASMHPD & NASADAD model is that people with co-occurring disorders have varying degrees of service needs. Furthermore, the model moves consumers from consultation (Quadrant I), through collaboration (Quadrant II), to integrated care (Quadrant III), to those with the most severe need (Quadrant IV) (See Figure B.2). The model provides a mechanism in addressing symptom severity and level of care on a continuum from less severe to more severe disorders. The model is not intended to depict classification of consumers; rather, it displays the universe of individuals with co-occurring disorders (Minkoff, 2001; NASMPHD & NASADAD, 1999). As of today, the model has no empirical evidence to support its assumptions.

Lehman's Categorical Framework (1994)

Lehman et al, (1994) developed a categorical framework for delineating the heterogeneity among consumers with co-occurring disorders. The framework is a typology of subgroups defined by whether consumers are singly or dually diagnosed and whether their disorders are current or past. As seen in the other two conceptual models, Leman's framework also presents consumers at varying degrees of comorbid psychiatric and substance abuse disorders. As a result, there were ten possible subgroups and three mutually exclusive diagnosis subgroups (see Appendix D).

Based on a self report questionnaire, the consumer was assigned to one of the 10 subgroups. Groups 7 through 10 were not considered in the final analysis or discussion due to the lack of representation. In comparing the six subgroups, the only difference in their demographics (age, gender, race and martial status) was gender. The subgroups with current substance abuse disorders (group 1, 2, 3 & 6) had a higher percentage of men. Comparing psychiatric disorders among the groups found that approximately one-third of each group (1-6) had a diagnosis of schizophrenia or schizo-affective disorders, and

slightly over half had major affective disorders, about equally split between unipolar and bipolar disorders. Alcohol was the most commonly used drug reported for all groups. However there was a significant difference in usage patterns. Group 3 (substance induced organic; current) had similar usage patterns as those in group 6 (substance abuse disorder, only). The most interesting finding of the study was the further identification of three cluster groups in which all the subjects would fit (see Appendix E).

Lehman's framework emphasizes the need to adopt a systematic approach for classifying subgroups within the context of co-occurring disorders. Like that of the MATCH Project, classifications contribute to the development of more effective treatments and services. This iterative process linking classification and treatment outcomes may in turn influence better systems of classification, thereby advancing treatment approaches. Classification systems encourage treatment planning and professional communication and discourage artificially constrained associations (Lehman, Myers, & Corty 2000).

Luke's Cluster Analysis (1996)

As stated earlier, co-occurring disorders is not a unitary construct but rather a disease concept that includes a wide variety of types of consumers with different histories of mental illness and substance use (Luke, 1996). Luke demonstrated the utility of analyzing the heterogeneity of a co-occurring inpatient population by examining the scores on an Addiction Severity Index (ASI). Seven scores (medical, employment, alcohol, drug, legal, family, and psychiatric functioning) on the ASI were used to group patients into seven homogeneous subgroups (best functioning, unhealthy alcohol use, functioning alcohol abuse, drug abuse, functioning polyabuse, criminal polyabuse, and unhealthy polyabuse). The study emphasized the various service needs of heterogeneous subgroups of consumers with co-occurring disorders. The best (highest) functioning subgroup would benefit most from a specialized short-term preventive treatment designed to link them up with existing community based supportive services to minimize recidivism whereas, individuals scoring functionally low on multiple domains would benefit most from a broad-based treatment condition (e.g. intensive case management,

extended individual and group therapy). Luke (1996) suggests that an important next step for co-occurring research is to replicate the formation of subgroups using different samples and settings (e. g. outpatient programs).

Mueser's Subgroups (2000)

A recent study conducted by Mueser et al, (2000) examined the relationship between patient characteristics and lifetime substance abuse disorders by focusing on prevalence, correlates, and subgroups of substance abuse disorders. The sample (N=325) consisted of a group of patients recently admitted to a psychiatric hospital and included patients living in rural, suburban, and urban areas of New Hampshire to improve generalizing to a broader population. Overall, the study found 58% of the study group met criteria for at least one type of lifetime substance abuse disorder (alcohol, cannabis, and cocaine). Alcohol was determined to be the most commonly abused substance, followed by cannabis.

Mueser and colleagues found univariate associations between patient characteristics and lifetime substance use. Their analyses indicated that younger participants were more likely to abuse cannabis and cocaine, rather than alcohol and those patients with cannabis use disorders had significantly lower levels of education. Patients with criminal histories were more likely to 1) have at least one symptom of conduct disorder, 2) one to three symptoms of antisocial personality disorder and 3) have all three types of substance abuse disorders.

Findings are consistent with previous studies of similar populations (Mueser et al. 1990, 1992; Regier et al. 1990; Lehman et al. 1994) where alcohol is the most common type of substance abuse disorder, cannabis second and cocaine third. Mueser and colleagues did find an interesting U-shaped, curvilinear relationship between age and alcohol use for patients who had been incarcerated and had an antisocial personality disorder. Younger patients (≤ 35 years) and older (≥ 48 years) patients were more likely to report an alcohol use disorder, whereas patients between 36 – 47 years did not. Research findings noted the relationship between cannabis and hospitalizations were in a counterintuitive direction: patients with one or more recent hospitalization were less

likely to have a lifetime cannabis use disorder, and the relationship could not be explained by age. In an earlier study conducted by Mueser (1990), patients with a lifetime history of cannabis misuse had significantly fewer lifetime psychiatric hospitalizations.

Several methodological strengths of the research included 1) the use of standardized, structured interviews and clinician reports, 2) prior consent by a large majority of patients eligible for the study, and 3) generalizability. The overall goal of the study was to assess the performance of a nonlinear method by combining demographics with clinical characteristics to predict substance abuse disorders. Results indicate that demographic variables are strong indicators for specific lifetime substance abuse disorders among a psychiatric population.

Statistical Critique

There has been extensive research examining the patterns and correlates of comorbid disorders (Kavanagh, Waghorn, Jenner, Chant, Carr, Evans, Herman, Jablensky & McGrath, 2002) but little has been done to explore how these patterns and correlates affect the probability of co-occurring subgroups. Furthermore, researcher's often approach comorbid data with a single focus of observation or analytical technique that overlooks the significance of multivariate analysis. For example, Lehman's (1994) categorical framework was a linear model developed on the basis of three questions and depending on the possible responses; ten subgroups were formed (see Appendix D). Participants (N=461) were selected from three psychiatric treatment facilities in an inner-city catchment area and assigned to a group based on their answers to the three study questions. Once in the groups, participants were evaluated through a structured diagnostic interview to compare clinical diagnosis and service needs. Lehman's study also investigated usage patterns within and across groups' by examining the distribution of means and standard deviations taken from Addiction Severity Index (ASI) composite scores. As a result participants were later assigned to one of three clusters (see Appendix E). As mentioned earlier, these subgroups and clusters are arbitrary and reflect a researcher's interest rather than an attempt to investigate the complex structure of comorbid disorders and/or the probability of authentic co-occurring subgroups.

Mueser et al., (2000) on the other hand examined the demographic and clinical correlates of substance abuse among recently hospitalized psychiatric patients. The focus of Mueser's study was to explore the relationship between consumer characteristics and their life time substance abuse disorders. Inclusion criteria for study participants (N=325) included an Axis I psychiatric diagnosis and a contact with a clinician within the past 6 months. Demographic information was taken from consumer charts and a structured clinical review was used to assess psychiatric and substance use diagnosis. A univariate analyses was conducted using a nonlinear method of data analysis (optimal data analysis) to determine if there was a relationship between characteristics and lifetime drug use disorders. A multivariate model, hierarchically optimal classification tree analysis or CTA (Yarnold et al., 1997), was used to predict alcohol use disorder from patient attributes. Mueser's study, unlike Lehman's linear model that focused on distance between cases, focused on the number of subgroups supported by cases within the sample. Both researchers examined subgroup differences utilizing a small number of variables based on distances between respondents, rather than similarities in response patterns. Although their results suggest that empirically distinct subgroups exist within co-occurring disorder samples, they are limited in their utility.

Luke et al., (1996) utilized the statistical technique called cluster analysis on a large urban sample of psychiatric inpatient population (N=456). Cluster analysis is a statistical method that recognizes cases with distinctive characteristics in a heterogeneous sample and clusters them into homogenous groups (Luke et al., 1996). Luke's research examined a large set of variables based on seven domains of the Addiction Severity Index (ASI) rating. Functioning levels in each domain (medical, employment, alcohol, drug, legal, family/social and psychiatric) were measured at the time of hospital admission. Using Ward's (1963) clustering algorithm, the data suggested five to seven clusters. To validate the clusters, Luke et al. ran an additional clustering procedure known as (k-means). The results supported seven clusters ranging in size from 34 to 100 group membership. The k-means clustering algorithm is used to partition data sets into pre-determined number of groups or clusters that are homogeneous in terms of selected continuous variables (Magidson, 1988). The cluster algorithm chooses the number K of

clusters and selects variables to define those clusters and randomly positions each cluster at a point in the variable space. Each case is then assigned to the nearest k cluster using Euclidean distance. Finally the cluster means are computed and the clusters are repositioned at the centroid point. The problems in using the k-means approach are that a predetermined number of clusters must be identified beforehand and an arbitrary metric is needed for defining similarity or distance between clusters. Because there is no statistical criterion used to determine the number of clusters, the clusters depend on a random start that can bias results.

To better understand the utility of subgroups, Kessler (2004) suggests that multivariate profile analysis, such as latent class analysis, be performed to investigate unobservable structures that may exist among comorbid disorders. The differences from traditional clustering models, such as the one used in Luke's et al., (1996) study, is that latent class analysis uses probabilities, instead of distances to define cases into subgroups/clusters. Furthermore, as researchers begin to explore complex multivariate data sets, they will need to employ statistical methods that are less restrictive and can handle nominal, ordinal and continuous variables, or any combination of the three, as latent class analysis allows.

CHAPTER III

METHODOLOGY

Participants and their Selection

Archival data of adults presenting for intensive outpatient treatment and/or case management for co-occurring disorders was re-analyzed for this study. The data set was selected due to its broad analysis of multiple domains taken from a large sample (N = 816) of individuals diagnosed with co-occurring disorders presenting at an outpatient treatment program (Figure 3.1). According to Treatment Episode Data (TED, 2001), the average age presenting for treatment is 34 to 36 years with more males presenting for treatment with co-occurring disorders (56%) than females presenting for a similar treatment (44%). TED 2001 reported racial/ethnic distribution among individuals with co-occurring disorders presenting for treatment, three-quarters were White (74%), 15 percent were African American, and 7 percent were Hispanic. This archival data set contains 816 cases (N=816) of adult males (n = 424 or 52%) and females (n = 392 or 48%). Over half of the participants were White (63%), and African American participants represented fewer than 35% of participants, while Hispanic or Latino only accounted for 1% of participants. Their ages ranged between 25-34 (29.8%) and 35-44 (36.2%).

The participants for this study included a subset of the original sample, taken from the target population for the TCE SAMSHA Grant T1-12720. The original grant objective was to enhance and expand an existing outpatient program setting for treating co-occurring disorders, with the stated goal to *"to develop the least restrictive and resource intense model of community-based dual-diagnosis treatment, while yielding results comparable to a residential program"*. All participants were 18 years of age and older who were affected by co-occurring disorders of substance abuse and mental illness presenting for treatment in Davidson County, located in Nashville, Tennessee, between March 11, 2002 and September 30, 2004. All participants presenting for treatment during this time were assessed for eligibility by clinical intake staff. A group of assessment tools were used with established reliability and validity in populations that are predominantly diagnosed with substance dependency conditions and serious mood or thought disorders.

The original assessment process was used to determine participant's appropriateness for an intensive outpatient program and/or case management. The complete protocol included both clinician-reports and self-reports to identify potential bias on the part of the clinician or the participant. Clinical or research staff were available to individuals requiring assistance in completing self-reports upon request, i.e., reading, explanations and clarifications of terms and questions.

The original grant assessment protocol included prescreening, an intake assessment, a psychiatric evaluation and a psychologist or other specialized assessment as needed, such as vocational, nursing case management or laboratory test. A brief referral form was completed by the referring agency to obtain succinct diagnostic and treatment history during the prescreen process. As part of intake assessment protocol, a clinician conducted a comprehensive psychosocial interview in collaboration with administering several standardized assessment batteries (Addiction Severity Index (ASI), Brief Symptom Inventory (BSI), and Treatment Services Review (TSR), Co-occurring and Other Functional Disorders (COFD) Assessment Scale, Triage Assessment for Addictive Disorders (TAAD), Lehman's Quality of Life (modified), SF-12 Health Survey. Psychiatrist interviews assesses 1) the need for pharmacotherapy; 2) diagnostic impressions using the multi-axial DSM-IV; 3) evaluation of co-morbidity conditions; 4) withdrawal risk; and 5) treatment planning recommendations made by intake staff. Participants deemed appropriate for the intensive outpatient program (IOP) and/or case management were advised of the study and asked to participate. Participants expressing an interest in the original study were presented with a *"Consent to Participate"* form. Participants were excluded if the informant was deemed incapable of giving informed consent or would otherwise be unable to participate in the program.

For the purpose of this research the original non-probability, purposive sample (N= 816) was re-analyzed to distinguish participants who entered the outpatient program from those who received case management only. All participants entering the outpatient program, with or without case management, will constitute the sample used in the current research. Those cases receiving only case management, and not enrolled in the outpatient program, was excluded from the current research sample (Figure 3.1)

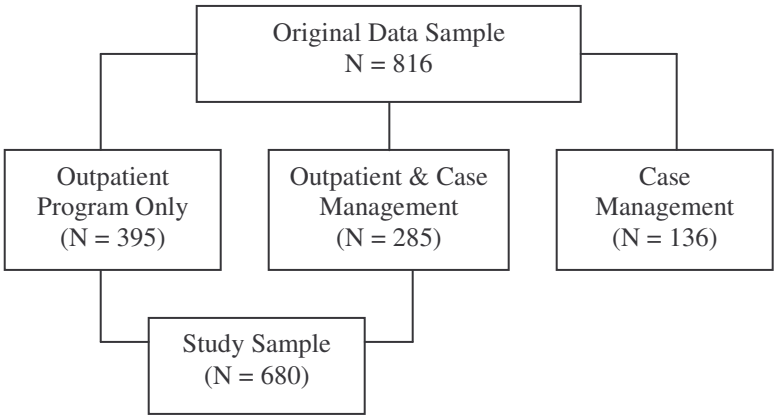

Figure 3.1. Data Subgroups*:* Original data sample consisted of participants enrolled in one of three programs. Data used for the current study included only two of the three programs (outpatient only and outpatient receiving case management).

Instrumentation

Government Performance and Results Act (1993)

SAMHSA used a battery of instruments to develop a measurement tool to assess the impact of drug treatment and prevention programs, in response to Public Law 103-62. The Government Performance and Results Act (GPRA, 1993; P.L. 103-62) requires federally funded programs to set performance objectives that result in measurable outcomes the government can use to improve policy decision-making, program effectiveness and public accountability. GPRA became the legislative framework for federally funded programs to set strategic goals, performance measurements, and report on the degree to which program goals are met. The intent of the GPRA is to lend structure to multi-program systems, like those found treating co-occurring disorders, by connecting substance abuse and mental health providers to a common policy/legislative directive (Kravchuk & Schack, 1996). With the implementation of the GPRA, the federal government has shifted its traditional compliance-oriented focus to a more results-oriented decision-making design (Radin, 2000).

The premise behind the GPRA was taken from Osborne and Gaebler's *Reinventing Government* (1992) that suggests strategic planning is necessary to improve social outcomes through long term visioning and setting outcome goals to achieve the vision (Kravchuk & Schack, 1996). With the implementation of the congressionally mandated GPRA, federal and local governments have created a systematic approach of collecting data for the purposes of measuring program outcomes, identifying national outcome measures, and improving access and quality to substance abuse and mental health treatment settings. Prior to the GPRA, federally funded program goals were poorly articulated and inadequate data on program outcomes were used to inform congressional policy makers on program funding decisions (Kautz, Netting, Huber, Borders, Davis, 1997). Policy makers, with the use of performance measures, not only seek to improve existing programs, but rather to ensure a mix of programs within the system is having the intended effect. Today, there is discussion among policy makers and practitioners debating if program success, determined through the use of performance measures, is a good indicator of consumer outcomes. However, determining the appropriateness and effectiveness of the GPRA is outside the scope of this paper.

Over the last 10 years, federal agencies have begun to explore the benefits of moving categorical programs, such as drug and mental health treatment programs, into performance partnerships requiring more accountability and collaboration from third-party implementers. For the most part, these partnerships are made up of federal, state and local program managers who are collectively responsible for the design of the measurement instruments. Even though the point of focus for the federal government is performance and achieving system-wide objectives, state and local managers are provided flexibility to meet the diverse needs of their unique populations. Many providers' gather additional data to assist them in addressing local and/or state specific service and treatment needs.

CSAT GPRA Client Outcome Measures for Discretionary Programs

Performance measurements are consistent with SAMHSA's co-occurring managed care initiatives and strategies mentioned earlier in the paper. In 1992, SAMHSA

created three centers, the Center for Substance Abuse Treatment, (CSAT), the Center for Substance Abuse Prevention (CSAP), and the Center for Mental Health Services (CMHS) to carry out SAMHSA's mission of building resiliency and facilitating recovery (Mulvey & Atkinson, 2005). Prior to the implementation of the GPRA, SAMHSA was committed to improving the effectiveness, efficiency and accessibility to drug and mental health treatment by developing national outcome measures as part of a data collection and information management strategy generated within its own funded grant programs.

SAMHSA, (and therefore, CSAT) in 1998 created a grant program to achieve its shared goal of expanding substance abuse treatment services in communities nationwide to form the Targeted Capacity Expansion (TCE) grant program. The instrument used to congressionally report TCE data, and used in the current study, was developed by SAMHSA, CSAT and TCE grantees through a participatory process. CSAT's TCE program encouraged substance abuse and mental health treatment providers to become actively involved in the evaluation/performance process. Groups were formed based on target populations that included: adolescents, consumers with a criminal history, consumers on methadone maintenance, American Indians, women, co-occurring and other dysfunctional disorders, and consumers with or at high risk for HIV/AIDS (Atkins, Wilson, & Avula, 2005).

Groups formed under SAMHSA's direction, identified demographic information and five co-occurring treatment domains to be measured and reported to congress. The development and approval (OMB No. 0903-028) of the "CSAT GPRA Client Outcome Measures for Discretionary Programs" is used to report treatment data nationwide on co-occurring disorders at baseline, and again at 6 and 12 month follow-up interviews (Appendix F). Data collected at baseline on the CSAT GPRA is used to conduct the current retrospective analysis. All items used in CSAT's GPRA outcome measures were taken largely from the Addiction Severity Index (ASI) and to a small degree the Treatment Services Review (TSR). The same seven domains found in the ASI and in the TSR were collapsed into five sections under CSAT's GPRA (mental and physical health and alcohol and drug items were coupled under 2 categories instead of 4).

Addiction Severity Index (ASI-5)

The Addiction Severity Index (ASI) questionnaire was originally developed to measure treatment outcomes and assist researchers in evaluating treatment programs for substance abuse facilities (McLellan, Luborsky, Cacciola, Griffith, Evans, & Barr, 1985). The ASI measures frequency, extent and duration of substance use over an individual's lifetime and during the 30 days prior to program intake (Grisom & Gragg, 1991; Corse et al, 1995; Butler et al, 2001) (Appendix G).

The originators of the ASI developed a semi-structured interview eliciting consumer's self-reported problems in seven life domains: physical health, employment and financial support, illegal or criminal activity, family and social relationships, psychiatric symptoms, and drug and alcohol use and then measures those responses with the use of two indices –interviewer severity ratings (ISRs) and composite scores (CSs) (McLellan et al, 1985). At the end of each section the interviewer uses a 10-point scale (0-9) to rate problem severity, ranging from 0 (no treatment necessary) to 9 (treatment needed to intervene in life-threatening situation). The composite score is the result of two subjective questions asking the consumer to rate *"How troubled or bothered they have been in a problem area over the last 30 days?*" and "*How important it is that they receive treatment for the problem?"* in each of the seven domains. The score is based on a scale (0-4), with 0 meaning *not at all* and 4 meaning *extremely.*

McLellan et al. (1985) reported strong concurrent validity (.74 to .91) and test-retest reliability (.92 or better) for 181 participants across three study groups from diverse treatment facilities. Participants were recruited from a Veterans Administration Clinic (n = 57), an inpatient substance abuse facility (n = 64), and a local psychiatric impatient facility (n = 60). Participants within the three different groups varied in age, ethnicity, gender and socio-economic status. Furthermore, between group differences were significant lending additional evidence to the concurrent validity of the ASI subscales. McLellan and colleagues demonstrated strong evidence for discriminant validity when they found correlations of $r \leq .3$ between social and psychiatric, legal and employment, social and alcohol, psychiatric and alcohol, and psychiatric and social dimensions.

High inter-reliability was obtained in a 2-year longitudinal outcome study for consumers seeking treatment for substance abuse (Stoffelmayr, Mavis & Kasim, 1994). Stoffelmayr et al. (1994) was concerned if two assessors interviewing the same consumer would produce the same or similar scores and if each assessor would apply the same standards during different phases of a study. All assessors received the same criterion based training program and were judged to be trained once their scores for four consecutive assessments did not deviate more than 10% when compared to experienced assessments. Paired assessments (100) were conducted and videotaped throughout the 2-year study. The ASI was administered to participants at admission to treatment, and again at 6, 12, and 18 month intervals. A primary assessor, conducting the actual field assessment, was paired with a second rater that observed the assessment. Both assessors recorded their scores independent of the other. In addition to the two independent assessors, an expert panel viewed the videotapes and produced a third score that became the standard. The researchers hypothesized that the mean differences would be less than 0.1 for CSs and 1.0 for ISRs. Accuracy was calculated based on the difference between the two assessor scores and the standard. CSs showed inter-rater accuracy was high for both year one (m = 0 to .040) and year two (m = 0 to .045). ISRs were poor the first year (m = .952 to 1.286), but improved the second year (m = .429 to .952). Intra-rater accuracy over time varied considerably on ISRs (m= .476 to 1.476), but achieved acceptable intra-rater accuracy on CSs (m=.014 to .046). Such findings point to CSs as being more reliable than ISRs and less prone to variations due to random error. The major finding of the longitudinal study established not only is inter-rater reliability high, but all correlations for reliability and accuracy were high (r = 0.90).

A test and retest reliability analysis on lifetime items of the ASI was conducted on 108 male participants in an aftercare program at a veterans addiction recovery center (Cacciola, Alterman, Rutherford, McKay & Mulvaney, 1999). Eligible participants were required to have: completed a 4-week intensive outpatient rehabilitation program (IOP); used alcohol or cocaine within 6 months of IOP; a current mood disorder (DSM-3); an American Psychiatric Association (1987) lifetime diagnosis of cocaine or alcohol dependence; no history of psychotic disorders; a minimum degree of stability in living

conditions and a minimum literacy rate of the forth-grade. The ASI was administered twice to participants, once at intake for the IOP and again at baseline for the aftercare program. ASI assessors (n = 24) were trained extensively by A.T. McLellan, developer of the ASI. Data analysis evaluated continuous variables using intraclass correlation coefficients (ICC) and paired t tests to identify trends in the information. Reliability of categorical variables was evaluated using the kappa statistic. Findings support the overall reliability of the lifetime items in the ASI. All but two domains achieved acceptable levels of test-retest reliability; the family/social and psychiatric domains were reported to be poor to fair. The researchers suggest the longer interval test-retest reliability (1 to 3 months apart) of the ASI lifetime items may have been biased by the consumer's experiencing greater distress at the onset of the IOP program as opposed to the second administration prior to the aftercare program.

Other test and retest reliability studies, to the extent which information can be consistently obtained from respondents, have varied from acceptable to unsatisfactory. In a study of 98 homeless substance users, Zanis et al, (1994) calculated intra-class correlation coefficients for CSs (.76) and ISRs (.62) as compared to Spearman-Brown correlations for CSs (.86) and for ISRs (.75). When examining ASI CSs separately, five of the seven produced coefficients with acceptable values: medial (.93), alcohol (.87), drug (.70), legal (.81) and psychiatric (.89), while two domains received unacceptable values: employment (.50) and family/social functioning (.52). In a later study, conducted on 62 severely mentally ill substance abusers, Zanis et al. (1997) examined the internal consistency of items constructing each CS using Cronbach's Alpha correlation coefficient (ranging 0 to 1). Researchers found only the legal composite score (.57) fell below acceptable internal consistency, while medical (.85), alcohol (.81), family (.73), and psychiatric (.77) CSs demonstrated good consistency, and employment (.68) and drug (.67) CSs were deemed satisfactory. When examining interobserver reliability, the investigators found coefficients associated with ISRs to be lower (Pearson .66 and Spearman-Brown .79) when compared to the CSs (Pearson .92 and Spearman-Brown .96).

A recent study conducted on 400 male inmates, investigators compared the ASI to similar assessment tools and found the ASI to have predictive value, sensitivity, and overall accuracy when paired with the Alcohol Dependence Scale (ADS) (Peters, Greenbaum, Steinberg, Cater, Ortiz, Fry, & Valle, 2000). The study examined screening instruments to determine their accuracy in identifying alcohol or drug disorders, or both alcohol and drug disorder in prison inmates and found the ASI, when coupled with the ADS, to be highly effective in detecting substance dependency among prison inmates. The combination of ASI/ADS had desirable psychometric properties that were not affected by age, race/ethnicity, or education level.

In a commentary written by Cacciola and Alterman (2004), both researchers note a long list of studies supporting ASI's construct validity in its ability to identify expected differences between men and women (Brown, Alterman, Rutherford, Cacciola, & Zagallero, 1994); homeless and housed individuals (Argeriou, McCarty, Mulvey, & Daley, 1994); antisocial and non-antisocial individuals (Cacciola, Rutherford, Alterman, & Snider,1994); consumers with and without co-occurring psychopathology (Cacciola, Alterman, Rutherford, McKay & Mulaney, 2001), drug and alcohol consumers (McLellan, Kushner, Metzger, Peters, Smith, Grissom, Pettinati, & Argeriou, 1992B). Reliability, validity and construct studies have repeatedly supported the use of the ASI among comorbid substance abusers seeking treatment. However, studies have shown that ISRs and CSs do not achieve consistent reliability and considerable limitations exist when administered to populations outside its intended use.

In the matter of co-occurring disorders, the ASI has been found to be less reliable and valid as the level of psychiatric severity increases (RachBeisel et al., 1999; Hodgins et al., 1992; Zanis, McLellan, & Corse, 1997). Corse and colleagues (1995) found that the ASI had limited utility when administered to consumers with both severe and persistent mental illness and substance abuse problems. Most researchers concur that the ASI retains good utility as a reliable instrument for use with individuals with less severe psychiatric disorders (Lehman et al. 1985; Stoffelmayr et al. 1994; Cacciola et al. 1999; Cacciola & Alterman, 2004; RachBeisel et al. 1999; Hodgins et al., 1992; Zanis, McLellan, & Corse, 1997). For consumers suffering from severe and persistent mental

illness research suggests the use of additional instruments for a more comprehensive assessment of psychiatric symptomology and functioning. Since the purpose of the present study is to identify homogeneous groups within a large outpatient treatment program by examining five areas of functioning, and not to assess or determine problem severity, the use of the ASI is appropriate for the current investigation of: (1) subgroups, (2) group differences, and (3) utility of subgroups for treatment planning.

In summary, the ASI continues to be used with persons with severe mental illness and substance abuse disorders, despite the inconsistent empirical evidence supporting its validity, reliability and general usefulness in measuring co-occurring disorders. This is in large part because there have been no instruments developed to assess addiction severity among persons with severe mental illness and substance abuse disorders until recently. The Dartmouth Assessment of Lifestyle Instrument (DALI), a brief screening instrument was developed to detecting recent (within 6 month) substance abuse disorders in persons with severe mental illness. The Dartmouth Assessment of Lifestyle Instrument (DALI) identifies three types of substance abuse disorders: alcohol, cannabis and cocaine (Rosenberg, Drake, Wolford, Mueser, Oxman, Vidaver, Carrieri, & Luckoor, 1998). Empirical evidence on the DALI has yet to surface, but initial findings indicate high concurrent validity for both alcohol (.74) and drug (.83) use disorders (Rosenberg et al. 1998; Peter, 2003). A copy of the ASI can be found in the Appendixes (Appendix F).

Treatment Service Review (TSR-5)

The TSR (McLellan, et al. 1992A) closely resembles the outcome categories of the ASI and is often administered together. The TSR is a 5-10 minute structured interview that measures type and frequency of alcohol and drug treatment services an individual receives weekly in seven areas of functioning encompassed by the ASI. The initial findings indicate the TSR has good test-retest reliability, concurrent validity in differentiating between levels of care, and offers a means of evaluating the "match" between a consumer's service needs to the actual services they receive (McLellan, et al 1992A). Each problem area is divided into four sections. The first section asks the consumer to report the number of days they were effected by a target behavior during the

past week or month. Examples of the types of questions asked include the number of days the consumer experienced significant medical problems, committed a crime, worked, drank alcohol, or had a significant conflict with a friend or family member. The second section requests the number of times during the past week/month they received services from a professional. The third section inquires about the relevance of the services received. The fourth section asks the consumer if the services received were provided from an inpatient program or by separate outpatient programs. The TSR is an extension of admission information asked in the ASI and is designed to measure substance abuse treatment; whereas, the ASI measures the substance abuser.

Alterman and McLellan (1993) used the TSR to compare the quantity and patterns of treatment cocaine dependent patients received in two Department of Veterans Affairs intervention programs. The investigators were interested in determining the similarities and/or differences between the inpatient and day hospital program. Alterman and McLellan hypothesized that the inpatient program would provide more services, specifically in the areas of drug, alcohol, psychiatric and medical areas. A multivariate analysis of variance (MANOVA) was performed comparing the day hospital program to the inpatient program. A statistical significant outcome was obtained ($F(88) = 7.23$, $p \leq .01$) indicating program differences in the amount and patterns of services provided. Contrary to the investigators hypothesis, patients participating in the day hospital program received significantly more employment services ($p \leq 0.001$), medical services ($p \leq 0.095$), alcohol services ($F\ (94) = 4.90$, $p \leq 0.008$) and more drug related services ($F(94) = 7.36$, $p \leq 0.008$) than those participating in the inpatient program. Overall, the findings provide evidence that the TSR can characterize the differences between treatment programs and has predictive utility above that offered by patient characteristics. A copy of the TSR can be found in the Appendixes (Appendix G).

Data Collection

Original data used in the current study was collected by Foundations Associates (FA) located in Davidson County, Tennessee. Foundation Associates obtained a *model* status for integrated treatment for co-occurring disorders from SAMSHA (2000) as one

of the three exemplary programs in the United States. FA's was featured at the Co-occurring Institute of the SSDP V (State System Development Program 5th) Conference, and the residential services were selected as a finalist for the American Psychiatric Associations' (APA) Gold Achievement Award (2000). FA's programs are based upon key elements best described by Minkoff, 2000) as the seven principles inherent in an integrated model of care for co-occurring disorders. The actual collection of the data was preformed by master level, research assistants under the supervision and training of the Principle Investigator. The data used in the current study was collected using the CSAT GPRA through self-report. The self-reported data was then entered, by original data collector, into a secure governmental data bank within 10 days of collection.

The five domains making up the CSAT GPRA collection instrument can best be defined as a consumer profile that measures social functioning and adjustment, if a consumer is receiving social/medical services aimed at restoring social functioning, as well as evaluating current and lifetime substance use. Consumer profiles made up of an individual's responses were captured in CSAT's GPRA outcome instrument measuring five areas of functioning. Drug and alcohol items focuses on obtaining information about the frequency of a consumer's substance use during the last 30 days prior to treatment entry and the number of years a consumer has abused substances (lifetime use). The items found in family and living condition section is a combination of both the ASI and the TSR. The focus of the section is to obtain information on where the individual has been living and if their substance use has added stress or emotional problems to their living conditions. Education, employment and income are straight forward questions taken from the ASI. The legal section asks three questions taken from both the ASI and the TSR. The mental and physical health problem and treatment items are taken from the ASI and the TSR. Questions inquire about the consumer's overall health at the time of the interview, what types of treatment they have received in the last 30 days and how many days in the last 30 days have they experienced emotional problems. Key domains and study variables, shown in Table 3.1, are found on the CSAT GPRA (Appendix F) which is comprised of questions taken from the ASI and the TSR.

To obtain the archival data necessary for the study, and under the supervision of committee members, a Data Release Agreement (see Appendix I) was forwarded to the original grantee (Foundation Associates', Nashville, TN) of the TCE SAMSHA Grant T1-1272. The agreement outlined terms and conditions for the explicit use of the data with restrictions. Approval of such conditions was made between the current investigator and the operating data owner (Michael Cartwright, Founder & President of Foundation Associates'). To protect consumer confidentiality, an agreement disclaimer required all personal identifiers (name, address, social security number) and other direct personal identifiers be purged prior to data transfer and require an encrypted electronic link file be maintained by the operating data owner. The data was made available upon the approval of the Data Release Agreement. The data was transferred on an SPSS file ready format, via a compact disc secured with an encrypted password for entry. The data set included all baseline information recorded on CSAT GPRA Client and approved by the University of Tennessee's IRB to use in current study.

Table 3.1 Key Domains/Study Variables

Key Domains	Variables	Measurements
Substance Use	Substance Use (days used/type of substance)	Count, Multi-categorical
	(Alcohol, Alcohol use to intoxication -# of drinks)	
Family/Living	Housing (Shelter, Street, Institution, Housing)	Multi-categorical
	Stress related to substance use.	Ordinal – Categorical
	Reduction of activities due to use.	Ordinal – Categorical
	Emotional problems due to use.	Ordinal – Categorical
Education/Employment	Enrollment in school/job training.	Multi-Categorical
	Education Level/Employment	Count, Multi-Categorical
	Income (variety of sources)	Ratio
Criminal History	#Arrest, Drug Related Offenses, # days in jail	Count
Health	Overall Health	Ordinal - Categorical
	Treatment Services (inpt, oupt, emergency, # of Days)	Count - Categorical
	Emotional Problems (# of days experienced serious	Count - Categorical
	depression, anxiety/tension, hallucinations, trouble	Count (# of days)
	concentrating, controlling violent behavior, suicide	Count (# of days)
	attempts, problems with prescribed medication)	Count (# of days)

Research Design

The exploratory research was conducted through a retrospective analysis to seek a parsimonious model of subgroups made up of individuals with co-occurring disorders entering an outpatient program. The current research proposes to identify homogeneous subgroups by analyzing case level data (substance use, medical, behavioral, and psychosocial factors) using a latent probabilistic clustering approach. Instead of using Euclidean distance to assign cases to the nearest group, cases were classified into groups using model based posterior membership probabilities. Advantages of using a probabilistic clustering approach involves: 1) minimizing the with-in group variation and maximizes between group variations; 2) less researcher bias in group assignment; 3) allowing observed variables, with groups, to have varied distributional forms, normal distributions with unknown variances and mixture models (Vermunt & Magidson, 2003).

Data taken from CSAT's GPRA instrument on the five domains, as presented in Table 3.1, were evaluated to answer the following research questions:

1. Do homogenous subgroups exist in the sample of adult individuals entering an outpatient program for co-occurring disorders?
2. How many homogeneous subgroups exist?
3. How well does the model fit the data?
4. What are the size and nature of the homogeneous subgroups?
5. What are the psychosocial variables associated with subgroup membership?
6. If no subgroups exist, what other research attempts should be made to explore the heterogeneity of co-occurring disorders.

The answer to the main research question: *Do homogeneous subgroups exist in the sample of adult individuals entering an outpatient program for co-occurring disorders?"* was determined by examining the pattern responses of the observed variables. A probability modeling approach, *Latent Class Analysis,* was used to explore if there are meaningful response patterns among the five categorical domains mentioned in Table 3.1.

A latent structure model is supported by distinctive subgroups taken from the sample, descriptive statistics were computed and reported by group to answer the

research questions: *"What are the size and nature of the homogeneous subgroups?"* and *"What are the psychosocial variables associated with subgroup membership?"* Correlates between indicators were examined to define and explain group membership, with specific attention to substance use. Consistent across all studies, researchers associate heavy, long-term alcohol disorders with more severe mental disorders where state hospitals, jails and emergency rooms are the locus of care (Quadrant IV, NASMHPD & NASADAD Model, 1999). Literature also provides evidence of a framework that indicates subgroups of individuals with co-occurring disorders can be determined by their level of functioning and patterns of substance abuse. Individuals, based on their responses, are assigned to interventions that emphasize intense inpatient or community based programs. These findings and theories were tested in the current study by evaluating the relationships between social functioning (criminal history, housing, employment/income, and level of education), illicit substance use (alcohol, marijuana, and cocaine), and physical and emotional problems (depression, anxiety, hallucinations, suicide attempts, violent behavior, trouble concentrating and side effects of medication).

Data Analysis

The first four research questions of this study were designed based on the assumption that individuals belong to discrete groups with respect to an unobserved categorical latent variable where values consist of qualitatively different subgroups. The indicators used to detect the latent variable may consist of mixed measurements. Research questions pertaining to subgroup identification are as follows:

1. Do homogenous subgroups exist in the sample of adult individuals entering an outpatient program for co-occurring disorders?
2. How many homogeneous subgroups exist?
3. How well does the model fit the data?
4. What are the size and nature of the homogeneous subgroups?

Based on this assumption, latent class analysis (LCA) was used to determine the existence and number of subgroups founded on similarity in response patterns rather than distance between respondents. LCA is a statistical technique that identifies the smallest

number of mutually exclusive groups of individuals with similar patterns of responses and helps explain relationships among observed variables.

LCA is a multivariate statistical procedure that calculates the probability that an individual will belong to a specific group while each group represents a distinct profile of observed *symptom endorsement probabilities* (SEPs; i.e. the likelihood of having a symptom given membership in a group) that is consistent among all members in the group (Chung & Martin, 2005). The analyses was done using *Latent GOLD 4.0* (Vermunt and Magidson, 2000). *Latent Gold 4.0* was chosen for its flexibility to analyze a complex data set of mixed scale type variables (nominal, ordinal, continuous and counts), and where missing data can be imputed as a part of the process. The manifest/observed variables represented in the five mutually independent constructs of CSAT's GPRA (substance use, family/living, education/employment, criminal history, physical and emotional health) were analyzed in two stages. The observed or study variables are referred to as *indicator* variables in *Latent GOLD 4.0.*

First, an exploratory LCA was conducted to obtain optimal group-solutions by stepwise addition, until the model fits the data or no longer improves. A model estimation of 1- 4 groups were computed as a starting point. Based on summary results, additional groups were added or deleted until the best solution is reached. *Latent Gold* software has built into its program the Expectation Maximization (EM) algorithm to estimate model parameters and an iterative process that updates the original model expectations with the estimates until the log-likelihood (LL) function becomes smaller and the *p*-value indicates the model is consistent with the data. This process ensures that the estimates of the parameter values have converged at a maximum likelihood. To determine the most parsimonious model and best fit to the data, a *p*-value greater than (.05) for a likelihood ratio chi-square (LRX) statistic, followed by the fewest number of parameters (Npar), and an information criteria indices were selected i.e., Akaike (AIC) and Bayesian (BIC). *Latent GOLD* offers an alternative option to assess model fit, by using the bootstrap of LRX to re-estimate the p-value. This is an important function because the LRX assumes that the statistic follows a chi-square distribution and by relaxing that assumption, estimating the statistic becomes more accurate. Instead of assuming the shape of a

group's distribution, the bootstrap method was used to determine the probability of the group's distribution from the data itself.

The fifth research question, *"What are the psychosocial variables associated with subgroup membership?"* was answered using parameter and profile output generated from *Latent GOLD*. The Wald Test p-value and Z statistics were used to determine if each indicator (observed variables) contributes in a significant way towards the ability to discriminate between the groups. Next, R^2 would be computed to predict class membership by measuring group variance for each indicator. Higher values of R^2 (measures between 0 and 1), would mean an indicator has greater ability to predict group membership than another. To further understand group characteristics, *Latent GOLD* provided output on conditional probabilities that show the differences in response patterns among the groups. In order to distinguish the groups, descriptive names were assigned to each group, based on information from the R-squared statistic and the conditional probabilities of each group. Once the groups were named, a profile plot (column percentages) is used for graphical representation showing the probabilities, given in a group, of having that answer pattern for the set of indicator variables. A modal assignment method, a cross-tabulation of frequencies, was analyzed to further define observed patterns of responses and the probability of someone being in a specific group. Finally, a diagnostic statistic, the bivariate residual, was computed to identify any weaknesses in explaining associations between indicators. "*The bivariate residual (BVR) corresponds to a Pearson chi-square statistic (divided by the degrees of freedom) in which the observed frequencies in a two-way cross-tabulation of the indicators are contrasted with those expected counts estimated under the model"* (Vermunt & Magidson, 2003). A BVR value substantially larger than 1suggests the model falls short of explaining the association between two indicators and BVR values larger than 2.4 are unacceptably high (Vermunt, 2000) . In the event that a BVR value is greater than 1, additional groups may be added.

CHAPTER IV

RESULTS

Demographic Characteristics

Study participants totaled (n = 680) where 54% (369) were female and 45% (311) were male. Program participants were typically 25-45 (68.4%) years of age (*M* = 36.23, *SD* = 9.55). Females (51%) presented for treatment at a younger age (18-35 yr) than men (40%) in the same age bracket. The oldest study participant was a 70 year old female (Table 4.1).

Descriptive Statistics

The following section discusses descriptive statistics on the indicators explored under the current research. First, missing data were examined using SPSS missing value analysis (MVA) and based on rates of missing information for a latent class analysis, where rates of over 30% for a two-class model are not considered reliable and rates over 40% for a three-class model become less reliable in predicting true class membership

Table 4.1 Demographic Characteristics

Indicator		n	%
Male		311	45.7%
Female		369	54.3%
Ethnicity	White	421	61.9%
	African American	253	37.2%
	Other	4	.4%
	Missing	2	.2%
Age Group	18-24	94	13.8%
	25-35	221	32.5%
	36-45	244	35.9%
	46-55	109	16.0%
	Over 55	12	1.8%

(Harel & Miglioretti, 2005; Bandeen-Roche, Miglioretti, Zeger, & Rathouz, 1997). Latent class analysis takes into account missing data so that all the data is considered for analysis. When using LCA it is not necessary to delete cases that have partial data because the software computes the missing data by utilizing a full-information expectation-maximum likelihood estimate (EM-MLE) of parameters. An expectation-maximum likelihood (EM-MLE) is used in statistics for finding maximum likelihood estimates of parameters in probabilistic modeling approaches (Vermunt & Magidson, 2000). EM-ML assumes the data are missing at random, however if this assumption is not meet, the EM-ML technique performs better than list or case deletion (Vermunt & Magidson, 2000). Further review of indicators, using SPSS case summary reports and Little's MCAR test, found response patterns for certain types of substances, treatment services and the mental health indicators to be uniformed non-responses or missing completely at random (MCAR) ($\chi^{2} = 46.27$, $df = 62$/ $p = .93$). All missing data are coded and an iteration process set at 100 (maximum number of iterations for all estimates to converge) is implemented by the EM algorithm. Given the large missing value rate among many of the mental health indicators, hallucinations (68.7%), trouble understanding and concentrating (68.8%), trouble controlling violent behavior (68.8%), attempted suicides (69%) and problems associated with prescription medicine (68.7) were excluded as single indicators and combined later into one indicator for model estimations and significance testing. In Table 4.2 variables for which there was a substantial amount of missing data and later deemed insignificant in determining a model are displayed.

In Table 4.3, alcohol, marijuana, cocaine and opiate use was measured as a count variable (days used within the last 30 days) indicating 48 % of the sample (N = 680) reported using alcohol ($\underline{M}$ 6.49 = SD = 8.41), 28% of the sample reported using marijuana ($\underline{M}$ 4.05 = SD 7.22) and 44% reported using cocaine ($\underline{M}$ =5.06, SD = 7.96). As shown in Table 4.4, participants were asked about their housing in the last 30 days and a majority of study participants (621) reported having housing most of the prior month. Housing was defined as owning or renting an apartment, room or house; living with someone, living in a halfway house or enrolled in a residential program. When asked how

Table 4.2 Missing Value Analysis

	Indicator	Missing (count)	%
Substance Use			
	Heroin, Morphine, Diludid, Demerol, Percocet, Darvon, Codeine and Opiates (Days used)	290	42.6
Service Treatment			
	Inpatient Treatment (how many days) for:		
	Physical complaint	302	44.4
	Mental or emotional difficulties	258	37.9
	Alcohol or substance abuse	267	39.3
	Outpatient Treatment (how many days) for:		
	Physical complaint	308	45.3
	Mental or emotional difficulties	261	38.4
	Alcohol or substance abuse	284	41.8
	Emergency Room Treatment (how many days) for:		
	Physical complaint	269	39.6
	Mental or emotional difficulties	274	40.3
	Alcohol or substance abuse	289	42.5
Mental Health			
	Experienced hallucinations (how many days)	467	68.7
	Trouble understanding/concentrating	468	68.8
	Trouble controlling violent behavior	468	68.8
	Suicide attempts	469	69.0
	Experience problems with medication	467	68.7

Table 4.3 Substance Use in Past 30 Days

Variable	Response	n	%	Mean (SD) days
Alcohol Use	No Use	356	53%	6.49 (8.41)
	Use	324	48%	
Marijuana Use	No Use	500	74%	4.05 (7.22)
	Use	180	26%	
Cocaine Use	No Use	383	56%	5.60 (7.96)
	Use	297	44%	

Table 4.4 Housing and Substance Use Problems

Variable	n
Housing	
Shelter	25
Street	13
Institution	2
Housed	621
Missing	19
Stressed due to substance use	
Not at all	125
Somewhat	91
Considerably	157
Extremely	279
Not Applicable	26
Missing	2
Reduction in activities due to use	
Not at all	186
Somewhat	77
Considerably	124
Extremely	264
Not Applicable	26
Missing	3
Emotional problems due to use	
Not at all	167
Somewhat	89
Considerably	123
Extremely	272
Not Applicable	26
Missing	3

their substance use affected their stress level, caused them to give up important activities or caused emotional problems, most answered being extremely effected by all three indicators.

A majority of participants (98%) were not enrolled in school or a vocational training program within the last 30 days (Table 4.5). Only 21% of participants reported working full-time in the last 30 days, while 49% reported being unemployed, but looking for work. When considering income, as seen in Table 4.6, only 153 (22%) of the 680 participants reported receiving wages during the last 30 days with an average monthly income of less than $226 (*M* = $225.74, *SD* = $612.23), with only 10% receiving, on an average less than $25 a month for public assistance (*M* = $24.81, *SD* = $92.94). Most participants also reported receiving little to no retirement income (*M* = $4.47, SD = $81.52). The average disability income reported was less than $130 (*M* = $129.59, SD = $360.75). Criminal history, as displayed in Table 4.7, indicates that most participants (92%) were not arrested during the last 30 days (*M* = .09, *SD* .32), with 53 individuals (or 8%) of the sample reporting 1 to 3 arrests during the same time frame, with 23 of them being arrested for a drug offense. Those being arrested spent an average of 1.5 days in jail (*M* = 1.57, *SD* = 7.48).

The domain measuring a participant's health included overall and mental health shown in Table 4.8 suggests a majority of the sample reported having very good to good overall health (*M* = 3.31, *SD* = .099) at baseline. For those individuals reporting days they experienced mental health problems within the past 30 days, depression (*M* = 15.37, *SD* = 12.79) and anxiety (*M* = 15.05, *SD* = 12.95) were similar (Table 4.9). All other mental health indicators reported low frequency counts. This can in part be due to the high prevalence of comorbidity between substance abuse and mental illness which requires a presumptive, and not necessarily a definitive diagnosis.

Latent Class Analysis

The following section presents the results of the analyses used to answer the main research questions: *If homogeneous subgroups exit in the sample and if so, do the subgroups represent a parsimonious model?* Results of the likelihood ratio Chi-squared,

Table 4.5 Education/Employment

Variable	n	%
Enrolled in School or Job Training		
Not Enrolled	667	98%
Enrolled, Full Time	5	.7%
Enrolled, Part Time	4	.6%
Other	2	.3%
Missing	2	.3%
Educational Level		
Less than High School	103	15%
Obtained some High School	396	58%
Some College	177	26%
Some Graduate School	4	.4%
Employment Status		
Employed Full-Time	139	21%
Employed Part-Time	42	6%
Unemployed Looking for work	335	49%
Unemployed Disabled	73	11%
Unemployed Retired	5	1%
Unemployed not looking for work	43	6%
Missing Data	43	6%

Table 4.6 Mean Income

Variable	n	%	Mean *(SD)* in dollars
Income (Dollars)			
Income from Wages			
Reported No Income	525	77%	$225.74 ($612.23)
Reported Income	153	22%	
Missing	2	.2%	
Public Assistance			
No Public Assistance	604	89%	$24.81 ($92.84)
Received Assistance	74	10%	
Missing	2	.2%	
Retirement			
No Retirement	675	99%	$ 4.47 ($81.52)
Received Retirement	3	.4%	
Missing	2	.3%	
Disability			
No Disability	545	80%	$129.59 $(360.75)
Received Disability	133	19%	
Missing	2	.2%	

Table 4.7 Criminal History

Arrest/Jail	n	%
Arrest in the past 30 days:		
No Arrest	627	92%
1-3 Arrest	53	8%
Drug related arrest past 30 days		
No Arrest	655	96%
1-3 Arrest	23	3%
Missing	2	.3%
Nights in spent in jail		
No nights in jail	620	91%
Spent nights in jail	58	8%
Missing	2	.2%

Table 4.8 Overall Health

Variable	n	%	Mean *(SD)*
Overall Health			
Excellent	23	3%	3.31 (.99)
Very Good	110	16%	
Good	260	38%	
Fair	205	30%	
Poor	82	12%	

Table 4.9 Mental Health Problems

Days Troubled by:	Mean	*(SD)*
Serious Depression	15.37	(12.79)
Serious Anxiety/Tension	15.05	(12.95)
Hallucinations	2.28	(13.05)
Understanding/Concentrating	2.20	(6.76)
Suicide Attempt	.11	(.43)
Prescription Medication	.74	(3.59)

information indices, Akaike and Bayesian Information Criterion (AIC and BIC), Bootstrap statistics, BVRs and a meaningful explanation of group membership are presented in determining subgroups and a model. The second set of research questions pertaining to the nature of each subgroup and the psychosocial variables associated with subgroup membership is determined by the Wald Test, analysis of the conditional probabilities and bivariate residuals.

Preparing Variables for the Analysis

To estimate a model, five domains with multiple indicators (substance use, living conditions education/employment, criminal history and health) were taken from the GPRA and analyzed through the use of *Latent Gold 4.0* (Vermunt & Magidson, 2000), a latent class analysis software. The software was chosen in part for its ability to estimate latent models with missing data by providing maximum likelihood (ML) estimations under missing completely at random (MCAR) for mixed variables. As indicated earlier (Table 4.2) many indicators had a high percentage of missing data and were eventually excluded as single indictors from analysis due to their insignificance in determining a model. The pattern of the non-response (MCAR) items in Table 4.2 can be partly addressed under several assumptions. The separate illegal drug indictor was answered while reporting which illegal drugs were used was not answered. Missing service treatment information is likely to represent a response of "no" or "not applicable" treatment received in the last 30 days. When considering the large amount of missing information on the mental health indicators, three important thoughts will be discussed in greater detail later in the paper: 1) consumers presenting for outpatient treatment services are less likely to exhibit severe mental health problems such as hallucinations or suicide attempts, 2) a co-occurring disorder, due to the high prevalence of comorbidity between substance abuse and mental illness, often requires a presumptive, and not necessarily a definitive diagnosis is given early in treatment and 3) what are the consequences of the missing information on data analysis and subsequent interpretation of findings. Needless to day, latent class analysis frames the missing data as a response pattern and connects both the observed and missing patterns in the likelihood function in models with

incomplete data (Grinkel, Vermunt, Andries van der Ark, & Sijtsma, 2007; Vermunt & Magidson, 2000).

To answer the research questions, *Latent Gold 4.0* authors' of the software suggest that model estimations begin with a range from 1-4 clusters using the criterion of maximum-likelihood estimates (MLE) through numerical optimization, utilizing an iterative method to estimate model parameters. As classes are added 2, 3...n, model fit tends to improve. Latent subgroups are structured on observed variables that are uncorrelated within any one group. An essential assumption of LCA is that of "conditional independence" where the observed study indicators (made up of several response items) are statistically independent within each subgroup.

During the first attempts in estimating the model, an analysis of the bivariate residuals found many indicators appeared to violate the assumption of conditional independence. Response patterns indicated a lack of "conditional independence" among indicators. Conditional independence requires all indicators be statistically independent (uncorrelated) within each latent subgroup. Early model estimations indicated count variables such as substance use (alcohol, alcohol use to intoxication, illegal drug use, opiate, marijuana and cocaine), and mental health (depression, anxiety, tension, trouble controlling violent behavior and hallucinations), as well as mixed variables representing criminal history (number of arrest, number of drug arrest, and nights spent in jail), and housing (shelter, street, institution, own/rent, living with someone, residential, halfway) exceeded number of allowed response categories or had dependent response items.

First, because LCA has constraints on number of response items per indicator, count (number of days having over 30 different responses) and multi-categorical variables were recoded using SPSS to collapse responses into fewer items. Count variables were recoded into ordinal-categorical response items (no use, ≤ 15 days use, and ≥16 days use) and multi-categorical variables were recoded into binary responses (arrest/no arrest and housed/not housed). These constraints reduce the number of parameters that require estimation and promote parsimony. Next, to eliminate dependent items that would promote the emergence of extra, spurious latent classes, two or more variables were combined to form one new variable. Using SPSS new variables were

based on combining responses for substance and mental health indicators. Illegal drugs, cocaine and marijuana were combined to form an *illegal drug* variable and serious depression, anxiety, hallucinations, lack of concentration, violent behavior, suicide attempts, and medication problems were combined to form a *mental health* variable.

Estimating the Model

To determine the number of subgroups within the sample, an estimation of 1- 4 subgroups was used. Using all indicators, early model estimations were inconsistent with the data (p-value $\leq$.05) suggesting that one or more of the indicators were insignificant in determining a model. In latent class analysis, the null hypothesis is that *"there is no difference between what the model is predicting and what the data are doing"*. In determining a parsimonious model the researcher wants the model to be consistent with the data. To identify which indicators were significant in determining a model, several model estimations were conducted by removing, and re-adding one indicator at a time. A model consistent with the data comprised of four ordinal-categorical indicators (alcohol use, illegal drug use, education and serious depression). The illegal drug indicator represents responses items taken from illegal drugs, cocaine and marijuana. The serious depression indicator represents a single variable and not the combined variable termed mental health. The Wald Test p-value ($\leq$ .05) was used to determine statistical significance among the four indicators. Living conditions, employment/income, criminal history and many of the mental/physical health variables were not significant when determining subgroups within the model. Model fit was assessed by the chi-squared likelihood ratio (L^2) p-value $\geq$.05, and based on the assumption that the L^2 statistic follows a chi-squared distribution. The L^2 statistic should not be substantially larger than the degrees of freedom. The L^2 statistic is useful in determining the amount of association among variables that remains unexplained in the model; the lower the value, the better the fit of the model to the data. Along with analyzing the L^2 statistic, two parsimony indices were used were smaller values correspond to more parsimonious models. Using these criteria, and considering the least number of parameters, Model-2 (L^2 = 113.78, p = .05, BIC = 5053.14, AIC = 4980.78, and Npar = 16) and Model-3 (L^2 = 82.40, p = .53,

BIC = 5067.41, AIC = 4963.40 and Npar = 23) appear to be appropriate for further analyses (Table 4.10).

Profile of Variables

A Wald Test p-value less than .05 was used to determine if all four variables contribute in a significant way towards the ability to discriminate between the two models. In the following model summary all four variables significantly contribute to the prediction of each model as shown in Table 4.11, except for alcohol use in Model-2. In Model-2, alcohol use was not significant (Wald = 4.69, p = .096), illegal drug use was significant (Wald =11.45, p = .0033), serious depression was significant (Wald = 4.21 p = .040) and education was significant (Wald = 7.82, p = .005). In Model-3, alcohol use was significant (Wald = 11.36, p = .023), illegal drug use was significant (Wald =22.70, p = .0001), serious depression was significant (Wald = 8.61 p = .013) and education was significant (Wald = 8.47, p = .014).

In an attempt to conclude which model best fits the data, a re-assessment of Model-2 and Model-3, using a bootstrap for L^2, was analyzed to provide a precise estimate by relaxing the assumption that the L^2 statistic follows a chi-square distribution (Table 4.12). A repeated re-estimation of parameters resulting from the bootstrap statistic indicates the earlier estimates of L^2 p-value were somewhat overstated for both models. Model-2 (p = .008, S.E. = .004) shows a statistically significant difference between what the model is predicting and what the data are doing. The bootstrap statistic for Model-3 (p= .23, S.E. = .018) used to determine goodness-of-fit, concludes that the model fits the data.

Bivariate Residuals (BRV)

In addition to the previous measures of model fit, another step taken to determine the best model for the data is an analysis of the bivariate residuals (BVR). The BVR assesses the extent to which the 2-way association(s) between any pair of variables is explained by the model. If the model is true, BVRs should not be substantially larger than 1 and a BVR larger than 2.4 is considered unacceptable (Vermunt & Magidson, 2000). As shown in Table 4.13, Model-2 had two BVR values larger than one (education/ illegal

Table 4.10 Model Summary

Model Name	BIC (LL)	AIC (LL)	Npar	L^2	df	*p*-value
Model-1	5089.78	5049.08	9	196.083	98	0.001
Model-2	5053.14	4980.78	16	113.785	91	0.053
Model-3	5067.41	4963.40	23	82.404	84	0.53
Model-4	5106.47	4966.40	30	75.804	77	0.51

Table 4.11 Variable Profile

Variable	Wald Test	*p*-value	R^2	(%)
Alcohol Use				
Model-2	4.69	.096	.2978	(30%)
Model-3	11.356	.023	.4219	(42%)
Illegal Drug Use				
Model-2	11.45	.0033	.1123	(11.2)
Model-3	22.696	.0001	.2376	(24%)
Serious Depression				
Model-2	7.822	.005	.0230	(2.3%)
Model-3	8.612	.013	.0258	(2.6%)
Education				
Model-2	4.214	.040	.0120	(1.2%)
Model-3	8.470	.014	.0258	(2.6%)

Table 4.12 Results from the Bootstrap L^2

Model Name	Npar	L^2	df	p-value	Bootstrap p-value	S.E.
Model-2	16	113.785	91	0.053	.008	.0040
Model-3	23	82.404	84	0.53	.233	.0188

Table 4.13

Bivariate Residuals

Model Name	Alcohol Use	Illegal Drug Use	Education	Serious Depression
Model-2				
Alcohol Use				
Illegal Drug Use	5.572			
Education	.2687	1.869		
Serious Depression	.7083	.8039	.9359	
Model-3				
Alcohol Use				
Illegal Drug Use	.0239			
Education	.7027	.3157		
Serious Depression	.1995	.4920	1.3920	

drug and alcohol/illegal drug) and Model-3 had one (serious depression/education). Model-2 did have an unacceptable BVR = 5.572 in the 2-way association between alcohol and illegal drug, indicating the relationship fails to adequately explain the two class model in terms of substance use among the participants.

Based on the previous statistical analyses, Model-3 represents a more parsimonious model based on a lower AIC, a bootstrap statistic that suggests there is no difference between what the model is predicting and what the data are doing and acceptable BVRs for all indicators. Model-3 also provides additional insight as to the relationship between the type of substance use and the other study indicators.

Subgroup Classifications

To answer the research question pertaining to the size and nature of the three subgroups under Model-3, an analysis of conditional probabilities and probability means were examined. In Table 4.14, a within group profile is used to illustrate the differences in response patterns between the three subgroups. An overview of the analyses shows subgroup 1 contains 41% (or 279) of the cases, subgroup 2 contains 33% (or 224 cases) and the remaining 26% (or 177 cases) are in subgroup 3. Subgroup 1 reported frequent use of alcohol and illegal drugs, most likely to attend some college and experienced less

Table 4.14 Within Subgroup Profile Model-3

	Subgroup 1(%)	Subgroup 2 (%)	Subgroup 3 (%)
Group Size (%)	40.59 %	33.11%	26.30%
Alcohol Use			
No Use	13.59	92.66	61.43
≤ 15 days	74.30	6.94	2.96
≥ 16 days	12.11	.40	35.61
Illegal Drug Use			
No Use	20.78	57.54	35.84
≤ 15 days	66.12	41.77	1.36
≥ 16 days	13.10	.69	62.80
Serious Depression			
No Depression	85.96	71.33	72.77
≤ 15 days	2.78	9.60	8.79
≥ 16 days	11.26	19.70	18.44
Education Levels			
Grades 1-8	10.90	20.98	14.36
Grades 9-12	56.41	60.02	58.81
Some College	31.84	18.72	26.27
Some Graduate	.86	.28	.56

depression during the last 30 days prior to treatment. Subgroup 2, reported the least use of alcohol and illegal drugs, less education and a slightly higher experience with depression. Subgroup 3, reported heavy use of both alcohol and illegal drugs, with varied educational levels and moderate depression when compared to the other two groups.

Subgroup Profiles

Figure 4.1 provides an overview of Model-3 in relations to the four indicators. The two substance use categories (alcohol and illegal drugs) represent the largest difference. Subgroup 1 appears to have more education than the other two groups, while subgroup 2 indicates higher levels of depression. In Table 4.15, probability means are computed using Bayes theorem and are a function of the model's parameters (estimated conditional response probabilities and estimated prevalence of each latent class). Each case is assigned to the latent class for which it has the highest (Bayesian) probability of membership. In subgroup 1, individuals have over a 90% probability of reporting 1-15 days of alcohol use, a 65% probability of reporting 1-15 days of illegal drug use, a 50% probability of having some college and a 45% probability of reporting no depression in the last 30 days prior to treatment. The probability means support study findings that suggests individuals reporting frequent substance use in the last 30 days are more likely to be in group 1 and individuals reporting heavy substance use are more likely to be in group 3, while those reporting no substance use are most likely to be placed in group 2.

Model Definition

The best fitting statistical model in the latent class analysis was one in which the overall sample was composed of three (3) subgroups. Model-3 including alcohol use, illegal drug use, education level and serious depression was identified as best fitting the data. It yielded a lower AIC, goodness of fit statistics that support the model predicts what the data are doing, acceptable BVRs and provided the simplest solution that sufficiently distinguished groups to permit theoretically meaningfully interpretations. The three-class model is best defined in conditional probability terms for the four indicators items, with substance use being the identifying attributes that stand out for each class. The largest group, Subgroup 1, composed of high probabilities to be frequent substance

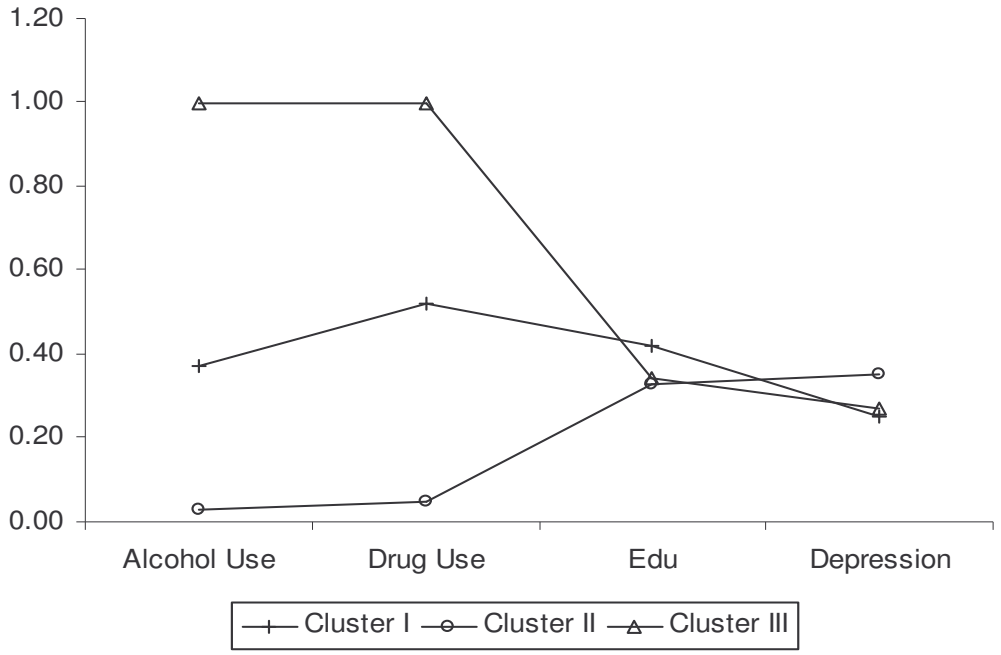

Figure 4.1 Profile Plot Model-3

Table 4.15 Across Group Probability Means for Model-3

	Subgroup 1	Subgroup 2	Subgroup 3
Alcohol Use			
No Use	10%	59%	31%
≤ 15 days	91%	7%	2%
≥ 16 days	34%	1%	65%
Illegal Drug Use			
No Use	23%	52%	25%
≤ 15 days	65%	34%	1%
≥ 16 days	24%	1%	75%
Serious Depression			
No Depression	45%	30%	25%
≤ 15 days	22%	45%	33%
≥ 16 days	25%	42%	33%
Education Levels			
Grades 1-8	28%	48%	24%
Grades 9-12	39%	33%	28%
Some College	50%	26%	24%
Some Graduate	34%	1%	65%

*across group response patterns

users with less reported depression. In comparison, Subgroup 3 composed of high probabilities to be heavy substance users with varying degrees of depression, whereas Subgroup 2 had high probabilities of reporting no substance use, but high probability of experiencing serious depression within the past 30 days. As shown in Figure 4.2 Model-3 is best described as, Subgroup 1 being *"frequent users/low depression/well educated"*, Subgroup 2 *"low-users/high depression/less educated"* and Subgroup 3 as *"heavy users/moderate depression/educated"*. In Figure 1 and Table 4.15, the 3 subgroups appear to indicate that substance use is not necessarily a predictor for depression or a lack of education. The opposite is true for the following model, with subgroup 2 reporting the least substance use and education while reporting experiencing more days of serious depression during the last 30 days.

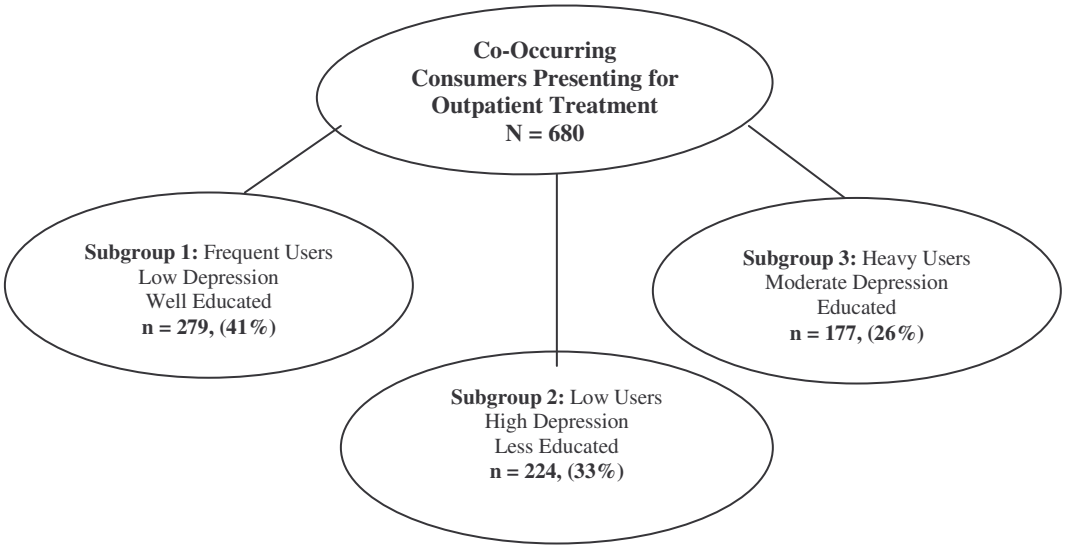

Figure 4.2 Model-3

CHAPTER V

SUMMARY AND DISCUSSION

Introduction

The purpose of this investigation was to answer the primary research questions, "*Do distinct homogeneous subgroups exist in a sample of individuals with co-occurring disorders presenting for outpatient treatment and if so, how many"* and "*How well does the model fit the data?"* The results of the study suggest a parsimonious model that supports the existence of three subgroups within the sample. The long-term research goal embedded in this initial investigation is to gather empirical evidence that homogeneous groups exist within the population diagnosed with co-occurring disorders. The current research introduces an exploratory design in which to determine if homogeneous subgroups based on latent variables, instead of predetermined indicators, exist. Direct empirical evidence, supporting the existence as to whether homogeneous subgroups, will significantly improve the usefulness and meaningfulness of group membership as we research on antecedents, outcomes, and evidence-based treatment programs continues.

The secondary research questions, "*What are the size and nature of the subgroups?"* and *"What are the psychosocial variables associated with the subgroups*?" are answered and discussed in the following section. As shown in previous literature and research, frequency of substance use and mental health problems are important indicators for diagnosing and treatment planning for co-occurring disorders (Mueser, et al. 1990, 1992; Reiger et al. 1990; Lehman et al. 1994; Mueser et al. 2000). In the current study substance use and depression are both used, along with education, to describe membership characteristics within each latent subgroup. This chapter presents a summary and discussion of the study's results for each of the research questions, a consideration of the study implications of the findings, study limitations, and recommended future directions involving the importance of empirically based co-occurring subgroups.

Model Prediction

To answer the primary research questions, multiple statistical tests and recoding of the data were required to determine if subgroups existed, and if so, how many subgroups would make up the most parsimonious model. A goodness-of-fit statistic, alternative goodness-of-fit index BIC, number of parameters, conditional bootstrap statistic an examination of the bivariate residuals were all employed to answer the primary research questions. Goals of latent class analysis are to determine significance of indicators within each subgroup, test how well the proposed models explain the data and analysis the smallest number of latent classes that adequately describes the association among indicators.

Current research findings are consistent with Ries and Miller (1993), Lehman et al, (1994), and Luke's (1996) assertion that substance use and mental health are important indicators in a systematic approach for classifying subgroups within the context of co-occurring disorders. Results of substance use, reported in the current study, support earlier research findings that alcohol is the most common type of substance reported. Study participants differed from those in other study settings, in that cocaine use was the second highest reported substance instead of marijuana and women reported higher use of cocaine than men. In part this could be attributed to the recent increase in crack-cocaine. According to the Tennessee Drug Threat Assessment Report (May 2002) cocaine use in the state of Tennessee rose over 30% since 1997 to 2000. Another unexpected finding was the relationship between alcohol use and age. These results suggest that the curvilinear relationship between alcohol use and age, that higher alcohol use occurs among younger and older age brackets, is less likely to occur with an outpatient population when compared to an inpatient population (Mueser et al., 1992, 1997, 2001).

Comparing the current 3-Class Latent Model with previous models, several considerations must be made before discussion. Most comparative studies have been conducted on inpatient populations limited to the Northeast region of the United States and in treatment settings ranging from psychiatric hospitals, Veterans Administration, hospital based residential programs, therapeutic environments, jails/prisons, homeless

shelters, and few have been conducted on outpatient populations. Ries and Miller's (1993) 4-Cell Model, later revised by NASMPHD & NASADAD (1999) is the conceptual framework for delineating subgroups within the co-occurring population. The 4-Cell Model has four quadrants based on severity of psychiatric symptomology and substance use. Each quadrant is based on problem severity that implies a continuum from less severe to more severe psychiatric and substance disorders. The assumption of the model suggest individuals seeking outpatient services are more likely to score lower on psychiatric symptomology and substance use than individuals presenting for inpatient treatment programs. The current 3-Class Latent Model differs from the 4-Cell Model, in that the lowest cell in Ries and Miller's model (Quadrant I) *'less severe mental disorder/less severe substance use disorder"* is not represented in the current model. Individuals in this classification, under Ries' model, have yet to seek treatment for their co-occurring disorder. Another difference between the two models suggest individuals in class 2 of the 3-Class Model were more likely to report higher levels of serious depression when compared to Ries' comparable class (Quadrant 2).

An essential step in latent class analysis is to determine if there is local independence between latent variables. Latent variables represent response patterns within each class or subgroup. For local independence to occur, all latent variables must be independent within and across all groups. Local dependence occurs when indicators and not independent, causing an overlap between response patterns and thereby effecting the latent variables to become dependent. The original research design included variables on anxiety, lack of concentration, hallucinations, controlling a violent temper, suicidal thoughts and side effects associated with prescription medication. Each indicator, independent of the other, was deemed insignificant in determining model prediction. Several attempts were made to combine some/all of the indicators into one variable measuring mental health, but all results ended in a non-significant p-value. This can also be said for other indicators including arrest, days spent in jail, housing, employment, family support and income. The insignificant variables violated the assumption of latent class analysis, in that they were not independent within or across each class and were eliminated from the analysis.

As seen in previous studies on co-occurring disorders, the consensus among researchers suggests multiple indicators are needed to best describe existing subgroups within the population. However, few researchers agree on which variables are most important, and in what setting. By assigning individuals to predetermined diagnostic subgroups, based on service patterns (Kessler, et al. 1999), or by defining their main substance of use (Miles, et al. 20030), functional abilities (Luke et al. 1996), diagnosis (Lehman, et al. 1994) or by examining the relationship between consumer characteristics and their lifetime substance use, researchers fail to look for patterns that may occur naturally and overlook unexpected or potentially meaningful results. The lack of direct empirical research on the heterogeneity of co-occurring disorders not only interferes with a deeper understanding of the population but can lead to inaccurate assumptions. Taking into account only four indicators were identified as significant in predicting a parsimonious model for the current study, the question of which indicators may be more important in the early stages of exploration rather than the actual number of variables to be studied. An empirical approach to identify latent homogeneous subgroups, instead of relying on arbitrarily structured or predetermined subgroups, will provide a systematic method in which researchers can test assumptions, determine the most important indicators for different treatment settings and begin to replicate research findings for the purpose of evidenced-based programs.

Subgroup (Class) Membership

To answer the study's secondary research questions on the nature and correlates associated with subgroup membership, a recap of the subgroups is presented. The model identified in the study supported three classes: Class I *"frequent users/low depression/well educated"*, Class 2 *"low-users/high depression/less educated"* and Class 3 as *"heavy users/moderate depression/educated"* (Figure 1). Differences between membership characteristics among the three classes support the research's secondary hypothesis that distinct subgroups exist among adults with co-occurring disorders presenting for outpatient treatment. Most significant, are the findings that corroborate

existing research that substance use and mental health are primary indicators when describing the population (Ries et al., 1993; Lehman et al., 1994; Luke et al., 1996). In the current study similar classifications are made based on substance use and level of depression. It is important to note the depression indicator was the only mental health indicator in the current study deemed significant, all other indicators measuring mental health were considered insignificant (≤ .5) in predicting a model. This suggests there may not be enough information collected on the mental health indicators to reliably distinguish membership between subgroups based on levels on mental health symptomology. To a larger extent, the high levels of missing data (above 50%) for the mental health indicator limits the study's ability to explain relationships and make inferences between and among the subgroups.

Overall study findings, based on available data, on group membership suggests a strong association between the use of alcohol, and illegal drugs in all three subgroups. Individuals reporting alcohol use, 30 days prior to presenting for treatment, were more likely to report similar use of illegal drugs for the same time period. Frequent users reporting ≤ 15 days of alcohol use, were more likely to report using illegal drugs for ≤ 15 days. Heavy users followed the same pattern of reporting heavy use (≥16 days) for both alcohol and illegal drugs. A similar response pattern is also true for participants reporting low substance use (subgroup 2) for both alcohol and illegal drugs. An alarming finding of the substance use analysis is illegal drug use is more likely to be reported in subgroup 2, among low users, than the use of alcohol.

When examining depression and how it relates to substance use/frequency of use, results indicate that participants reported their substance use indiscriminately. Frequent users (≤ 15 days) were likely to be bothered by serious depression (47%) the least among the three groups, while the heaviest users (≥16 days) were likely to report only moderate disturbance with serious depression (66%). The unexpected findings of the analysis between substance use and depression, was the high likelihood (87%) of group 2 (low users) on reporting being bothered by serious depression during the last the 30 days. The differences between the subgroups use of substance and depression indicate a trend that substance use is secondary to serious depression. The finding provides ancillary evidence

that a common misconception exist among service providers that consumers with co-occurring disorders tend to self-medicate their psychiatric symptoms. These findings give credence to the theory that consumers are more likely to use substances to alleviate emotional feelings, but not to self-medicate symptoms of psychiatric symptoms such as serious depression (Minkoff, 2001; Mueser et al., 1998). The results of this analysis imply that substance abuse programs can be an important first contact in primary prevention and treatment of mental disorder symptomology. These results contribute to the current body of literature that all consumers who present for treatment with either disorder should include screening and assessment for co-occurring disorders.

Additional descriptive statistics conducted on education and substance use suggest individuals with higher levels of education are more likely to report substance use in the past 30 days when presenting for treatment. Participants obtaining some college were more likely to report alcohol use (54%) when compared to those receiving $\leq 8^{th}$ grade educations (40%) or participants receiving a 9th -12th (47%). Individuals reporting a 9 -12th grade education were more likely to report illegal drug use for the same period. Interestingly, individuals with $\leq 8^{th}$ grade educations were more likely to report using alcohol $\geq$ 16 days within the past 30 days but are less likely to report serious depression.

In summary, study results extend knowledge about individuals with co-occurring disorders who are entering an outpatient program while also presenting support to the hypotheses that homogenous groups exist in the sample. Overall findings suggest group membership is consistent with the general assumptions that substance abuse and mental health are important determinates that should be considered when exploring the heterogeneity of co-occurring disorders (Minkoff, 2001; NASMPHD & NASADAD, 1999). Missing information and the assumptions surrounding the missing data on mental health problems 30 days prior to presenting for treatment, may suggest that the prevalence of probable mental health disorders among consumers entering outpatient co-occurring programs have yet to manifest.

Clinical Significance

The clinical significance of this study focus' on acknowledging the uniqueness of this population and our clinical responsibility in knowing consumers as persons. The multifaceted complexity of co-occurring disorders and an individual's response to these disorders demands tailored interventions to meet their diverse needs. Implicit in this exploration of heterogeneity is also an expectation of an optimal level of care. This study seeks to provide a theoretical justification for the need to better understand the population through the use of innovative methodological approaches.

The current study begins to dispel the notion that the population is *best* described in terms of a hierarchical structure denoted by an increase in problem severity or symptomology (Ries et al., 1993; NASMHPD & NASADAD, 1999; Lehman et at., 1994; Lehman, et al., 2000; Luke et al., 1996; Mueser et al., 2000; Mueser et al., 2001). The hypothesis supporting a hierarchical order in co-occurring disorders is not supported with these findings, specifically as it relates to increased substance use and mental health problems. With regard to appropriately diagnosing co-occurring disorders, it is premature to propose a substitution for the current diagnostic approach; but as Lehman (2000) suggested, "*Do certain patterns of co-occurrence pose especially high risk for misdiagnosis?* If so, would we not begin to look closer at individuals presenting for the first time to an outpatient program. Likewise, these consumers may engage in outpatient treatment settings more easily, even though their focus may be only on their substance use. This in mind, outpatient service providers should be cognizant of the potential misdiagnoses and underreporting of mental illnesses among this population.

The clinical findings suggests, to a large extent, participants in the study did not answer questions pertaining to mental health problems, other than serious depression, or treatment services received within the last 30 days. These omissions could be interpreted as "not applicable" answers that may suggest that consumers presenting at an outpatient program currently suffer less from psychological disturbances than their substance use. Additionally, consumers seeking outpatient programs with less severe co-occurring disorders may present to programs they assume to be more focused on substance abuse treatment, rather than mental health treatment. Regardless, all consumers entering the

outpatient program in this study reported a lifetime of either substance abuse or mental health problems.

Another plausible explanation for the large missing data for mental health, may exit within the less definitive "co-occurring" term itself. In considering the results from this outpatient population and their limited responses to being "bothered" by symptoms commonly associated with mental illnesses, they present as less clear candidates for co-occurring disorders. More importantly, how can we be sure the sample was representative of individuals with co-occurring disorders? There is no disputing literature that indicates mentally ill consumers are at high risk for substance abuse and substance abusers are at high risk for mental illness (Lehman et al., 2000; Mueser et al., 2000; Drake et al., 2001; Minkoff et al., 2003), but when does the risk become an appropriate diagnoses for a co-occurring disorder? The current findings support literature suggesting that a thorough assessment be given at baseline and continued over treatment because the various combinations of these disorders manifest differently over time (Drake, et al., 2001). At times symptoms can overlap, interact, and even mask each other making early diagnosis difficult. The study sample did receive a thorough assessment at baseline and a diagnosis of co-occurring disorder was given to all participants prior to treatment.

An important clinical implication resulting from the study, regardless of reported symptoms, is the need to conduct routine assessments for all consumers to accurately determine diagnosis and treatment. Initial assessments are often presumptive because neither disorder may be present at baseline or the consumer is in a state of decompensation causing self-report to be less reliable. Similarly, the presence of one disorder should not preclude treatment for the other. Moreover, multiple screening tools for both substance abuse and mental health problems should be included in the initial and subsequent assessments.

Despite the limited empirical data available on the heterogeneity and integrated treatment interventions for co-occurring disorders, both approaches offer a wide range of strategies from which to explore predictive treatment models. To be able to provide consumers with optimal care for both disorders, we need to develop a means of characterizing the heterogeneous nature of the population before we can predict treatment

models with tailored interventions. The current 3-Class Model suggest 3 separate locus of care strategies associated with integrated care. In subgroup 1 (*frequent users/low depression/well educated)*, respondents might best benefit from individual or group intervention outcomes focused on limiting use (harm reduction), family counseling, prevention, education and motivational interviewing and/or brief intervention therapy. Group 2 (*low-users/high depression/less educated)* respondents should receive an in-depth psychiatric evaluation as part of their initial assessment to determine the need for a psychopharmacologic treatment regime. Psychiatric stabilization will be essential to their engagement and retention in an outpatient program. Consumers in group 2 will most likely benefit from a more individualized treatment program of case management, individual therapy, a longer period of continuing care, frequent assessments and screening for problem symptomology, psychosocial functioning and substance use. The third group (*heavy users/moderate depression/educated)* may benefit most from a comprehensive integrated treatment approach utilizing stage-specific interventions. Stage specific interventions personalized to meet the consumer's willingness to change. Group 3 respondents should be engaged in on-going active treatment (utilizing various integrated treatment components mentioned above), as well as including multiple support groups for recovery, rehabilitation and relapse prevention.

Study Implications

The current study offers a new way at looking at data to define groups within a population by using a probabilistic model approach that allows patterns of association to emerge. Exploring data structure instead of artificially constructing it, we gain a deeper understanding of the unobservable nuances of a population. Past studies have overlooked the concurrent and predictive validity of parameters on group structure, rendering their findings questionable. In a latent class analysis, the first step is to conduct a significance test on indicators (Table 4.7). Determining their significance in a multivariate data set allows the researcher to make important assumptions about subgroup membership characteristics.

Given the exploratory nature of latent class analysis and the need to identify underlying psychosocial factors that govern overt behaviors, social researchers should re-evaluate their current statistical methods. Earlier observational studies on the heterogeneity of co-occurring disorders restricted our ability to fully explore unobserved variables, potentially overstating associations, bias observation towards the null, and underestimate dependency between indicators. Latent class analysis is a robust and powerful tool to approach classification techniques and modeling. Moreover, latent class analysis does not presuppose normal distributions, linear relationships or continuous/interval measurement levels like other methodologies. Needless to say, latent class analysis has some practical problems, addressed under study limitations, but the possibilities offered add theoretical value to systematic research approaches.

The premise of this model suggests subgroups within an outpatient treatment setting can be distinctly different and such differences can be used to develop meaningful and effective treatment programs. An integrated care treatment approach has shown advances and success in treating this complex population through a host of therapeutic strategies. By identifying homogeneous subgroups within the population and matching these subgroups to appropriate elements of integrated care, in theory, provides new research opportunities to explore predictive modeling. Clinical benefits in predictive modeling facilitate evidence-based programs and promote delivery and access to effective services. This research to practice approach translates, not only into therapeutic relevance by providing appropriate care, but for prevention, diagnosing, and long-term care management.

Argued earlier in this paper, co-occurring disorders are best described in chronic illness terms. Disease management is a promising managed care strategy that has empirical evidence of improving care and reducing cost associated with chronic illnesses (Kongstvedt, (1996). The need to identify co-occurring subgroups that hold therapeutic relevance is the same framework instituted by the medical field and implemented under the clinical strategy of disease management. Healthcare service providers understand the need to implement and improve treatment settings based on long-term stabilization. Ideally, treatment intensity is dictated by problem severity and at a lesser degree trained

staff and local treatment resources. The latter is “the” reality for individuals diagnosed with co-occurring disorders. Consequently, attempting to provide appropriate care is the primary aim among co-occurring service providers, but the complexity of the population makes it difficult for providers to be responsive to their unique service needs. Classification schemes and prospective long-term care plans have positive implications for both the consumer and the provider. From a conceptual viewpoint the more healthcare providers can differentiate among consumers, the less dependent they become on diagnosis and more focused on treatment.

Identifying mutually exclusive subgroups, like those found in managed care, is based on the premise that the level of resources necessary for delivering quality of care is directly correlated with knowing and understanding the multiple domains of an illness/disease. With the acceleration of managed care strategies into the public sector, behavioral programs will be expected to impose stricter organization, controls, quality measurement and accountability on the delivery of services. Through research, similar to the current study, empirical data is needed to better understand and serve complex populations. As in managed care, behavioral healthcare must show quality and effectiveness of care delivered by programs through the use of clinical outcome measures, define a common system of cost accounting for both disorders and monitor data carefully to emphasis collaboration and not cost shifting. Behavioral medicine providers have been remiss in implementing research findings into practice and creating evidence-based programs and outcomes for the co-occurring population (SAMHSA, 2000). Without collaborative commitment between researchers and practitioners little will change in healthcare policy as it relates to co-occurring disorders. More importantly, success for behavioral providers not only relies on improved communications between practitioner and researcher, but systems management infrastructures are needed to implement and monitor evidence-based programs. Managed care initiatives may continue to be debated on its strengths and weaknesses, but little debate is required over the success of its systems integration capabilities. Current behavioral health systems consider systems integration as a composite of interagency referral patterns, information sharing and funding relationships instead of advance technology.

In terms of healthcare policy, behavioral health providers are unprepared to meet the challenges of implementing and managing evidence-based programs demanded by government funding agencies (SAMHSA, 2000). Co-occurring service providers have focused much of their time on meeting the wide range of social and rehabilitative support service needs of the public sector and less on infrastructure, access and prevention. The time is here to shore up support among the medical field and policy makers to create available funding to build sound infrastructures for the nation's behavioral healthcare system. Behavioral service providers need to work closely with the National Council for Community Behavioral Healthcare on developing proactive legislation to address prevention as well as expand treatment dollars for co-occurring disorders. Prevention policies must become standard in behavioral healthcare with an emphasis on promoting wellness rather than treating the illness associated with mental and substance abuse disorders. Another policy area of contention is the Mental Health Parity Act of 2007, which recently passed in the Congress. The Act has made great strides since its conception in 1996, but falls short of mandating group health plans to provide mental health and substance abuse treatment to their insured. Instead health plans that choose to offer mental health and substance abuse treatment are required to offer *only* parity. The contentious piece of the parity debate is fueled by private payers such as insurance companies and large self-insured companies insisting that behavioral health organizations have not produced evidence-based data relating to the effectiveness of their programs, in particular outpatient programs (Barry, 2006).

Study Limitations

The central limitation of the study is the archival data are collected for reasons other than for the present research objectives. The primary objective in collecting the original data, over a one-year period at three separate intervals, was to determine the effectiveness of an outpatient program and not to determine if homogeneous subgroups existed in the sample. Regarding the original data collected by means of the GPRA, several challenges were presented early in the modeling process that resulted in the elimination of multiple indicators. Latent class analysis can handle multivariate

(categorical/ordinal) data easily but less so if there are a large number of response patterns causing sparse frequency tables. Sparseness takes place when there are a large number of indicators and each indicator has multiple response categories. The problem occurs when there are large scale response patterns (trends) among the variables, causing the data to appear sparse in meaningful information.

The most important limitations to the study was the exclusion of all, but one, mental health indicator due to missing information (68%) and the manipulation of the data to determine a model. It can be said that different decisions in the handling of the missing data and preparation of the variables necessary for estimating a model, would have resulted in a different model. This suggest when observed data are incomplete, the missing data can add uncertainty to group membership and the overall model. It also suggests that research bias enters into the recoding and recomputing of variables. Furthermore, it is possible that the current model understates the prevalence of mental health symptoms and may fall short of accurately explaining the relationship among multiple variables in the sample of individuals with co-occurring disorders entering an outpatient program.

Local independence is a basic assumption in latent class analysis that all study (observed) variables are independent within each latent class. Local independence implies the latent variable (unique response pattern) fully accounts for the association between the observed and expected variables. A simple Wald statistic can be used to identify if an indicator is significant in determining the model. Essentially, insignificant variables lead to local dependence and render the model meaningless. To identify which variables are dependent upon each other, the researcher must manually explore all insignificant variables through a trial and error process. The process involves starting with a basic assumption as to which variables are dependent and which ones are most important to the overall model. When dependency is determined, joint variables are created to re-estimate the model. Concerns with this process include the heuristic nature of determining dependency; secondly, there are no criteria for making the trade-off between creating joint variables to eliminate insignificant and/or dependent variables

which may increase the noise within a latent variable versus completely eliminating the insignificant variables from the potential model (Huang, 2005).

Local maxima is a major concern that needs to be considered anytime an optimization technique sets out to find the global maxima or the best fit of a model to the data. Local maxima are a numerical procedure that provides optimal performance in producing a model by taking into consideration only a portion of the data at a given staring point. To find the best fit, the EM algorithm continually searches for the best "global" fit by using an iteration process with different starting values. Using different starting values can lead to unstable or inconsistent modeling results. A technical option, not necessarily a solution, is to generate a larger set of random starting values (iteration) and compare the results of each starting value. If the results converge, it is likely global maxima has been obtained. If results continue to be unstable, there is strong likelihood the data table holds a large number of relatively low frequency counts (sparseness). In the event of sparseness, the system assigns a non-probability value of zero to parameters. Identifying the parameters that have no probability value can be a lengthy exploration. When identified they can be removed but with some cost. In a probabilistic environment, like latent class analysis, removing parameters considered to be erroneous can potentially change the scalability of the data and the model outcome. The best solution is to identify steps that minimize the possibility of local maxima (data sparseness) occurring (Vermunt et al., 2000; Huang, 2005,).

Future Directions

The central recommendation is to move rapidly to exploratory analysis to identify and understand homogeneous subgroups within the co-occurring population in order to facilitate the development of subgroup specific evidence-based interventions and their adoption into treatment programs. It is time to move away from "mere description" of heterogeneity in narrow or arbitrarily structured terms and toward rigorous scientific exploration. More critically, latent class analysis provides a new and relatively flexible methodological approach that contributes in identifying empirically defined subgroups. Latent class analysis is an emerging model-based clustering approach in psychosocial

analysis of categorical and/or ordinal data without imposing a priori assumption of grouping variables or number of groups. Researchers along with practitioners should work collaboratively to develop and incorporate shared decision-making standards when using cluster-based modeling approaches. When decision-making standards are adopted and systematically implemented and subgroups are well-defined, new research questions should focus on how best to use these groups for treatment planning, creating care management and evidence-based programs.

Meanwhile, additional latent class analysis research needs to include multi-site studies conducted in various treatment settings among a variety of co-occurring populations, and gender based studies. In future LCA research, researchers must understand the potential barriers associated with missing data, local dependence, local maxima and insignificant indicators in order to appropriately guide future studies. In utilizing archival data, the researcher must put emphasis on item quality to ensure accurate and unbiased estimates of the latent class model parameters. In addition, tremendous progress has been achieved in the recognition and treatment of co-occurring disorders but additional research topics should include the need to better understand the trajectory of the illness from socio-environmental and other non-biological factors as well as psychosocial.

From a systems perspective, behavioral healthcare providers under the current bifurcated delivery system are not providing the necessary link between the use of services and illness control and outcomes. Behavioral health systems continue to function under an acute care model when treating chronic illnesses like co-occurring disorders. A fundamental directional change needs to occur within the delivery system to adopt strategies that have proven successful under managed care. Priorities include implementing a long-term care perspective, building strong infrastructures to support the technology and outcome demands of evidence-based programs, rigorous and systematic research standards and advocacy efforts to support local and federal funding for integrated treatment practices at all levels. Consequently, adopting certain tenets of managed care initiatives must also encompass the systems mission, philosophy, governance, and quality management with regard behavioral medicine.

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APPENDICES

APPENDIX A

FOUR GENERAL MODELS OF CO-OCCURRING DISORDERS

Table A.1

Four General Models of Co-occurring Disorders. (Anthony, 1991; Kosten & Ziedonis, 1997; Kushner & Mueser, 1993; Weiss & Collins, 1992) (See Appendix A).

Model	Description and Examples
Common Factor	High rates of co-morbidity are the result of risk factors shared across both severe mental illness and substance abuse disorders
Secondary Substance Abuse Disorder	Severe mental illness increases a person's chances of developing a substance abuse disorder
Secondary Mental & Psychiatric Disorder	Substance abuse precipitates severe mental illness in people who would not otherwise develop a severe mental illness.
Bi-directional	Either severe mental illness or substance abuse disorders can increase a person's vulnerability to developing the other disorder.

APPENDIX B

SAMHSA, MANAGED CARE INITATIVES FOR CO-OCCURRING DISORDERS

Table B.1

SAMHSA, Managed Care Initiatives for Co-Occurring Disorders

Initiatives	Strategies
Policy	Emphasize the importance of co-occurring disorders as a national policy. Develop standard language on co-occurring disorders. Stimulate system collaborations at the State level. Convene federal stakeholders to establish a research agenda.
Prevention	Develop a national strategy on prevention Incorporate drug prevention and education efforts in all service programs. Consumer assessments should include determination of family histories
Assess	Promote integration of mental health and substance abuse treatment services. Promote and train multidisciplinary team. Provide relative and sensitive treatments across culture, ethnicity, and gender. Develop and maintain a long-term perspective to treatment.
Quality	Foster professional education on co-occurring disorders. Refine assessment and identification of co-occurring measurement tools. Foster treatment specificity, flexible and individualized treatment plans
Evaluation	Develop relapse and maintenance criterion as inherent in co-occurring disorders. Recognize that principles and best practices should change with new knowledge.

APPENDIX C

THE NATIONAL ASSOCIATION OF STATE MENTAL HEALTH PROGRAM DIRECTORS' AND NATIONAL ASSOCIATION OF STATE ALCOHOL AND DRUG ABUSE DIRECTOR'S MODEL OF THE UNIVERSE OF CO-OCCURRING DISORDERS

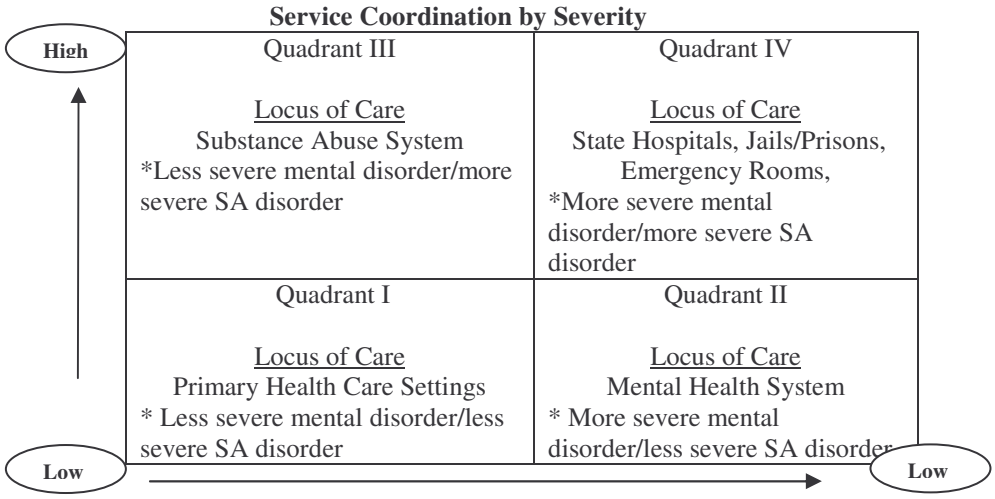

Figure C.1

The National Association of State Mental Health Program Directors' and National Association of State Alcohol and Drug Abuse Directors' Model of the Universe of Co-Occurring Disorders.

APPENDIX D

LEHMAN'S SUBGROUPS (1994)

Table D.1

Lehman's Subgroups (1994)

Subgroups	Lehman's 10 Subgroup Definitions	n=
Group I	Definite dual diagnosis; current.	109
Group II	Possible dual diagnosis; current.	71
Group III	Substance induced organic; current.	74
Group IV	Definite dual diagnosis: not current.	78
Group V	Independent mental disorder: current.	89
Group VI	Substance abuse disorder only, current.	40
		N = 461
Group VII	Substance-induced organic mental disorder, past.	6
Group VIII	Independent mental disorder only, past.	0
Group IX	Substance abuse disorder only, past.	1
Group X	No disorder.	0

APPENDIX E

LEHMAN'S CLUSTER GROUPS
(DSM-IV Diagnostic Groupings)

Table E.1

Lehman's Cluster Groups. (DSM-IV Diagnostic Groupings)

DSM-IV Diagnosis Groupings	
Cluster A	Paranoid, schizoid, and schizotypal personality disorders.
Cluster B	Anti-social, borderline, histrionic, narcissistic personality disorders
Cluster C	avoidant, dependent, obsessive-compulsive, & passive-aggressive personality disorders and personality disorders not otherwise specified.

APPENDIX F

CSAT GPRA CLIENT OUTCOME MEASURES FOR DISCRETIONARY PROGRAMS

Form Approved
OMB No. 0930-0208
Expiration Date 12/31/2005

CSAT GPRA Client Outcome Measures for Discretionary Programs

Public reporting burden for this collection of information is estimated to average 20 minutes per response if all items are asked of a client/participant; to the extent that providers already obtain much of this information as part of their ongoing client/participant intake or followup, less time will be required. Send comments regarding this burden estimate or any other aspect of this collection of information to SAMHSA Reports Clearance Officer, Room 16-105, 5600 Fishers Lane, Rockville, MD 20857. An agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The control number for this project is 0930-0208.

A. RECORD MANAGEMENT

Client ID |____|____|____|____|____|____|____|____|____|____|____|

Contract/Grant ID |____|____|____|____|____|____|____|____|____|____|

Grant Year |____|____|____|____|
Year

Interview Date |____|____| / |____|____| / |____|____|____|____|

Interview Type

1. Intake
2. 6 month follow-up
3. 12 month follow-up
4. 3 month follow-up

Service Type

For *intake* interview: What service type *will* the client receive in your program? (Check all that apply.)

_____ 1. Case Management
_____ 2. Day Treatment
_____ 3. Inpatient
_____ 4. Outpatient
_____ 5. Outreach
_____ 6. Intensive Outpatient
_____ 7. Methadone
_____ 8. Residential
_____ 9. Other _____
_____ 10. Other _____
_____ 11. Other_____

B. DRUG AND ALCOHOL USE

1. During the past 30 days how many days have you used the following:	Number of Days	Number of Years (Lifetime)
a. Any alcohol	|____|____|	|____|____|
b1. Alcohol to intoxication (5+ drinks in one sitting)	|____|____|	|____|____|
b2. Alcohol to intoxication (4 or fewer drinks and felt high)	|____|____|	|____|____|
c. Illegal drugs	|____|____|	|____|____|

2. During the past 30 days, how many days have you used any of the following:	Number of Days	Number of Years (Lifetime)
a. Cocaine/Crack	|_____|____|	|_____|____|
b. Marijuana/Hashish (Pot, Joints, Blunts, Chronic, Weed, Mary Jane)	|_____|____|	|_____|____|
c. Heroin (Smack, H, Junk, Skag), or other opiates:		
1. Heroin (Smack, H, Junk, Skag)	|_____|____|	|_____|____|
2. Morphine	|_____|____|	|_____|____|
3. Diluadid	|_____|____|	|_____|____|
4. Demerol	|_____|____|	|_____|____|
5. Percocet	|_____|____|	|_____|____|
6. Darvon	|_____|____|	|_____|____|
7. Codeine	|_____|____|	|_____|____|
8. Tylenol 2,3,4	|_____|____|	|_____|____|
d. Non-prescription methadone	|____|____|	|____|____|
e. Hallucinogens/psychedelics, ect…	|____|____|	|____|____|
g. 1. Benzodiazepines: Diazepam , ect..		
2. Barbiturates: Mephobarbital, ect.		
3. Non-prescription GHB		
4. Ketamine (Special K or Vitamin K)		
5. Other tranquilizers, downers, sedatives		
h. Inhalants (poppers, snappers, rush, whippets)	|____|____|	|____|____|
i. Other illegal drugs (specify) _____	|____|____|	|____|____|

3. **In the past 30 days have you injected drugs**? ○ Yes ○ No
If no, go to Section C.

4. In the past 30 days, how often did you use a syringe/needle, cooker, cotton or water that someone else used?

- ○ Always
- ○ More then half the time
- ○ Half the time
- ○ Less then half the time
- ○ Never

C. FAMILY AND LIVING CONDITIONS

1. In the past 30 days, where have you been living most of the time?

- ○ Shelter (safe havens, TLC, low demand facilities, reception centers, other temporary day or evening facility)
- ○ Street/outdoors (sidewalk, doorway, park, public or abandoned building)
- ○ Institution (hospital, nursing home, jail/prison)
- ○ Housed:
  - ○ Own/rent apartment, room, or house
  - ○ Someone else's apartment, room or house
  - ○ Halfway house
  - ○ Residential treatment
  - ○ Other housed
    (specify)_____

2. **During the past 30 days, how stressful have things been for you because of your use of alcohol or other drugs?**

- ○ Not at all
- ○ Somewhat
- ○ Considerably
- ○ Extremely
- ○ Not applicable

3. **During the past 30 days, has your use of alcohol or other drugs caused you to reduce or give up important activities?**

- ○ Not at all
- ○ Somewhat
- ○ Considerably
- ○ Extremely
- ○ Not applicable

4. During the past 30 days, has your use of alcohol or other drugs caused you to have emotional problems?

- ○ Not at all
- ○ Somewhat
- ○ Considerably
- ○ Extremely
- ○ Not Applicable

D. EDUCATION, EMPLOYMENT, AND INCOME

1. Are you currently enrolled in school or a job training program? (IF ENROLLED: Is that full time or part time?)

- ○ Not enrolled
- ○ Enrolled, full time
- ○ Enrolled, part time
- ○ Other (specify)_____

2. What is the highest level of education you have finished, whether or not you received a degree? (01=1st grade, 12=12th grade, 13=college freshman, 16=college completion)

|____|____| level in years

2a. If less than 12 years of education, do you have a GED (General Equivalency Diploma)?

○ Yes ○ No

3. Are you currently employed? (Clarify by focusing on status during most of the previous week, determining whether client worked at all or had a regular job but was off work)

- ○ Employed full time (35+ hours per week, or would have been)
- ○ Employed part time
- ○ Unemployed, looking for work
- ○ Unemployed, disabled
- ○ Unemployed, volunteer work
- ○ Unemployed, retired
- ○ Unemployed, not looking for work
- ○ Other (specify) _____

4. Approximately, how much money did YOU receive (pre-tax individual income) in the past 30 days from…

	INCOME							
a. Wages	$				,			.00
b. Public assistance	$				,			.00
c. Retirement	$				,			.00
d. Disability	$				,			.00
e. Non-legal income	$				,			.00
f. Other (specify) _____	$				,			.00

E. CRIME AND CRIMINAL JUSTICE STATUS

1. **In the past 30 days, how many times have you been arrested? |____|____| times**
   If no arrests, go to item E3

2. **In the past 30 days, how many times have you been arrested for drug-related offenses?** |____|____| times

3. **In the past 30 days, how many nights have you spent in jail/prison?** |____|____| |nights

F. MENTAL AND PHYSICAL HEALTH PROBLEMS AND TREATMENT

1. **How would you rate your overall health right now?**

   - ○ Excellent
   - ○ Very good
   - ○ Good
   - ○ Fair
   - ○ Poor

2. During the past 30 days, did you receive:

a. Inpatient Treatment for:	No	Yes ±	**If yes, altogether** for how many nights (DK=98)
i. Physical complaint	○	○	_____
ii. Mental or emotional difficulties	○	○	_____
iii. Alcohol or substance abuse	○	○	_____

b. Outpatient Treatment for:	No	Yes ±	**If yes, altogether** how many times (DK=98)
i. Physical complaint	○	○	_____
ii. Mental or emotional difficulties	○	○	_____
iii. Alcohol or substance abuse	○	○	_____

c. Emergency Room Treatment for:	No	Yes ±	**If yes, altogether** for how many times (DK=98)
i. Physical complaint	○	○	_____
ii. Mental or emotional difficulties	○	○	_____
iii. Alcohol or substance abuse	○	○	_____

3. During the past 30 days, did you engage in sexual activity?

○ Not permitted to ask ○ Yes ○ No

○ **If yes, altogether** How many (DK=98)

a. Sexual contacts (vaginal, oral, or anal) did you have?	|____|____|____|
b. Unprotected sexual contacts did you have?	|____|____|____|
c. Unprotected sexual contacts were with an individual who is or was:	
1. HIV positive or has AIDS	|____|____|____|
2. An injection drug user	|____|____|____|
3. High on some substance	|____|____|____|

4. In the past 30 days (not due to your use of alcohol or drugs) how many days have you:

a. Experienced serious depression	|____|____|
b. Experienced serous anxiety or tension	|____|____|
c. Experienced hallucinations	|____|____|
d. Experienced trouble understanding, concentrating, or remembering	|____|____|
e. Experienced trouble controlling violent behavior	|____|____|
f. Attempted suicide	|____|____|
g. Been prescribed medication for psychological/emotional problem	|____|____|

4a. If you reported one or more days in question 4, how much have you been bothered by
these psychological or emotional problems in the past 30 days? (If you did not report any days to the items in question 4, skip to the next question.)

- ○ Not at all
- ○ Slightly
- ○ Moderately
- ○ Considerable
- ○ Extremely

H. DEMOGRAPHICS (ASKED ONLY AT BASELINE)

1. Gender

- ○ Male
- ○ Female
- ○ Transgender
- ○ Other (specify) _____

2. Are you Hispanic or Latino?

○ Yes ○ No

If yes, what ethnic group do you consider yourself? **(CSAT ONLY)**

- ○ Central American
- ○ Cuban
- ○ Dominican
- ○ Mexican
- ○ Puerto Rican
- ○ South American
- ○ Other, specify _____

3. What is your race? (Select one or more)

- ○ Black or African American
- ○ Asian
- ○ American Indian
- ○ Native Hawaiian or other Pacific Islander
- ○ Alaska Native
- ○ White
- ○ Other (specify)_____

4. What is your date of birth? |____|____| / |____|____| / |____|____|____|____|
Month / Day / Year

I. FOLLOW-UP STATUS (REPORTED BY PROGRAM STAFF ABOUT CLIENT ONLY AT FOLLOW-UP)

1. What is the follow-up status of the client?

- ○ 01 = Deceased at time of due date
- ○ 11 = Completed within specified window
- ○ 21 = Located, but refused, unspecified
- ○ 22 = Located, but unable to gain institutional access
- ○ 23 = Located, but otherwise unable to gain access
- ○ 24 = Located, but withdrawn from project
- ○ 31 = Unable to locate, moved
- ○ 32 = Unable to locate, other

J. DISCHARGE STATUS (REPORTED BY PROGRAM STAFF ABOUT CLIENT ONLY AT FOLLOW-UP)

1. On what date was the client discharged? |____|____| / |____|____| /
|____|____|____|____|
Month / Day / Year

2. What is the client's discharge status?

- ○ 01 = Completion/Graduate
- ○ 02 = Termination

  If the client was terminated, what was the reason for termination? (Select one response.)
  - ○ 01 = Left on own against staff advice with satisfactory progress
  - ○ 02 = Left on own against staff advice without satisfactory progress
  - ○ 03 = Involuntarily discharged due to nonparticipation
  - ○ 04 = Involuntarily discharged due to violation of rules
  - ○ 05 = Referred to another program or other services with satisfactory
  - ○ 06 = Referred to another program or other services with unsatisfactory
  - ○ 07 = Incarcerated due to offense committed while in treatment satisfactory progress
  - ○ 08 = Incarcerated due to offense committed while in treatment with Unsatisfactory progress
  - ○ 09 = Incarcerated due to old warrant or charged from before entering treatment with satisfactory progress
  - ○ 10 = Incarcerated due to old warrant or charged from before
  - ○ 11 = Transferred to another facility for health reasons
  - ○ 12 = Death
  - ○ 13 = Other

  _____

APPENDIX G

ADDICTION SEVERITY INDEX (ASI)

INSTRUCTIONS

1. Leave No Blanks - Where appropriate code:
   X = question not answered
   N = questions not applicable
   Use only one character per item.
2. Item numbers circled are to be asked at follow-up. Items with an asterisk are cumulative and should be rephrased at follow-up (see Manual).
3. Space is provided after sections for additional comments.

ADDICTION SEVERITY INDEX

SEVERITY RATINGS

The severity ratings are interviewer estimates of the patient's need for additional treatment in each area. The scales range from 0 (no treatment necessary) to 9 (treatment needed to intervene in life-threatening situation). Each ratings is based upon the patient's history of problem symptoms, present condition and subjective assessment of his treatment needs in a given area. For a detailed description of severity ratings' derivation procedures and conventions, see manual. **Note:** These severity ratings are optional.

Fifth Edition

SUMMARY OF PATIENTS RATING SCALE

0 - Not at all
1 - Slightly
2 - Moderately
3 - Considerably
4 - Extremely

G1. I.D. NUMBER [ ][ ][ ][ ]

G2. LAST 4 DIGITS OF SSN [ ][ ][ ][ ]

G3. PROGRAM NUMBER [ ][ ][ ]

G4. DATE OF ADMISSION [ ][ ][ ][ ][ ][ ]

G5. DATE OF INTERVIEW [ ][ ][ ][ ][ ][ ]

G6. TIME BEGUN [ ][ ] : [ ][ ]

G7. TIME ENDED [ ][ ] : [ ][ ]

G8. CLASS: [ ]
1 - Intake
2 - Follow-up

G9. CONTACT CODE: [ ]
1 - In Person
2 - Phone

G10. GENDER: [ ]
1 - Male
2 - Female

G11. INTERVIEWER CODE NUMBER [ ][ ]

G12. SPECIAL: [ ]
1 - Patient terminated
2 - Patient refused
3 - Patient unable to respond

GENERAL INFORMATION

NAME _____

CURRENT ADDRESS _____

_____

_____

G13. GEOGRAPHIC CODE [ ][ ][ ]

G14. How long have you lived at this address? [ ][ ] [ ][ ]

G15. Is this residence owned by your or your family? [ ]

G16. DATE OF BIRTH [ ][ ][ ][ ][ ][ ]

G17. RACE [ ]
1 - White (Not of Hispanic Origin)
2 - Black (Not of Hispanic Origin)
3 - American Indian
4 - Alaskan Native
5 - Asian or Pacific Islander
6 - Hispanic - Mexican
7 - Hispanic - Puerto Rican
8 - Hispanic - Cuban
9 - Other Hispanic

G18. RELIGIOUS PREFERENCE [ ]
1 - Protestant
2 - Catholic
3 - Jewish
4 - Islamic
5 - Other
6 - None

G19. Have you been in a controlled environment in the past 30 days? [ ]
1 - No
2 - Jail
3 - Alcohol or Drug Treatment
4 - Medical Treatment
5 - Psychiatric Treatment
6 - Other

G20. How many days? [ ][ ]

ADDITIONAL TEST RESULTS

G21. Shipley C.Q. [ ][ ][ ]

G22. Shipley I.Q. [ ][ ][ ]

G23. Beck Total Score [ ][ ]

G24. SCL-90 Total [ ][ ][ ]

G25. MAST [ ][ ]

G26. [ ][ ][ ]

G27. [ ][ ][ ]

G28. [ ][ ][ ]

SEVERITY PROFILE

	MEDICAL	EMP/SUP	ALCOHOL	DRUG	LEGAL	FAM/SOC	PSYCH
9							
8							
7							
6							
5							
4							
3							
2							
1							
0							

PROBLEMS

MEDICAL STATUS

M1. How many times in your life have you been hospitalized for medical problems? (Include o.d.'s, d.t.'s, exclude detox.)

M2. How long ago was your last hospitalization for a physical problem? Years Months

M3. Do you have any chronic medical problems which continue to interfere with your life?

M4. Are you taking any prescribed medication on a regular basis for a physical problem? 0 - No 1 - Yes

M5. Do you receive a pension for a physical disability? (Exclude psychiatric disability.)
0 - No
1 - Yes _____
Specify

M6. How many days have you experienced medical problems in the past 30 days?

FOR QUESTIONS M7 & M8 PLEASE ASK PATIENT TO USE THE PATIENT'S RATING SCALE

M7. How troubled or bothered have you been by these medical problems in the past 30 days?

M8. How important to you now is treatment for these medical problems?

INTERVIEWER SEVERITY RATING

M9. How would you rate the patient's need for medicaltreatment?

CONFIDENCE RATINGS

Is the above information significantly distorted by:

M10. Patient's misrepresentation ?
0 - No 1 - Yes

M11. Patient's inability to understand ?
0 - No 1 - Yes

COMMENTS

_____

_____

_____

EMPLOYMENT/SUPPORT STATUS

E1. Education completed Years Months

E2. Training or technical education completed Months

E3. Do you have a profession, trade or skill?
0 - No
1 - Yes _____
Specify

E4. Do you have a valid driver's license ?
0 - No 1 - Yes

E5. Do you have an automobile available for use? (Answer No if no valid driver's license.) 0 - No 1 - Yes

E6. How long was your longest full-time job? Years Months

E7. Usual (or last) occupation ?

_____
Specify in detail

E8. Does someone contribute to your support in any way?

E9. (ONLY IF ITEM 8 IS YES) Does this constitute the majority of your support?

E10. Usual employment pattern , past 3 years.
1 - full time (40 hrs/wk)
2 - part time (reg. hrs.)
3 - part time (irreg., daywork)
4 - student
5 - service
6 - retired/disability
7 - unemployed
8 - in controlled environment

E11. How many days were you paid for working in the past 30? (include "under the table" work.)

How much money did you receive from the following sources in the past 30 days?

E12. Employment (net income)

E13. Unemployment compensation

E14. DPA

E15. Pension, benefits or social security

E16. Mate, family or friends (Money for personal expenses)

E17. Illegal

E18. How many people depend on you for the majority of their food, shelter, etc.?

E19. How many days have you experienced employment problems in the past 30?

FOR QUESTIONS E20&E21 PLEASE ASK PATIENT TO USE THE PATIENT'S RATING SCALE

E20. How troubled or bothered have you been by these employment problems in the past 30 days?

E21. How important to you now is counseling for these employment problems?

INTERVIEWER SEVERITY RATING

E22. How would you rate the patient's need for employment counseling?

CONFIDENCE RATINGS

Is the above information significantly distorted by:

E23. Patient's misrepresentation ?
0 - No 1 - Yes

E24. Patient's inability to understand ?
0 - No 1 - Yes

COMMENTS

_____

_____

_____

DRUG/ALCOHOL USE

	PAST 30 DAYS	LIFETIME YEARS	USE (Rt of admin)
D1. Alcohol - any use at all			
D2. Alcohol - to intoxication			
D3. Heroin			
D4. Methadone			
D5. Other opiates/ analgesics			
D6. Barbiturates			
D7. Other sed/ hyp/tranq.			
D8. Cocaine			
D9. Amphetamines			
D10. Cannabis			
D11. Hallucinogens			
D12. Inhalants			
D13. More than one substance per day (include alcohol)			

Note: See manual for representative examples for each drug class

*Route of Administration: 1 = Oral, 2 = Nasal, 3 = Smoking, 4 = Non IV inj., 5 = IV inj.

D14. Which substance is the major problem? Please code as above or 00-No problem; 15-Alcohol & Drug (Dual addiction); 16-Polydrug; when not clear, ask patient. [ ][ ]

D15. How long was your last period of voluntary abstinence from this major substance? (00 - never abstinent) [ ][ ] Months

D16. How many months ago did this abstinence end? (00 - still abstinent) [ ][ ]

How many times have you:

D17. Had alcohol d.t.'s ? [ ][ ]

D18. Overdosed on drugs ? [ ][ ]

How many time in your life have you been treated for:

D19. Alcohol Abuse : [ ][ ]

D20. Drug Abuse : [ ][ ]

How many of these were detox only?

D21. Alcohol : [ ][ ]

D22. Drug : [ ][ ]

How much would you say you spent during the past 30 days on:

D23. Alcohol ? [ ][ ]

D24. Drugs ? [ ][ ]

D25. How many days have you been treated in an outpatient setting for alcohol or drugs in the past 30 days? (Include NA, AA). [ ][ ]

How many days in the past 30 have you experienced:

D26. Alcohol Problems? [ ][ ]

D27. Drug Problems ? [ ][ ]

FOR QUESTIONS D28-D31 PLEASE ASK PATIENT TO USE THE PATIENT'S RATING SCALE

How troubled or bothered have you been in the past 30 days by these:

D28. Alcohol Problems ? [ ]

D29. Drug Problems ? [ ]

How important to you now is treatment for these:

D30. Alcohol Problems ? [ ]

D31. Drug Problems ? [ ]

INTERVIEWER SEVERITY RATING

How would you rate the patient's need for treatment for:

D32. Alcohol Abuse ? [ ]

D33. Drug Abuse ? [ ]

CONFIDENCE RATINGS

Is the above information significantly distorted by:

D34. Patient's misrepresentation ? 0 - No 1 - Yes [ ]

D35. Patient's inability to understand? 0 - No 1 - Yes [ ]

COMMENTS

LEGAL STATUS

L1. Was this admission prompted or suggested by the criminal justice system (judge, probation/parole officer, etc.) 0 - No 1 - Yes

L2. Are you on probation or parole ? 0 - No 1 - Yes

How many times in your life have you been arrested and charged with the following:

- L3. - shoplifting/vandalism
- L4. - parole/probation violations
- L5. - drug charges
- L6. - forgery
- L7. - weapons offense
- L8. - burglary, larceny, B&E
- L9. - robbery
- L10. - assault
- L11. - arson
- L12. - rape
- L13. - homicide, manslaughter
- L14. - prostitution
- L15. - contempt of court
- L16. - other

L17. How many of these charges resulted in convictions?

How many time in your life have you been charged with the following:

L18. Disorderly conduct, vagrancy, public intoxication

L19. Driving while intoxicated

L20. Major driving violations (reckless driving, speeding, no license, etc.)

L21. How many months were you incarcerated in your life? Months

L22. How long was your last incarceration? Months

L23. What was it for? *(Use codes 3-16, 18-20. If multiple charges, code most severe)*

L24. Are you presently awaiting charges, trial or sentence? 0 - No 1 - Yes

L25. What for? (If multiple charges, use most severe).

L26. How many days in the past 30 were you detained or incarcerated?

L27. How many days in the past 30 have you engaged in illegal activities for profit?

FOR QUESTIONS L28 & L29 PLEASE ASK PATIENT TO USE THE PATIENT'S RATING SCALE

L28. How serious do you feel your present legal problems are? (Exclude civil problems)

L29. How important to you now is counseling or referral for these legal problems?

INTERVIEWER SEVERITY RATING

L30. How would you rate the patient's need for legal services or counseling?

CONFIDENCE RATINGS

Is the above information signficantly distorted by:

L31. Patient's misrepresentation ?

L32. Patient's inability to understand ?

COMMENTS

FAMILY HISTORY

Have any of your relatives had what you would call a significant drinking, drug use or psych problem - one that did or should have led to

Mother's Side	Alc	Drug	Psych	Father's Side	Alc	Drug	Psych	Siblings	Alc	Drug	Psych
H1. Grandmother				H6. Grandmother				H11. Brother			
H2. Grandfather				H7. Grandfather							
H3. Mother				H8. Father				H13. Sister			
H4. Aunt				H9. Aunt							
H5. Uncle				H10. Uncle							

Direction: Place "0" in relative category where the answer is clearly no for all relatives in the category; "1" where the answer is clearly yes for any relative within the category; "X" where the answer is uncertain or "I don't know" and "N" where there never was a relatives from that category. Code most problematic relative in cases of multiple members per category.

FAMILY/SOCIAL RELATIONSHIPS

F1. Marital Status

1 - Married
2 - Remarried
3 - Widowed
4 - Separated
5 - Divorced
6 - Never Married

F2. How long have you been in this marital status? (If never married, since age 18). Years Months

F3. Are you satisfied with this situation ?
0 - No
1 - Indifferent
2 - Yes

F4. Usual living arrangements (past 3 yr.)
1 - With sexual partner and children
2 - With sexual partner alone
3 - With children alone
4 - With parents
5 - With family
6 - With friends
7 - Alone
8 - Controlled environment
9 - No stable arrangements

F5. How long have you lived in those arrangements? (If with parents or family, since age 18). Years Months

F6. Are you satisfied with these living arrangements?
0 - No
1 - Indifferent
2 - Yes

Do you live with anyone who: (0 - No 1 - Yes)

F7. Has a current alcohol problem ?

F8. Uses non-prescribed drugs ?

F9. With whom do you spend most of your free time:
1 - Family
2 - Friends
3 - Alone

F10. Are you satisfied with spending your free time this way?
0 - No
1 - Indifferent
2 - Yes

F11. How many close friends do you have?

Direction for F12-F26: Place "0" in relative category where the answer is clearly no for all relatives in the category; "1" where the answer is clearly yes for any relative within the category; "X" where the answer is uncertain or "I don't know" and "N" where there never was a relative from that category.

Would you say you have had close, long lasting, personal relationships with any of the following people in your life:

F12. Mother
F13. Father
F14. Brothers/Sisters
F16. Children
F17. Friends

Have you had significant periods in which you have experienced serious problems getting along with:

	PAST 30 DAYS	IN YOUR LIFE
F18. Mother		
F19. Father		
F20. Brothers/Sisters		
F21. Sexual partner/spouse		
F22. Children		
F23. Other signficant family		
F24. Close friends		
F25. Neighbors		
F26. Co-Workers		

Did any of these people (F18-F26) abuse you:

	PAST 30 DAYS	IN YOUR LIFE
F27. Emotionally (make you feel bad through harsh words)?		
F28. Physically (cause you physical harm)?		
F29. Sexually (force sexual advances or sexual acts)?		

How many days in the past 30 have you had serious conflicts:

F30. With your family ?

F31. With other people ? (excluding family)

FOR QUESTIONS F32-F35 PLEASE ASK PATIENT TO USE THE PATIENT'S RATING SCALE

How troubled or bothered have you been in the past 30 days by these:

F32. Family problems

F33. Social problems

How important to you now is treatment or counseling for these:

F34. Family problems

F35. Social problems

INTERVIEWER SEVERITY RATING

F36. How would you rate the patient's need for family and/or social counseling?

CONFIDENCE RATINGS

Is the above information significantly distorted by:

F37. Patient's misrepresentation ?
0 - No 1 - Yes

F38. Patient's inability to understand ?
0 - No 1 - Yes

COMMENTS

PSYCHIATRIC STATUS

P1. How many times have you been treated for any psychological or emotional problems?

P1* In a hospital ☐☐

P2* As an Outpatient or Private patient ☐☐

P2. Do you receive a pension for a psychiatric disability? 0 - No 1 - Yes ☐

Have you had a significant period, (that was not a direct result of drug/alcohol use), in which you have:

	PAST 30 DAYS	IN YOUR LIFE
P3. Experienced serious depression	☐	☐
P4. Experienced serious anxiety or tension	☐	☐
P5. Experienced hallucinations	☐	☐
P6. Experienced trouble understanding, concentrating or remembering	☐	☐
P7. Experienced trouble controlling violent behavior	☐	☐
P8. Experienced serious thoughts of suicide	☐	☐
P9. Attempted suicide	☐	☐
P10. Been prescribed medication for any psychological emotional problem	☐	☐

P11. How many days in the past 30 have you experienced these psychological or emotional problems? ☐☐

FOR QUESTIONS P12 & P13 PLEASE ASK PATIENT TO USE THE PATIENT'S RATING SCALE

P12. How much have you been troubled or bothered by these psychological or emotional problems in the past 30 days? ☐

P13. How important to you now is treatment for these psychological problems? ☐

THE FOLLOWING ITEMS ARE TO BE COMPLETED BY THE INTERVIEWER
0 - No 1 - Yes

At the time of the interview, is patient:

P14. Obviously depressed/withdrawn ☐

P15. Obviously hostile ☐

P16. Obviously anxious/nervous ☐

P17. Having trouble with reality testing, thought disorders, paranoid thinking ☐

P18. Having trouble comprehending, concentrating, remembering ☐

P19. Having suicidal thoughts ☐

P20. How would you rate the patient's need for psychiatric/psychological treatment? ☐

CONFIDENCE RATINGS

Is the above information significantly distorted by:

P21. Patient's misrepresentation ? 0 - No 1 - Yes ☐

P22. Patient's inability to understand ? 0 - No 1 - Yes ☐

COMMENTS

APPENDIX H

TREATMET SERVICE REVIEW (TSR-5)

Name: _____ Date: _____

Interviewer: _____ Pt. ID #: _____

Treatment Week #: _____ Program #: _____

Treatment Services Review (2/1/89)

Please record services (provided or referred) by the treatment program (IN-PROG) separately from those provided by other sources (OUT-PROG).

MEDICAL PROBLEMS How many **days** in the past week have you:

1. experienced significant physical medical problems? _____

	IN-PROG	OUT-PROG
2. been hospitalized for physical medical problems?	_____	_____
3. received medication for a medical problem?	_____	_____

How many **times** in the past week have you:

4. seen a physician for medical care?	____/____	____/____
5. seen a nurse, nurse practitioner, or physician's assistant for medical care?	____/____	____/____
6. had a significant discussion pertinent to your medical problems:		
individual session?	____/____	____/____
group session?	____/____	____/____

EMPLOYMENT AND SUPPORT PROBLEMS:	IN-PROG	OUT-PROG
1. How many ***days*** in the past week have you been paid for working?	_____	
2. been in school or training?	_____	_____

How many **times** in the past week have you:

3. seen someone regarding employment opportunities, training or education:		
employment specialist?	____/____	____/____
counselor/social worker?	____/____	____/____

4. seen someone regarding unemployment compensation, welfare, social security, housing or other income: benefits specialist? ____/____ ____/____

counselor/social worker? ____/____ ____/____

5. had a significant discussion pertinent to your employment/ support problem:

individual session? ____/____ ____/____

group session? ____/____ ____/____

ALCOHOL PROBLEMS: How many ***days*** in the past week have you:

1 . drunk any alcohol? _____

2. drunk any alcohol to the point of intoxication (note definition)? _____

	IN-PROG	OUT-PROG
3. been in inpatient treatment for an alcohol problem?	_____	_____
4. received medication to help you to detoxify from alcohol?	_____	_____
5. received medication to **prevent** you from drinking?	_____	_____
6. received a blood alcohol test (e.g., breathalyzer)?	_____	_____

How many ***times*** in the past week have you:

7. attended an alcohol education session? ____/____ ____/____

8. attended an AA or 12-step meeting? ____/____ ____/____

9. attended an alcohol relapse prevention meeting? ____/____ ____/____

10. had a significant discussion pertinent to your alcohol problems:

individual session? ____/____ ____/____

group session? ____/____ ____/____

DRUG PROBLEMS:

How many ***days*** in the past week have you:	IN-PROG	OUT-PROG
1 . used any illicit drug?	_____	
2. been in inpatient treatment for a drug problem?	_____	_____

3. received medication to help you detoxify/come off a drug? _____ _____

4. received medication to maintain/stabilize your drug use? _____ _____

5. received medication to block the effects of drugs? _____ _____

6. received a urinalysis, or other test for drug use? _____ _____

How many ***times*** in the past week have you:

7. attended a drug education session? ____/____ ____/____

8. attended a session of NA or CA? ____/____ ____/____

9. attended a drug relapse prevention group or session? ____/____ ____/____

10. had a significant discussion pertinent to your drug problems:

individual session? ____/____ ____/____

group session? ____/____ ____/____

DRUG PROBLEMS: How many ***days*** in the past week have you:

	IN-PROG	OUT-PROG
1 . used any illicit drug?	_____	
2. been in inpatient treatment for a drug problem?	_____	_____
3. received medication to help you detoxify/come off a drug?	_____	_____
4. received medication to maintain/stabilize your drug use?	__ _____	_____
5. received medication to block the effects of drugs?	_____	_____
6. received a urinalysis, or other test for drug use?	_____	_____

How many ***times*** in the past week have you:

7. attended a drug education session? ____/____ ____/____

8. attended a session of NA or CA? ____/____ ____/____

9. attended a drug relapse prevention group or session? ____/____ ____/____

10. had a significant discussion pertinent to your drug problems:

individual session? ____/____ ____/____

group session? ____/____ ____/____

LEGAL PROBLEMS: How many **days** in the past week have you:

1 . been incarcerated? _____

2. engaged in illegal activities for profit? _____

IN-PROG **OUT-PROG**

3. the courts, criminal justice system, probation/parole office been

contacted regarding your legal problem (either by patient or program)? ____/____ ____/____

4. had a significant discussion pertinent to your legal problems:

individual session? ____/____ ____/____

group session? ____/____ ____/____

FAMILY PROBLEMS: How many **days** in the past week have you:

1 . experienced significant family/social problems? _____

2. experienced significant loneliness and/or boredom? _____

How many ***times*** in the past week have you: **IN-PROG** **OUT-PROG**

3. had a significant discussion pertinent to your family problems

with family present: family specialist? ____/____ ____/____

counselor/social worker ____/____ ____/____

4. had a significant discussion pertinent to your family problems

without family present:

family specialist? ____/____ ____/____

counselor/social worker ____/____ ____/___

PSYCHOLOGICAL / EMOTIONAL PROBLEMS: How many **days** in the past week have you:

1. experienced significant emotional problems? _____

	N-PROG	OUT-PROG
2. been hospitalized for an emotional or psychiatric problem?	____/____	____/____
3. received testing for psychiatric or emotional problems?	_____	_____
4. received medication for your psychiatric or emotional problems?_	_____	_____

How many ***times*** in the past week have you:

5. received a session in which you **practiced** a form of relaxation training,

biofeedback, or meditation? psych specialist?	____/____	____/____
counselor/social worker	____/____	____/____

6. received a session in which you **practiced** a form of behavior modification

(e.g., role play, rehearsal, psychodrama, etc.)

psych specialist?	____/____	____/____
counselor/social worker	____/____	____/____

7. had a significant discussion/individual therapy pertinent to your

psychiatric or emotional problems:

psych specialist?	____/____	____/____
counselor/social worker	____/____	____/____

APPENDIX I

DUAL DIAGNOSIS MANAGEMENT (DDM)
DATA RELEASE AGREEMENT

DUAL DIAGONSIS MANAGEMENT (DDM): DATA RELEASE AGREEMENT

THIS AGREEMENT is made on the _____ 2006

BETWEEN: Dual Diagnosis Management (DDM) (Operating Data Owner) acting as Operator for and on behalf of itself, **Kathleen H. Darby**, **(Recipient)** CMSW, acts for and on behalf of herself.

WHEREAS:

DDM has developed the following Terms and Conditions under which proprietary Data (Substance Abuse and Mental Health Service Administration (SAMHSA) Expansion and Enhancement Grant: Outpatient Program, *T1-12720)* shall be released to **Kathleen H. Darby**. Pursuant to the Terms and Conditions, **DDM** shall make available the Data to **Kathleen H. Darby** and **Kathleen H. Darby** agrees to take and use such Data, on the terms and conditions herein contained.

Terms and Conditions:

a) The Data provided to Recipient is for the exclusive purpose for academic research and may not be used for any other purposes without the explicit written approval, in advance, Operating Data Owner.
b) The Data is released to Recipient as a working copy for her use only. The distribution, sale, donation, transfer, or exchange of any portion of these Data in any way is expressly prohibited. *This restriction includes sharing data, unless arranged with Operating Data Owner or an Operating Data Owner representative in advance.*
c) The use of this Data prohibits any and all persons from learning the identity of any subject that may be represented in the Data.
d) Scholarly communication must acknowledge explicitly the Operating Data Owner as the source of the Data. In addition to full citations, acknowledgements should include that "Data has been supplied under such agreement". While acknowledging the source of the Data, authors must indicate that the results or views expressed in scholarly communication are those of the author/authorized user.
e) Data obtained by this agreement remains the property of the Operation Data Owner.
f) The agreement shall remain in force for two years from commencement date, unless this agreement is terminated pursuant to clause (g).
g) Agreement may be terminated, if either party breaches any of the provisions hereof and such breach shall not be remedied within thirty (30) days of written notice.

Personal Identifiers: Data have been purged of name, address, social security number, and other direct personal identifiers to prevent individual identification. An identifier number was assigned to each participant to eliminate the need for identifying information. An encrypted electronic link file was maintained by the researcher to associate identification numbers with confidential identifying information. This link file was accessible only by the evaluator and research assistant. No individual identifiable information has been divulged in any evaluation reports or presentations. As an additional step to enhance confidentially and protection of research participants, a Confidentially Certificate (CC) was obtained from the Department of Health and Human Services (DHHS) that ensures confidentiality of research participants.

I acknowledge that I have read and understand the terms and conditions of the agreement, and agree to abide by them.

_____

Kathleen H. Darby, CMSW (Recipient) DATE Michael Cartwright, Executive Director, DDM DATE

VITA

Ms. Kathleen Darby has over 25 years experience in healthcare management, 9 years of current research experience and 2 years of teaching experience in social work courses at both the undergraduate and graduate level. In addition, Ms. Darby has noteworthy experience in conducting and overseeing co-occurring substance and mental illness disorders, disability, and disease and pain management support groups. She has worked on various research projects integrating care and improving access to healthcare for individuals with co-occurring disorders. Ms. Darby is scheduled to defend her dissertation; *Co-occurring Disorders: A Latent Class Analysis,* in April 2007 and acquire her Ph.D. from the University of Tennessee, College of Social Work.

Ms. Darby is an active community advocate for the rights of the underserved in Middle Tennessee. She served as a board member of the Tennessee Chapter for the National Association of Social Workers (NASW) from 2000 to 2005. Other accomplishments include, over 20 years of community service experience, a Gloria A. Kimmel Student Award, Teachers Award from the Martha O'Bryan Center and the recipient of a Jefferson Scholar Award.