Supported Housing Programs

For the Homeless Mentally Ill: A Survival Analysis

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Dedications

I dedicate all that I have and will become to Steve, to my parents, and to God, without whom pursuits such as this would have no meaning. They believed in me and gave me the strength and courage to believe in myself, and for this I am eternally grateful.

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Abstract

Supported Housing Programs
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The present paper is the result of dissertation research on factors related to treatment failure in supportive housing programs for the adult, homeless, chronically mentally ill (CMI) population. The paper begins with a general review of the literature on the population, including an overview of epidemiological issues. Historical efforts to increase understanding of service needs of the population are then reviewed. The paper continues with a description of supportive housing and its subtypes, reviews a sampling of supportive housing effectiveness research, and introduces the constructs of residential stability and program retention as potential supportive housing outcome indicators. Research regarding possible mediators of housing stability is then examined. A description of the present study is presented, followed by results of a Kaplan-Meier analysis and an extended Cox regression analysis of longitudinal supportive housing data in which the terminal event is disengagement from Philadelphia-based supported housing programs. The paper concludes with a discussion of the theoretical and practical implications of the study's statistical results.

1. The Homeless Mentally Ill

1.1 A Brief Review of Epidemiology

Epidemiological studies of the homeless mentally ill have yielded a wide range of estimates of chronic mental illness in the homeless population. A New York City study by Baxter and Hopper (1981) is perhaps the largest such study as it analyzed survey results from a large sample of users of men's shelters. The results were alarming. It was found that approximately 50% of New York's homeless males suffered from serious mental illness. Fischer and Breakey (1992) reported that homeless individuals were twenty times more likely to have serious mental illness than the general population. In a review of epidemiological studies of homelessness by Fischer and Breakey (1991), the rate of schizophrenia in the homeless population ranged from 10-13%, the rate of affective disorders ranged from 21-29%, and dementia was found in 2-3% of the population. Axis II DSM-IV personality disorders were also found to be prevalent. Rates of personality disorders ranged from 21-42% of those in shelters for single persons, with paranoid, schizoid, and antisocial personality disorder occurring with the highest frequency. There is consensus among researchers that approximately one third of homeless adults in the United States are severely mentally ill according to validated, standardized assessment instruments (Dennis et al., 1991; Breakey, 1996; Gulcur et al., 2003). The United States Office of Housing and Urban Development (HUD) cited even higher figures in its 1996 planning report, stating that the figure may be as high as 50% (Philadelphia Health Management Corporation, 2001). North and colleagues (2004) reported that rates of psychiatric illness among the homeless increased significantly

between 1980 and 2000. As a consequence of the high prevalence rates, the terms homeless and mentally ill have, in a sense, become interchangeable.

The reasons for the high rate of homelessness among the mentally ill population are complex. In general, recent increases in homelessness are thought to be related to a decrease in employment opportunities, dwindling public support for the poor and a dearth of low-cost housing (Rosenheck, Bassuck & Salomon, 1998). The picture becomes grimmer for individuals with deficits in psychological functioning. Individuals with severe mental illness, if left without provision of support in various areas, suffer decompensation of daily living skills (Comer, 1988). As a result, they are less equipped to maintain jobs, and frequently face barriers to employment such as discrimination. This state of affairs is likely related to the fact that the CMI are one of the most impoverished populations in the United States (Federal Task Force on Homelessness and Severe Mental Illness, 1992). Individuals with such symptoms may become homeless as an endpoint in a path on which they avoid interaction with the mental health system due to the perceived negative ramifications on one's self-concept of receiving a psychiatric label, the perception that the system will impose excessive demands, or a lack of trust in treatment providers due to past negative experiences (Katz, Nardacci, & Sabatini, 1993). Homelessness may also be a reaction to psychotic symptoms such as hallucinations and delusions. Psychotic individuals may suffer from blatant rejection when they attempt to enter temporary shelters, and may have difficulty adjusting to the rules imposed upon them by shelters and housing programs – rules that are quite different from the rules of the street (Federal Task Force on the Homelessness and Severe Mental Illness, 1992). In a study of homelessness among mentally ill men performed by Susser and colleagues

(1997), those with mental illness were found to be ten to twenty times more likely to become homeless than the general population.

Drugs and alcohol complicate the picture even further. Rates of substance abuse among the homeless are alarmingly high, estimated at 30-40% of the population (Sosin, 2003). Alcoholism is one of the most prevalent health problems among the homeless mentally ill. In a recent study examining changes in psychiatric rates among the homeless over the past two decades, alcohol was found to be the be the most prevalent substance of abuse in a 2000 homeless sample, with the rate for males exceeding 70%. According to the same study, in part due to increases in crack cocaine use, recent estimates of the lifetime prevalence rates of illicit drug abuse among the homeless are also alarming, and may be approaching 50%. (North et al., 2000). Comorbidity rates (i.e., rates of dual diagnosis with both mental illness and substance abuse) among the homeless have been estimated as ranging from 2 to 34% (Drake, Osher & Wallace, 1991); Fischer & Breakey, 1991). These rates have risen dramatically in recent years. For example, in a study by Gonzales and Rosenheck (2002), 43% of a homeless sample of 5,432 individuals was found to meet DSM-IV criteria for both substance abuse and psychiatric disorder.

In general, extended substance abuse seems to significantly increase the risk of homelessness (Fischer & Breakey, 1991). Individuals with dual diagnosis are at higher risk for homelessness than those who suffer from pure mental health or pure substance abuse diagnoses (Drake, Osher & Wallace, 1991). This is likely due, in part, to a recursive phenomenon. That is, substance abuse tends to exacerbate psychiatric symptoms, and the experience of having psychiatric symptoms in turn increases the likelihood of alcohol and illicit substance use. Further, exacerbation of mental health or

substance abuse symptoms can increase psychological, physical, social, and economic barriers to mental health treatment. Systemic barriers such as separate funding streams and conflicts between mental health and substance abuse providers complicate the picture further (Fischer & Breakey, 1991; Dixon & Osher, 1993). As the severity of the case rises, so too does the number of barriers to care (Bachrach, 1984). Consequently, dually diagnosed individuals tend to be at higher risk for homelessness, and tend to be homeless for longer periods than their non-dually diagnosed counterparts.

The epidemiological estimate ranges cited above clearly are wide. This has historically been the case with estimates derived from the homeless CMI population. The wide ranges have predominantly been due to differences in the methodologies of studies, such as differences in the definitions of homelessness and chronic mental illness utilized for inclusion in studies, differences in diagnostic assessment methods, and sampling bias at survey recruitment sites (Bachrach, 1984; Bachrach, 1996; Vergare & Arce, 1986). A particular problem is that due to the diversity of the homeless mentally ill population, some individuals, such as those who are withdrawn and isolated, may be under-surveyed and others over-surveyed (Philadelphia Health Management Corporation, 1985). Nonetheless, it is obvious that the rate of mental illness and substance abuse dependence among the homeless population is quite high. Consequently, special attention and sensitivity to the homeless mentally ill are necessities. A review of the historical background and conclusions of the mental health field's attempts to more thoroughly apprehend and respond to the needs of the population follows.

1.2 The Service Needs of the Homeless Mentally Ill

The homeless mentally ill are an extremely difficult to treat and often treatment resistant population. Individuals with a history of protracted homelessness who are without clinical level mental health concerns, and individuals with severe mental illness who reside in safe housing are complicated groups to treat in and of themselves. The homeless mentally ill population, having both problems simultaneously, therefore presents a challenge to the mental health system that can seem impossible to solve. The homeless mentally ill carry with them service needs that are far from straightforward. Their concerns cannot be addressed via interventions found in concrete treatment manuals. These individuals present a complex collection of needs that include basic-level requirements such as food, shelter, financial resources, vocational training and/or employment, psychiatric and medical treatment and substance abuse counseling. They also have more abstract needs that can often be overlooked, such as assistance with integration of social support and treatment networks (Federal Task Force on Homelessness and Severe Mental Illness, 1992; Swayze, 1992[1]).

Treatment with psychotropic medications may improve engagement, but adherence monitoring is made more difficult by consumers' lack of a fixed residence, as well as by consumers' impaired judgment and often fierce sense of independence. At the same time, responding to only basic needs such as housing and finances represents a temporary fix, as many homeless mentally ill persons lack the skills needed to maintain and manage a home and an income in the long term.

The push for deinstitutionalization and the Community Mental Health Movement of the 1960's were attempts to address the long-term needs of the homeless mentally ill

and reduce the “revolving door” phenomenon of cyclical readmission to psychiatric treatment facilities (Martin, 1990; Morrissey, 1999). These changes in the area of community service improved the quality of care for many homeless mentally ill individuals. However, it was discovered in the 1980’s that mentally ill individuals who were homeless often received community services but remained undomiciled, or were essentially reinstitutionalized due to placement in residential treatment facilities (Ogilvie, 1997). Fortunately, the mental health field responded to this crisis. For example, in 1982, in response to what was determined to be an inadequate shelter system, the city of Philadelphia instituted a public system that would increase the likelihood that homeless individuals, both mentally ill and normal functioning, would reach residential stability. The system resulted in improved access to transitional housing programs followed by referral to boarding homes and/or specialized care if needed. However, although well-intentioned, such a system still allowed some mentally ill individuals to be discharged from shelter services without adequate housing. Also, residential stability was defined in a rather loose and perhaps short-term manner, and the issue of development of the skills needed to obtain and maintain independent housing often went unaddressed (Comer, 1988).

In 1983, under the presidency of Ronald Reagan, the first federal task force was convened in order to study the issue of homelessness and mental illness. The Task Force gathered again in 1990 and produced a comprehensive report of service needs and policy-related issues that was published in 1992 (Federal Task Force on Homelessness and Severe Mental Illness, 1992). Unfortunately, the efforts of the team did not lead to

changes in policy nor programmatic suggestions for this population (National Coalition for the Homeless, 1999).

In 1984, another task force, the American Psychiatric Association Task Force on the Homeless Mentally Ill, visited community programs designed to provide services to the population via a grant from the Alcohol, Drug Abuse, and Mental Health Administration (ADMHA). Following these visits, this Task Force increased the focus of practitioners on the individualized needs of this special population by publishing a fourteen-point list of recommendations for mental health care providers (Talbott & Lamb, 1984). These recommendations are as follows:

1. *Any attempt to address the problems of the homeless mentally ill must begin with provisions for meeting basic needs: food, shelter, and clothing.*
2. *An adequate number and ample range of graded, stepwise, supervised community housing settings must be established.*
3. *Adequate, comprehensive, and accessible psychiatric and rehabilitative services must be available, and must be assertively provided through outreach services when necessary.*
4. *General medical assessment and care must be available.*
5. *Crisis services must be available and accessible to both the chronically mentally ill homeless and the chronically mentally ill in general.*
6. *A system of responsibility for the chronically mentally ill living in the community must be established, with the goal of ensuring that ultimately each patient has one person responsible for his or her care.*

7. *Basic changes must be made in legal and administrative procedures to ensure continuing community care for the chronically mentally ill.*
8. *A system of coordination among funding sources and implementation agencies must be established.*
9. *An adequate number of professionals and paraprofessionals must be trained for community care of the chronically ill.*
10. *General social services must be provided.*
11. *Ongoing asylum and sanctuary should be available for that small proportion of the chronically mentally ill who do not respond to current methods of treatment and rehabilitation.*
12. *Research into the causes and treatment of both chronic mental illness and homelessness needs to be expanded.*
13. *More accurate epidemiological data need to be gathered and analyzed.*
14. *Additional monies must be expended for longer-term solutions for the homeless mentally ill.*

Also in 1984, a meeting was held in Rockville, Maryland to review the findings of nine, one-year research studies on the service needs of the homeless mentally ill funded by NIMH. The findings presented at this meeting included the fact that a substantial proportion of the homeless population were exhibiting overt, unequivocal signs of mental illness and substance abuse and dependence that were manifestations of a very wide range of clinical diagnoses. It was also found that the size of the population of homeless mentally ill individuals had increased across the years prior to the meeting, especially among younger people. Despite this, many homeless mentally ill individuals had not

received treatment within the mental health system. Those who had received treatment were likely to have exhibited the “revolving door” pattern of service use rather than a pattern of treatment and progressive gains in functioning followed by residential stability. It was suspected that the increase in the rates of mental illness among the homeless may have been due to a lack of individualized services for the population, and/or the use of traditional mental health services to which this population is often resistant. Another possible reason was that members of this population are often mobile, making them more difficult to treat (Bachrach, 1996; Breakey, 1987). It was suspected that this mobility may not have been an inherent characteristic of the mentally ill homeless, but rather an artifact of insufficient services. That is, if the quality of service provision had more adequately met the needs of this population, rates of mobility might have been lower. Also discussed in the NIMH meeting was the fact that no single characteristic can be used to describe this population, and its members may comprise a subculture that possesses differences from the general population in terms of perception of time, perception of space, self-esteem, and self-efficacy, all of which need to be taken into consideration in the course of intervention. Finally, it was determined that effective service provision occurs when providers are empathetic and flexible, and when services are individualized. Ultimately, the meeting resulted in the recommendation that more studies should focus on the specific kinds of services and delivery styles that tend to be more attractive to subgroups of the homeless mentally ill population (Bachrach, 1984). NIMH meetings were held on an annual basis after the first meeting in 1984. In addition to epidemiological questions, service needs continued to be explored actively in the hope of improving the quality of care and long-term outcome of the mentally ill homeless.

Between 1982 and 1986, the NIMH funded ten research studies that specifically focused on the relationship between homelessness and mental illness. These ten studies were predominantly urban-based, descriptive, cross-sectional studies on episodically and chronically homeless adults over the age of 18. Tessler and Dennis (1989) described results of eight out of the ten studies. Samples for these eight studies were drawn from the street, or were selected from shelters, soup kitchens, and drop-in centers based on an *a priori* determination of the proportions of homeless that were utilizing the services of these settings. Using standardized diagnostic instruments, it was shown that 28 to 37% of those sampled had chronic or acute mental illness. Slightly under half of the mentally ill subgroup was found to be abusing substances. Twenty-five to 40 percent of the total sample had a history of prior psychiatric inpatient stays. Eight to 22 percent of the total sample across the eight studies suffered from both mental illness and substance abuse disorders. In terms of needs assessment (performed via a divergent set of methods), it was found that housing was a primary concern for consumers themselves. It was also discovered that the population may be more resistant to mental health services than they divulge, and are therefore more difficult to engage. It was therefore suggested that behavioral measures of mental health treatment adherence are an important issue. The researchers also found that homeless mentally ill individuals are more socially impoverished, experience more barriers to employment despite a desire to work, experience more physical health problems, and may have more contact with the legal system than homeless persons without mental illness. Although suffering from many methodological weaknesses such as possible sampling bias and pooling of data across

studies whose methodologies were often quite different, the NIMH studies acted to continue stimulating interest in the homeless mentally ill population among researchers.

Between 1985 and 1987, NIMH funded twenty smaller projects to examine the effectiveness of the NIMH CSP, which was based on Stroul's Community Support System (CSS) Model, a biopsychosocial model that calls for further integration of community treatment resources and contains multiple components that include housing (Stroul, 1989; Martin, 1990; Morrissey, 1999). The CSP was designed to provide long-term rehabilitation services for this population within the community, including outreach and intensive case management. The CSP demonstration projects determined that the engagement stage for this population is a critical one, that there is a need for a wide range of housing options, and that consumers need long-term services and follow-up (Dennis et al., 1991).

In 1986, as a part of the Homeless Survival Act passed by Congress, the Robert Wood Johnson Foundation requested proposals for sites to participate in the Program on Chronic Mental Illness (PCMI), a national demonstration program whose objective would be to improve the quality of care for CMI individuals. The program was administered by HUD and provided grants, loans and rent subsidies to programs in nine cities in the United States for a duration of five years (National Coalition for the Homeless, 1999; Morrissey, 1999). Much of this funding went directly into an initiative that involved the establishment of local housing development corporations. Funding also aided the development and evaluation of scattered site transitional, supportive housing programs for the homeless mentally ill in Austin, Texas, Baltimore, Maryland, Charlotte, North Carolina, Cincinnati, Ohio, Columbus, Ohio, Denver, Colorado, Honolulu, Hawaii,

and Philadelphia, Pennsylvania (Cohen & Somers, 1990; Federal Task Force on Homelessness and Severe Mental Illness, 1992). Sites provided normal housing. Supports were fashioned after the Program for Assertive Community Treatment (PACT) Model, a model conceptualized by Stein and Test (1980) and similar to the CSS Model in terms of integration of services. PACT support services were provided by individual case managers.

In 1987, the federal government introduced the Urgent Relief for the Homeless Act. Shortly after, in response to the death of Republican Representative Stewart B. McKinney of Connecticut, this Act was renamed the Stewart B. McKinney Homelessness Assistance Act (P.L. 100-77). The McKinney Act was subsequently signed into law by President Ronald Reagan. It originally authorized eighteen demonstration programs administered by NIMH, National Institute on Alcohol Abuse and Alcoholism and the National Institute on Drug Abuse. The demonstration programs were designed for the purpose of providing research data on the use of emergency shelter services, job training, primary health care and education. Also included was the Supportive Housing Demonstration Program (SHDP), administered by HUD. The SHDP was intended to provide flexible funding for the creation of innovative programs for homeless individuals and families (Hogan & Carling, 1992; Manderscheid & Rosenstein, 1992; U.S. Department of Housing and Urban Development, 1995). In 1988, SHDP competitive funding was awarded to five states - Ohio, Oregon, Rhode Island, Washington, and Wisconsin (Livingston et al., 1992). As a result of this funding, nine transitional and permanent supportive housing demonstration projects were implemented under the sponsorship of non-profit organizations and local governments. Programs served a

diverse population, including CMI, primary substance abusers, battered women and the developmentally disabled. In its final program report (HUD, 1995), HUD announced that longitudinal analyses had demonstrated positive outcomes for such programs in terms of participant residency and mental health.

A second round of McKinney projects instituted in 1990 and administered by the Center for Mental Health Services (CMHS) strove to strengthen the link between homeless services, community mental health programs and public housing in several cities in the United States (Dennis, Cocozza, & Steadman, 1998). In the early 1990's, four major U.S. cities received NIMH funding for the second round McKinney research demonstration program (Shern et al., 1997). Between 1992 and 1997, 1,127 SHDP flexible grants were awarded, 379 of which were for permanent housing programs (HUD, 1995). A sampling of the positive results of SHDP programs are described in the *Effectiveness of Supportive Housing Programs* section of this paper.

Amendments to the original McKinney Act in 1988, 1990, 1992, and 1994 have expanded the range of its provisions. The development of supportive housing programs was made easier by the Fair Housing Amendment of 1988, which extended federal fair housing legislation to individuals with disabilities, including mental illness (Dixon & Osher, 1993). However, the creation of the Projects for Assistance in Transition from Homelessness (PATH) Program in 1990 and the implementation of the Access to Community Care and Effectiveness Services Support (ACCESS) Demonstration Program in 1992 were arguably the most important amendments. The PATH Program is a modification of the Community Mental Health Services Program and provides services funding for CMI individuals who were at risk for homelessness. Services include

outreach, diagnostic screening, case management, community mental health services, drug and alcohol rehabilitation services and residential support. The ACCESS Program provides funding in nine states for programs that integrate mental health and subsistence services for CMI individuals, thus improving the ability of jurisdictions to provide needed services to a formerly underserved population. These projects resulted in improvements in the connection between housing and support services via the use of case management treatment models (Manderscheid & Rosenstein, 1992).

The activity of national demonstration projects ultimately led to improvements in service provision. In 1992, the Federal Task Force on Homelessness and Severe Mental Illness, initially gathered in 1990, published its final report (Manderscheid & Rosenstein, 1992). The report recommended increased funding of the ACCESS federal initiative, as well as another federal initiative called SAFE HAVENS, which would provide group housing for individuals unwilling to utilize transitional housing or traditional shelters. In 1992, NIMH's thirty member Schizophrenia Patient Outcomes Research Team (PORT) disseminated its treatment recommendations. The PORT's recommendations specifically included the need for daily living support and behavioral, cognitive and vocational skills training, as well as the necessity of assertive case management (Lehman, Steinwachs et al., 1998). Also in 1992, Congress transformed SHDP into a permanent program with more flexible federal funding guidelines. In recent years, renewals of McKinney grants and projects sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) have occurred, such as the Collaborative Program to Prevent Homelessness (Williams et al., 2001). Unfortunately, funding cuts are threatening the McKinney Act and other programs in more recent years, despite that fact that the White

House has identified the homeless as a target population in its Points of Light Initiative (Federal Task Force on Homelessness and Severe Mental Illness, 1992; Rowe, Hoge & Fisk, 1996; NCH, 1999; SAMHSA, 2003) and the fact that it is common knowledge that there is a nationwide lack of affordable housing (Carling, 1993).

1.3 Independent Research on the Homeless Mentally Ill

In 1991, the National Mental Health Advisory Council disseminated recommendations for a research plan to improve services for the severely mentally ill (Federal Task Force on Homelessness and Severe Mental Illness, 1992). Individual researchers have taken up the call, furthering our understanding of service needs of the homeless mentally ill. Researchers have repeatedly cited a consumer preference for more concrete need fulfillment (Ball & Havassy, 1984; Breakey, 1987; Mulkern & Bradley, 1986). Prioritization of basic needs such as independent housing allows consumers to experience a higher sense of autonomy than is the case when services are inherently linked with housing, such as in half-way houses and residential treatment facilities (Tanzman, 1993). Also, conclusions from research studies on this population have indicated a need to go beyond reactive emergency services, as such services do not adequately address the cycle of acute homelessness, psychiatric decompensation, hospitalization, short-term shelter stays, further declines in global functioning and ultimate protracted homelessness. Professionals have responded to this knowledge by adjusting clinical services in a manner consistent with it. This is evidenced by the fact that there has recently been an increase in specialized treatment programs for the homeless mentally ill.

Empirical data regarding the relative effectiveness of specialized programs for the homeless mentally ill population are unfortunately inconclusive. Anecdotally, it appears that programs designed to meet consumers' basic level needs and provide mental health services simultaneously are more clinically effective than traditional community mental health services alone. The types of services and structure of living situations that are provided as a follow-up to psychiatric hospitalization have, according to the literature, served as better predictors of re-hospitalization than clinical factors for this population (Coulton, Holland & Fitch, 1984). There is accumulating evidence that provision of both housing and supportive services in an integrated manner enhances continuity of care and long-term treatment success for the homeless mentally ill (Bachrach, 1996; Drake et al., 1997). For example, a report published by HUD in 1994 indicated that most tenants of HUD funded projects were satisfied and experience improvement in their quality of life (Office of Policy Development and Research, HUD, 1994). A brief description of supportive housing follows.

2. Supportive Housing Programs for the Homeless Mentally Ill

2.1 A General Overview

The term *supportive housing* refers to housing programs that link residency with support services (Lipton et al., 2000). Chipperfield and Aubrey (1991) identified the following objectives of the supportive housing model: (a) establishment of independent housing; (b) fostering of skills and supports for cooperative living via assessment of needs and implementation of strategies to address needs; and (c) support for a consumer's participation and decision-making in his/her own treatment. Supportive housing services follow what is essentially a psychosocial rehabilitative model, and include: (a) traditional, intensive case management, consisting of both assistance in connecting with various community resources and ongoing individualized support designed to increase adherence to treatment regimens; (b) training or retraining of daily living skills and assistance with daily demands such as home-maintenance; (c) psychiatric care, including crisis management; (d) psychological care, such as connection with outpatient, intensive outpatient, day/partial or substance abuse treatment; (e) assistance with physical health-related needs; and (f) assistance with educational, vocational, and financial needs (Brown & Wheeler, 1990). Case managers are sometimes assisted by adult daily living skill (ADL) aids or volunteers. Housing is often subsidized by federal funds, particularly Section 8 certificates from HUD. Flexible financial supports, such as start-up funds for the purchase of furniture, are also often available (Livingston et al., 1992).

2.2 Models of Supportive Housing

The term *supported housing* refers to programs in which consumers are housed in independent residential settings from the outset. It thus differs from group housing such

as personal care boarding homes in which consumers are monitored. In supported housing programs, housing is generally chosen by the consumer with assistance and tends to be permanent. Also, support services are individualized, chosen by the consumer, flexible, and optional (Ridgeway et al., 1994). In supported housing, treatment needs are viewed as secondary to housing needs. Supported housing falls under the *mainstream model* of supportive housing (Dickey et al., 1996). Supported housing is differentiated from *therapeutic milieus*, which are unit-based, therapeutic environments for groups of individuals that are located within the community and are viewed as a step-down from inpatient settings. Supported housing is also differentiated from *community residences*, which provide supports, but house consumers in group homes or shared apartment in the community, and *single-room occupancy hotels (SRO's)*, which house consumers independently in the community, but provide on-site mental health teams (Katz, Nardacci, & Sabatini, 1993). Therapeutic milieus, community residences, and SRO's are examples of the *continuum model* of supportive housing. Continuum model programs view consumer treatment needs as primary, and provide supports that fall along a continuum ranging from most to least restrictive (Boydell & Everett, 1992; Dickey et al., 1996).

2.3 The Effectiveness of Supportive Housing Programs

The positive cost-benefit ratio of supportive housing relative to homeless service use, hospitalization or congregate residences has been demonstrated (Dickey, et al., 1996; Rothbard et al., 1999; Schinka et al., 1998). In a recent, large-scale study by Culhane, Metraux and Hadley (2002), service data from 4,679 homeless, CMI individuals in New

York City were analyzed. Results indicated that supportive housing program placement resulted in a savings of $16,281 per housing unit per year relative to treatment as usual.

Although there are relatively few well designed studies of the non-monetary benefits of supportive housing (Belcher & Ephross, 1989; Carling, 1993), the effectiveness of such programs in comparison to traditional treatment of the homeless mentally ill is anecdotally well known (Bebout et al., 1997; Belcher & Ephross, 1989; Breakey, 1987; Carling, 1993; Drake et al., 1997; Katz, Nardacci, & Sabatini, 1993), and descriptive data exist to support it. For example, Livingston and colleagues (1992) reported data gathered at the one-year point of the NIMH National Supportive Housing Demonstration Program implemented in 1988. The researchers interviewed 95 supported housing clients who had been in programming for a minimum of one month across nine programs in five states. Consumer Global Level of Functioning (GAF) and psychiatric symptomatology were assessed. In addition, case managers reported the number of lifetime psychiatric hospitalizations and housing type prior to client enrollment in the demonstration program. Finally, researchers engaged in site visits in order to administer structured interviews to program staff members, and content analysis was performed on these data. In an analysis of data from four of the five states (data analysis from Washington were delayed), the researchers found that clients had severe psychiatric illness, with schizophrenia cited as the most common diagnosis. Clients were rated as having a high level of service needs, often due to a history of violence or substance abuse. The majority of clients lived in group housing or group residential treatment facilities prior to enrollment in the demonstration program, but were living predominantly in normal, permanent housing at the time of the study. Although it has been determined

that choice is an important factor in success of supportive housing programs (Barrow et al., 1989; Depp et al., 1989), most clients were matched by staff with available housing. However, the majority of programs utilized individualized treatment plans. The researchers found that clients generally rated housing as not quite affordable enoughs as they were paying an average of 40% of their monthly income for rent, but rated housing as generally satisfactory and safe. A possible explanation of the success of the program is that case management caseload sizes were conservative, ranging from 2 to 15 consumers, and direct service availability ranged from 8 to 16 hours per day, showing a consistently high level of the non-restrictive service intensity. Descriptive data such as these show that on a basic level, supportive housing programs are serving homeless individuals with chronic mental illness, as well as dually diagnosed consumers. This is consistent with the original intention of such programming. It also seems that consumers are benefiting from supportive housing programs via improvement in areas such as housing stability and satisfaction.

In the final report of NIMH's National SHDP (HUD, 1995), results of research on survey data from 623 programs were presented. HUD reported that at least 56% of all transitional housing consumers entered stable housing, which included unsubsidized, privately owned and subsidized housing (e.g., Section 8 housing). Employment (full or part-time) increased from an average of 18% to an average of 38% for consumers between the time of program entrance and graduation or exit. Positive outcome was qualitatively judged to be mainly due to supportive and case management services. Improvements in self-esteem and personal accountability of consumers, as well as the presence of stable, affordable housing, were also judged to be important factors. Of those

who participated in permanent housing programs, 69% remained in stable housing for at least one year, and approximately 50% of those who left their program prematurely entered stable housing subsequently. Qualitative data indicated that housing and support services were responsible for these latter two outcomes.

Other researchers have found similar, positive results. Korr and Joseph (1995) reported the results of an experimental study of the Chicago McKinney Project, an SHDP based on the continuum model. One hundred and fourteen undomiciled patients of a state psychiatric hospital were randomly assigned to the supportive housing program (n=48) or to a control treatment (n=47) that consisted of linkage with whatever community service was available and no ongoing case management. Analysis of data from case managers indicated that experimental group participants were more than twice as likely to be housed. At six month follow-up, none of the experimental group members returned to homelessness, and 68% of the experimental group had remained in the supportive housing program. Hurlburt, Wood and Hough (1996) reported on the outcome of the San Diego McKinney Project. They found that 59% of 362 members of an SHDP with intensive case management achieved stable independent or community housing. A less intense, more traditional supportive case management model did not decrease positive outcome. In a report of the second round McKinney Programs initiated in the early 1990's, Shern and colleagues (1997) described pooled data from a total of 894 participants of varying types of supportive housing programs across five projects in four states. The study periods ranged from 12 to 24 months. Results indicated that a statistically significant proportion of consumers achieved stable community housing (either independent or group housing). Mowbray and Bybee (1998) analyzed data from

SHDP's in Factorytown and Collegetown, Michigan that followed the continuum model of supportive housing. Results for 130 participants for whom complete data were available across the 12-month study period showed that 82% had some experience with permanent, independent housing and 45% were stably housed for at least a brief period of time in dependent residential settings. Not so positive was the fact that 36% of those who attained permanent, independent housing at some time during the 12 months experienced at least brief homelessness after attainment of permanent housing. Fifty-three percent spent time in a homeless shelter or correctional facility (mean stay = 40 days). One third of this 53% experienced shelter or correctional stays prior to attainment of permanent housing. The implication here is that short-term results may show a return to homelessness for many participants. However, a chronic pattern of homelessness cannot be expected to end immediately upon provision of housing (Breakey, 1987; Katz, Nardacci, & Sabatini, 1993). Individuals often reap secondary gain from remaining homeless, such as an increased sense of freedom and the ability to utilize entitlement benefits as they wish. Supportive housing effectiveness researchers should therefore seek to gather long-term follow-up data.

There is some debate as to the effectiveness of the continuum model of supportive housing relative to the mainstream model. In the continuum model, individuals progress in a step-wise fashion from transitional programs with more intensive support and monitoring. In contrast, mainstream model programs place consumers directly into independent housing that is intended to be permanent. Many researchers have found that treatment strategies have little or no effect or are declined by consumers unless they feel safe in and satisfied with their residential programs (Drake & Adler, 1984; Hadley,

McGurrin & Fye, 1993). Others have theorized, however, that consumers' perception of safety can be compromised in programs that are based on the mainstream, supported housing model because the sudden imposition of responsibility can be overwhelming. Some studies have found that placement in mainstream model programs may lead to decreased functioning in various areas. For example, results of the Boston McKinney Project indicated that placement directly into permanent, independent housing may have fostered increased substance abuse (Dickey et al., 1996). Results of a qualitative study by Walker and Seasons (2003) indicated that mainstream placement may lead to loneliness. Therefore, the use of continuum model of treatment has been advocated by some (Bebout et al., 1997; Belcher & Ephross, 1989; Fields, 1990). Breakey (1996) described a stage-wise model believed to increase potential success. This model consisted of four stages: engagement, basic service provision, transition to mainstream mental health services, and integration into mainstream services.

Other researchers, including members of the National Association of State Mental Health Program Directors (NASMHPD), have expressed a belief that the residential transitions that are inherent in the continuum model may disrupt consumers' social relationships and sense of stability (Boydell & Everett, 1992; Coulton, Holland & Fitch, 1984; Dixon & Osher, 1993; Hogan & Carling, 1992; Ridgeway & Zipple, 1990). They assert that placement in group homes or other living situations that are a part of the continuum model may decrease success by usurping consumers' perception of freedom and dignity (Blanch, Carling, & Ridgway, 1988; Howie the Harp, 1990; Schutt, 1992). Also, it is thought that successive moves may hamper living skill gains made in previous programs (Carling, 1993). Goering and colleagues (1990) surveyed homeless mentally ill

consumers and found that they preferred permanent housing and more flexible supports than can be provided by programs based on the continuum model. Similarly, female users of hostiles and drop-in centers expressed a preference for permanent, independent housing with a higher level of privacy than is the case with many continuum programs. According to Tsemberis (1999), in comparison to 2,864 participants in a continuum model supportive housing program, 139 supported housing consumers retained housing at a significantly higher rate (84.2% across three years vs. 59.6% across two years). Tsemberis and Eisenberg (2000) reported that compared to a citywide sample of 1,600 non-supported housing, homeless mentally ill consumers, 242 supported housing consumers enrolled in the Pathways Program in New York, a model that combines independent housing with ACT supports, achieved significantly better housing tenure after five years. The superiority of the same mainstream, Pathways model over continuum-type treatment was also demonstrated in a randomized study by Gulcur and colleagues (2003). According to repeated measures analysis of variance, in a sample of 225 consumers, those assigned to continuum treatment spent significantly more time homeless than those served by the Pathways program.

There is no unequivocal evidence pointing to the superiority of one type of program over the other. The debate regarding the comparative effectiveness of the mainstream and continuum models may be one that ultimately has no resolution because the homeless mentally ill are a diverse population with different housing needs (Tessler & Dennis, 1989). There is clearly a need for more refined research comparing the two approaches (Drake, Osher, & Wallach, 1993). A possible reason for the lack of data regarding comparison of specific models is the dearth of general supportive housing

outcome research. Many factors make supportive housing outcome studies procedurally quite difficult and complicate interpretation of results. For example, many studies focus on an overly narrow level of assessment in their definition of consumer success (Belcher & Ephross, 1989). Some authors have suggested that researchers extend the definition of outcome indicators beyond changes in psychiatric symptom severity and psychosocial functioning (Carling, 1990), and include residential stability as a research factor. There have been a number of studies exploring this variable. A sampling of studies that attempt to identify correlates of stability is reviewed below.

3. Tenure Research

3.1 Correlates of Residential Stability

Studies of factors that inhibit or increase residential stability of the homeless mentally ill have predominantly been descriptive in nature (Ball & Havassey, 1984; Comer, 1988; Fischer & Breakey, 1991). An example of such studies is one by Comer (1988), who found that individuals who were discharged from public shelter services and referred to specialized care facilities obtained significantly greater residential stability than those referred to boarding homes. Inability to work was associated with lower residential stability. Referral to specialized treatment or boarding home settings was associated with differences in psychiatric symptomatology. Individuals with less severe symptoms such as anxiety and depressed mood were more likely to be referred to specialized treatment or boarding homes than to return to the streets. Individuals with paranoia, hallucinations, suspiciousness, inappropriate affect, and peer relationship difficulties were more likely to return to the streets without referral. The latter finding may have been the case because these individuals were labeled as “difficult to treat.”

The 1995 HUD SHDP final report indicated that between 1987 and 1990, transitional SHDP consumers remained in programmatic housing for an average of nine months. 68% of CMI consumers of permanent HUD SHDP’s remained in housing for at least one year, and of those who left programmatic housing prior to one year, many moved to public housing or moved into stable arrangements with family or friends (HUD, 1995). Pollio et al. (1997) reported chart review data from 120 participants of a multi-service agency serving homeless mentally ill persons. Half of these individuals had been housed for at least 24 months and the other half were homeless. Analysis of the data

revealed that significantly more of the housed participants were female. Housed participants were more likely to have presented with primary subsistence needs, and were more likely to have utilized support services, such as drop-in centers and counseling.

In addition to descriptive research, there are narrower studies that shed light on potential predictors of residential stability. Brown and colleagues (1991) compared 22 homeless, CMI individuals who were self-referred to a supported housing program in Oregon with 21 homeless mental health system consumers who were involuntarily engaged in the same program. Results offer support for the role of choice in supported housing outcome. Voluntary participants had significantly higher residential stability (characterized as number of housing moves) across the one-year time frame of the study. Also, voluntary participants had significantly more reduction in psychiatric hospitalization. The study unfortunately had several weaknesses, such as the small sample size and potential sampling bias that resulted from the fact that involuntary consumers had more than twice the rate of suicide attempts, polysubstance abuse, child abuse, domestic violence and history of hospitalization. In addition, supported housing case managers of the voluntary participants were assigned caseloads that were double the size of caseloads of the involuntary consumer case managers, and the inclusion in the study of individuals who were housed in adult foster care and half-way houses compromises the definition of supported housing and the validity of the study. Nonetheless, choice and personal control may in fact be a significant determinant of housing stability (Carling, 1993; Sohng, 1996). Drake, Osher and Wallach (1991) described their experience that dually diagnosed individuals in housing programs may be more inclined to leave housing if excessive pressure or demands are placed on them.

Srebnick et al. (1995) attempted to replicate findings on the role of choice in supported housing success. These researchers reported that of 115 consumers from ten NIMH SHDP's in five states, those who experienced greater perception of choice were less likely to move during the one year time period of the study. More recently, Tsemberis and colleagues (2003) reported that homeless mentally ill consumers who were randomly assigned to the Pathways supported housing program in which they were afforded a great deal of flexibility and choice faired significantly better in terms of housing retention than consumers assigned to a continuum care-based control condition.

Substance abuse has also been implicated in decreased residential stability. For example, Drake, Wallach and Hoffman (1989) found that individuals who became homeless following psychiatric hospitalization in an urban state hospital had histories of greater alcohol and street drug use than aftercare patients with stable housing. Several other examples of the effect of substance abuse exist in the literature. Lamb and Lamb (1990) studied 53 severely mentally ill, formerly homeless consumers of a residential mental health treatment program and determined that substance abuse played a role in onset of homelessness spells prior to program entry. In a study by Kuno and colleagues (2000) of mentally ill individuals who were admitted to an extended, acute care psychiatric hospital in Philadelphia between 1990 and 1993, participants were at higher risk for homelessness, defined as admission to a public shelter, if they had a substance abuse episode during the study period. Kuhn and Culhane (1998) analyzed data representing shelter use in Philadelphia and New York City between 1988 and 1995. The study utilized duration of homelessness and number of homeless episodes as independent variables. Using a cluster analysis strategy, the researchers found distinct patterns of

shelter use that validated a three group model of homelessness typology. The three cluster groups - chronically homeless, episodically homeless and transitionally homelessness - represented decreasing numbers of shelter days and homeless episodes. When the three clusters were compared according to background characteristics, substance abusers were overrepresented in the chronically homeless group. Episodically homeless individuals in the study were also more likely to have substance abuse problems than transitionally homeless. Olfson and colleagues (1999) performed a logistic regression on data from 316 individuals with primary diagnoses of schizophrenia or schizoaffective disorder. Participants had been discharged from inpatient stays at four New York City psychiatric facilities between October, 1994 and April, 1996. Results showed that those with a substance abuse or dependence disorder were six times more likely to have become homeless by the time of three month follow-up assessment. Hurlburt, Hough, and Wood (1996) found that out of 361 supportive housing consumers in the San Diego McKinney Project, those without substance abuse problems who were placed in Section 8 independent housing were more likely to experience residential stability than those with Section 8 housing who were diagnosed with substance abuse disorders. Substance abusing consumers of supported housing under the auspices of the McKinney Project in Boston were more likely to have inpatient hospitalizations and residential instability (Dickey et al., 1996). Bebout and colleagues (1997) conducted a descriptive study of 158 dually diagnosed consumers of supportive housing programs with a comprehensive treatment component and transition from temporary to permanent housing. Participants were limited to those formerly residing on the street or in shelters. Housing stability was defined as having a fixed, safe residence within or outside of the program. Findings

indicated that for the 122 participants whose complete data were available, correlates of residential stability included improved substance abuse status. Predictors of stable housing included progress in substance abuse treatment and less substance use. Goldfinger and colleagues (1999) examined housing stability in 118 homeless shelter users randomly assigned to either group homes or independent apartments following the supported housing model. Of the 110 consumers available for follow-up at 18 months, 76% of the pooled participants remained housed at the 18-month time point. However, substance abuse predicted decreased housing stability for the total sample.

Substance abuse may also play a more complex role in terms of housing stability. Dixon et al. (1993) found that for 26 homeless mentally ill adults recruited for participation in an ACT program, substance abuse was significantly associated with less compliance with case manager housing recommendations, and housing outcomes were poorer for those who were noncompliant with program recommendations. Although the sample size of the study was small and participants were recruited for the study, suggesting that sampling bias may have occurred, these results show that treatment adherence may mediate the relationship between substance abuse and housing outcome.

A variable that is related to substance abuse – symptomatic severity – also seems to play a key role in determining housing stability. The mere presence of a mental health indicator may put one at risk for escalating housing instability (Kuhn & Culhane, 1998). Drake, Wallach and Hoffman (1989) found strong correlations between psychiatric symptomatology and housing status among 187 former state hospital inpatients followed in community aftercare. Particularly significant were correlations with hostility and bizarre behavior, paranoia, disorganization, suicidal behavior and depression. Lamb and

Lamb (1990) found that 53 formerly homeless, CMI consumers of a residential treatment program were likely to have been disorganized and paranoid during homeless spells that occurred prior to program entry. Olfson and colleagues (1999) found that when age, gender and ethnicity were controlled, recently released psychiatric inpatients with primary discharge diagnoses of schizophrenia and schizoaffective disorder were 6.5 percent more likely to become homeless by three month follow-up for every one point increase in Brief Psychiatric Rating Scale score, and 5.9 percent more likely for every one point increase in Global Assessment of Functioning score. Goldfinger et al. (1999) found that those whose clinicians had initially evaluated them as not ready for independent living obtained less housing constancy than those who were assessed as being psychiatrically more stable. Dickey et al. (1996) found that of 112 consumers available for follow-up 18 months after being randomly assigned to either SRO's or group homes, housing stability was inversely associated with psychiatric hospital admission across the two groups. That is, consumers in both groups who had a lower rate of psychiatric hospitalizations (which implies less severity) experienced more residential stability.

Another factor that seems to be related to residential stability is intensity of services. Morse et al. (1994) reported results of a multivariate regression analysis of data from 178 CMI, homeless consumers randomly assigned to one of three treatment conditions: continuous treatment team (CTT), drop-in center or traditional outpatient treatment. Results indicated that stable housing and satisfaction with services were significantly higher for the CTT group, and the effects of treatment condition on stable housing were significantly mediated by number of housing-related service contacts,

number of financial entitlement contacts, number of mental health treatment contacts outside and number of supportive service contacts (e.g., help with housekeeping or money management). That is, the CTT group received more service contacts, and increases in service contacts were in turn associated with increased residential stability. Other examples of the role of intensity of service are found in research based on data from the ACCESS Program. Rosenheck and colleagues (1998) evaluated the effects of level of program service integration on outcomes for participants of the program between May, 1994 and July, 1995. Data from 2,943 consumers from the 18 sites of the ACCESS Program were analyzed using multivariate regression analysis. The researchers found that a higher level of service integration was significantly associated with a greater likelihood of exiting from homelessness. Morse and colleagues (1997) reported on an experimental study of a sample 135 consumers followed for 18 months after being randomly assigned to one of three approaches: brokered case management services, PACT and PACT plus ADL assistance from community workers. The sample consisted of both homeless individuals and at risk individuals. The researchers found that those in the ACT only condition experienced more days in stable housing than individuals in the other two conditions. This seems to suggest that a lower level of service intensity leads to increased housing stability. However, the authors admitted that the ACT plus ADL workers condition had a shortage of case managers. Thus, the results may actually point to the benefit of increased service provision to the homeless mentally ill.

As was suggested in the Dixon et al. (1993) study, treatment adherence appears to be an important variable. Drake, Wallach and Hoffman (1989) determined that homeless individuals discharged from a state psychiatric hospital were less compliant with

aftercare treatment, particularly pharmacotherapy, than those who were in stable housing during inpatient follow-up. Other studies that more directly explore residential treatment have demonstrated an effect of compliance as well. Baier and colleagues (1996) studied 228 former consumers admitted between 1986 and 1991 to a 90-day group housing program designed to provide temporary housing, mental health services and social and vocational/educational rehabilitation services to consumers. Results indicated that the mean length of stay in the program was 95 days, and that consumers who accomplished the goals of the program stayed significantly longer than those who did not. In general, individuals who left the program against medical advice had significantly more psychiatric hospitalizations than those who were discharged when deemed ready by clinical staff. Also, consumers diagnosed with a personality disorder had significantly longer program tenure than those without personality disorders. Explanations of these results included the speculation that individuals with personality disorders alone and those with few psychiatric hospitalizations prior to admission (indicating higher pre-admission functioning) may have been more adherent to their treatment regimens and therefore more able to benefit from programming in the long run.

Ethnicity may also be related to housing stability. In a study by Kuno and colleagues (2000) of mentally ill individuals who were admitted to an extended, acute care psychiatric hospital in Philadelphia between 1990 and 1993, African American participants were at higher risk for a homeless episode. In the Goldfinger et al. (1999) study described earlier, minority participants in the independent housing group had less residential stability (measured as days homeless). Similarly, Kuhn and Culhane (1998) found that African American shelter consumers were overrepresented among episodically

and chronically homeless populations. That is, African American consumers were found to have a greater number of public shelter days and longer homelessness episodes than consumers of other ethnicities. However, in the above studies, socioeconomic differences between ethnic groups were not controlled and may have confounded results.

There is evidence that gender plays a role in determining residential stability. According to Polio and colleagues (1997), females may be more likely to remain in stable housing. North and Smith (1993) suggested that females with dependent children may experience shorter periods of homelessness, while males may experience more chronic homelessness. An exception to this trend was found in a study by Kuhn and Culhane (1998) of public shelter users in Philadelphia between 1991 and 1995. These researchers found that females were overrepresented in a more chronically homeless group as compared to the number of females who were only transitionally or episodically homeless.

Age is a demographic characteristic that seems to have a clearer association with housing tenure. The direction of the age effect may be dependent upon the type of homelessness that is studied. For example, Kuhn and Culhane (1998) found that chronic public shelter users were older than their transitionally and episodically homeless counterparts. However, studies of homelessness in general seem to point to older age as predictive of increased residential stability. For example, according to Drake, Wallach and Hoffman (1989), state psychiatric inpatients who were homeless during aftercare follow-up were younger than their counterparts with stable housing. In a study by Kuno and colleagues (2000) of mentally ill individuals who were admitted to an extended, acute care psychiatric hospital in Philadelphia between 1990 and 1993, younger

participants were at higher risk for homelessness, defined as admission to a public shelter. Length of time in the health and human service system seems to be related to housing stability as well. Mowbray and Bybee (1998) performed a logistic regression on housing and homeless status data at four and twelve months for 132 participants of NIMH National Supportive Housing Programs in Michigan. Results indicated that older age, longer duration of involvement with homelessness services and longer time participating in mainstream community mental health services significantly predicted housing stability status. It is feasible that those who adhere to treatment and experience more psychiatric gains tend to remain in programming longer, and in turn obtain longer term benefits in residential stability.

In summary, it is clear that many factors affect residential stability of homeless mentally ill people. These factors include program-related variables such as type of program and intensity of services, as well as client-related factors such as perception of choice, substance abuse, treatment adherence, symptom severity, ethnicity, gender, age and length of time in the human services system. More research is needed in this area, specifically research that attempts to determine which individuals experience barriers to residential stability. One way to attain an increased understanding in this area is to expand research to include exploration of consumer retention in supportive housing programs.

3.2 Program Retention Research

Attrition is a particular problem in programs targeted towards CMI individuals (Herinckx et al., 1997). It undermines the effectiveness of even well-designed, well-monitored community programs, and may bias results of outcome studies (Toomey et al.,

1989; Young et al., 2000). The homeless mentally ill may tend to be more mistrustful of the mental health system and less insightful about their functional deficits (Dennis et al., 1991). Attrition rates within the population may therefore be even greater than in the general CMI population (Morrissey & Dennis, 1990). For example, the 1995 HUD SHDP final report indicated that between 1987 and 1990, transitional SHDP's were utilizing only 81% of their housing capacity. Even more recently, the average residential stay for transitional housing program consumers was only nine months (HUD, 1995).

Attrition and retention are policy issues in that programs that consistently do not operate to capacity may have their funding threatened. Despite this, outcome studies often fail to explore attrition and retention adequately. There is a dearth of studies attempting to determine factors that predict attrition and retention, despite that an understanding of such factors could give program developers practical tools for improving services, decreasing costs and securing funding.

Research examining housing attrition is difficult due to the inherent problems involved in locating and maintaining follow-up contact with those who leave programs. When attritors are located for follow-up, they are often too cognitively impaired to respond adequately to interview questions (Toomey et al., 1989). A limited number of studies that attempted to determine factors related to attrition of CMI individuals from community mental health treatment were found in the present literature review. Tutin (1987) found that for 93 consumers of rural, outpatient community mental health services, results of a discriminant analysis indicated that at the end of a one year period, therapist qualities and chronicity of psychiatric illness were associated with drop out status. Univariate ANOVA's were interpreted by the researcher and significance levels of

discriminant weights of factor analytically-derived variables were not reported, but the results of this study are nonetheless interesting. Marshall et al. (1994) analyzed data from 71 mentally ill homeless people referred to psychiatrists for 18 to 36 months via survival analysis. Results showed that risk of attrition from contact with psychiatric services was significantly higher for those who were diagnosed as substance dependent in the month prior to initial presentation at the clinic and was also higher for those who were dually diagnosed with mental illness and alcohol dependence. In an attempt to replicate Gary Bond's controlled research on rates of retention of CMI individuals in assertive community treatment between the late 1980's and early 1990's, Herinckx and colleagues (1997) analyzed data from CMI individuals randomly assigned to a traditional assertive community treatment program, a consumer-run assertive community treatment team or usual community aftercare control condition. A survival analysis was performed to examine treatment retention rates. Cox regression results indicated that number of nights homeless in the six months prior to engagement in treatment mediated retention rates. That is, consumers with more nights of prior homelessness were more likely to remain in programming. Also, those in the treatment as usual condition had a risk of dropout that was two and one third times greater than the risk for those in the two assertive community treatment conditions. Young et al. (2000) reported on a large-scale study of attrition from ten community mental health clinics in Ventura County, California. Of 1,769 consumers, the most frequent reasons for leaving the clinic given by consumers were perception of personal improvement, problems with clinician, problems with treatment and barriers to treatment such as cost, transportation and comorbidity factors. Those who were younger, married, diagnosed with schizophrenia, had a history of legal

problems at baseline, were living in a non-mental health facility at baseline and reported less satisfaction with family and friends at baseline were more likely to leave treatment. Another large scale study by Chinman, Rosenheck and Lam (2000) found that of 2,798 CMI consumers of ACCESS demonstration projects, those who reported a solid alliance with their case manager at three months and twelve months had fewer days homeless (i.e., more days in the program) as of twelve month follow-up interviews.

Only a limited number of studies of adherence and retention problems in programs designed specifically for the homeless mentally ill were found. Baier and colleagues (1996) reported that over one fourth of 228 consumers of a program that linked group housing and support services left the program against professional advice. Reasons for attrition included “inability” to follow program rules, receipt of first entitlement check and advice from family members to leave. Grunebaum et al. (1999) explored predictors of SRO management problems that led to termination. Being a management problem was defined as being disruptive to the atmosphere or functioning of the residence, and/or requiring excessive staff time. The study found that 58% of the total sample had caused management problems in the past six months, the most common problem being poor self-care. Residents who abused drugs were more likely to be management problems. Residents who were nonadherent to their medication regimens (defined as taking less than half of their prescribed medication) were more likely to be a management problem, whether abusing drugs or not.

With the exception of the two logistic regressions mentioned earlier, the studies reviewed thus far do not include exploration of relative risk of consumer drop-out across time for subgroups of the homeless mentally ill. Such studies are needed in recognition of

the fact that homelessness and housing patterns among the homeless are dynamic phenomena (Drake, Wallach, & Hoffman, 1989; Dennis et al., 1991; Drake, Osher, & Wallach, 1993; Hurlburt, Wood, & Hough, 1996; Wong, Piliavin, & Wright, 1998) and the fact that outcome data are similarly dynamic (Mercier, Fournier, & Peladeau, 1992). Very few longitudinal studies of residential stability of the homeless mentally ill exist in the literature (Wong, Piliavin, & Wright, 1998). There is a particular dearth of longitudinal studies that specifically explore residential stability in supportive housing programs for homeless mentally ill individuals (Hurlburt, Wood, & Hough, 1996; Goldfinger et al., 1997; Lipton et al., 2000; Tsemberis & Eisenberg, 2000). Longitudinal studies that generally consider factors related to residential stability are reviewed below, followed by a review of those that specifically examine supportive housing data.

3.3 Longitudinal Studies of Residential Stability

Lipton, Nutt and Sabatini (1989) studied 49 homeless, psychiatric inpatients assigned at discharge to either a residential psychiatric treatment program (n=26) or standard post-discharge follow-up care (n=23). Participants were followed for one year, during which they were assessed along several variables at intake, every four months, and at discharge. Results indicated that those in the residential treatment condition were significantly less likely than controls to have extended homelessness (defined as 30 or more consecutive nights homeless). The period of greatest risk of homelessness for the experimental group was within the first month of the study, whereas the greatest risk for controls was longer, extending for four months from intake. Results showed the superiority of a residential treatment approach, but did not attempt to identify predictors of return to homelessness.

Sosin, Piliavin and Westerfelt (1990) reported on a two-wave panel study of residential transitions of recently and chronically homeless in Minneapolis. The sample was derived from drop-in centers, shelters and meal providers in the city, and was analyzed as two groups – recent arrivals and those with longer current homeless episodes. Results indicated that more previous episodes tended to reduce the probability of an "exit" from homelessness. A large proportion of the recently homeless group exited from homelessness in the six months between wave one and wave two interviews as compared to those with longer homeless careers. However, 60% of the recently homeless individuals who exited from homelessness entered another homeless spell during the study, showing that domicile often does not adequately resolve the problems that underlie homelessness. According to the researchers, this seems to be the case even when housing is supported by government programs. As evidence of the dynamic nature of homelessness, of the 60% mentioned above, one third entered domicile again before wave two interviews. Interestingly, those in the more chronic group exited from homelessness at a rate that was similar to the recently homeless group, and they were more likely to have maintained domicile as of the second wave of interviews. In the recently homeless group, those who exited homelessness between interviews tended to move into dependent/supported situations rather than independent ones. In support of the mainstream model of supportive housing, those who exited to more independent housing were less likely to return to homelessness by wave two. In contrast, for the chronically homeless group, exits to public, dependent housing lasted longer.

Sosin, Bruni and Reidy (1995) performed a repeated measures multivariate analysis of covariance on two-wave data across a six month time period from 299

substance addicted graduates of a substance abuse rehabilitation program. Participants were randomly assigned to one of three conditions: (a) case management only (n=70); (b) case management plus transitional housing (with support provided to participants in finding future, permanent housing) (n=108); or (c) a traditional aftercare control condition (n=121). It was found that the treatment conditions were superior to the traditional aftercare condition in increasing entitlement benefits, decreasing reported average days of substance use and improving residential stability. Interestingly, the case management only treatment affected substance use and residential stability to a larger degree than supportive housing. This may have been due to the fact that not all residences were substance controlled environments. In support of this, living in a controlled residence was significantly associated with residential stability at the time of the second wave of assessments.

Rosenheck and colleagues (1995) performed an analysis of homeless veterans who were provided with community residence and treatment via the Homeless Chronically Mentally Ill Veterans Program. 564 veterans completed follow-up interviews. Results of a repeated measures analysis of variance indicated that recruitment via direct outreach and tenure in the residential treatment program were significantly related to days in program housing. A larger number of clinical contacts and public support payment increases were both significantly associated with a reduction in days homeless.

Hurlburt, Wood and Hough (1996) reported results of a longitudinal study of the San Diego McKinney Research Demonstration Project. As part of the program, 362 homeless, mentally ill participants were randomly assigned to one of four conditions: (a)

comprehensive case management with access to a Section 8 certificate; (b) traditional case management with access to a Section 8 certificate; (c) comprehensive case management without access to a Section 8 certificate; and (d) traditional case management without access to a Section 8 certificate. Participants were assessed every two months for a period of two years for housing stability and other outcomes. A Cox regression analysis was performed to determine time to first evidence of consistent housing that continued until the end of the two-year study period. No significant effects were found for a set of demographic variables, Section 8 certificate status, or case manager status. A second analysis was performed, in which multiway contingency tables were utilized in order to determine experimental effects of predictor variables on housing stability, this time defined as assignment to one of six housing stability categories: (a) stable independent housing; (b) stable community housing; (c) variable housing; (d) institutionalization; (e) unstable housing (participants not meeting the researchers' criteria for inclusion in categories 1-4, but having twelve or more months of data); and (f) disengagement (participants having less than twelve months of data). Section 8 status was significantly associated with housing stability. No relationships were found between case management status and housing outcome, or between experimental interactions and housing outcomes. Next, the two stable housing categories were combined into one category, and the other four categories (c, d, e and f above) into one. The hypothesis that those with Section 8 certificates would have a higher probability of housing stability was tested. No significant effect was found. Additionally, two other predictions were tested - that for the stable housing group (the new category formed by combining categories a and b), access to Section 8 housing would increase the probability of achieving stable

housing, and that Section 8 participants would enter stable housing faster. Both predictions were confirmed. Specifically, Section 8 participants were 7.6 times more likely than those without certificates to achieve stable housing, and those with certificates achieved stable housing faster. Also, women achieved stable housing status faster than male participants. Finally, attrition was examined, and it was found that non-Section 8 participants were more likely to drop out of the program. Also, the qualitative observation that individuals who disengaged and did not utilize case management services had worse housing outcomes was noted. Although results should be considered with caution due to unadjusted inflation of the experiment-wise error rate, the study has implications for the relationship between housing choice and residential stability outcome.

Piliavin et al. (1996) attempted to determine patterns of exits from and returns to homelessness by analyzing two-wave, longitudinal data. Participants consisted of 65 individuals determined to be acutely homeless (homeless for 14 days or less) and recruited from social service agencies, and a cross sectional sample of 200 episodically and chronically homeless individuals who were available for interview at the time of that the researchers visited social service agencies. Survival analyses were run with exit from homelessness to stable independent or stable dependent (living with a family member or friend in conventional housing) for 30 days or more as the first terminal event, and return to homelessness as the critical event in the second analysis. Results of the first analysis, which combined data in both samples, indicated that exits from homelessness to independent housing were more reliably predicted. Results for analysis of the first wave of data indicated that people who worked in the 30 days prior to their wave 1 interview

were more likely to exit from homelessness, and that the "risk" of exit from homelessness for those who viewed themselves as being similar to other homeless people was lower than the risk for those who did not view themselves as similar (i.e., those who viewed themselves as different from other homeless people were more likely to obtain housing in wave 1). Also, Native Americans and males were less likely to exit from homelessness. However, the effect for gender was moderated by an effect for welfare. Males who were on welfare were more likely to exit from homelessness than those who were not, and the wave 1 decreased hazard rate for males became non-significant when welfare status was controlled. The wave 1 rate of exit from homelessness was lower for individuals who had been homeless prior to the study and whose homeless spells prior to the study were longer. For individuals who exited to dependent housing in wave 1, there was a higher hazard for those with vocational training and for individuals with symptoms of severe alcoholism, and a lower hazard rate for those who had been married and had children at some time in the past. The second wave analysis examined data from the 31st day after exit from homelessness for all individuals whose first and second wave data were available. The rate of return to homelessness was lower for those who had a longer past work history. Also, contrary to many other studies, the rate of return to homelessness was significantly lower for males.

Wong and Piliavin (1997) surveyed 443 single men, single women and females with dependent children who used shelters or meal systems in Chicago and had been homeless in the thirty days prior to the baseline interviewing. They determined that females with dependents exited from homelessness sooner, perhaps due to the fact that they were more likely at baseline to have formal social service support (e.g., cash benefits

or subsidized housing). However, females with dependents (as well as single females) had a lower hazard rate for exiting homelessness if they were alcohol users. Single women had a higher hazard rate for exit (i.e., had a higher rate of entering domicile) if they were severely mentally ill, perhaps due to increased access to mental health services. Single males who had worked for more than fifty percent of their lives had a higher rate of exit from homelessness. Interestingly, entitlement benefits had no effect on rate of exit from homelessness for single men. Across gender, African Americans and those with histories of longer prior homeless spells were less likely to exit from homelessness. Contrary to many other studies, older participants also were less likely to exit. In the next wave, single men and single women were more likely to return to homelessness than women with dependents. Also, access to formal social service resources reduced the risk of returning to homelessness. However, ethnicity did not play a significant role in determining risk for return to homelessness.

Goldfinger et al. (1997) reported longitudinal data from 111 consumers of the Boston McKinney Project. Individuals who were found to be eligible for integrated housing and intensive case management services were assigned to either an “evolving consumer household” (ECH) condition in which they resided in groups that were managed by the consumers themselves, or independent living (IL). Initial assessment took place at baseline, followed by client interviews at six, twelve and eighteen months. The researchers found that ECH consumers were less satisfied with the amount of privacy that they had, and substance abuse seemed to moderate this effect. However, ECH participants spent less time psychiatrically hospitalized and were less likely to have

episodes of homelessness than IL consumers. Substance abuse was cited as a possible predictor of housing loss.

Morse and colleagues (1997) recruited 165 homeless or at-risk consumers from psychiatric emergency rooms and inpatient units and randomly assigned them to receive brokered case management services, assertive community treatment or assertive community treatment combined with daily living and leisure skills support from paraprofessional community workers. The researchers found that of the 135 consumers who were followed for the entire eighteen months of the study, those in the assertive community treatment only group were more likely to maintain residential stability than those in the brokered case management group. Assertive community treatment plus a community worker was not superior to brokered case management, but this is very likely due to the fact that many participants in this group were not actually assigned a worker due to "implementation problems." The researchers speculated that housing stability results are related to the fact that those in the assertive community treatment group received services that were more intensive.

McBride et al. (1998) performed two studies on 215 homeless or at-risk individuals recruited from shelters (study 1), emergency rooms or inpatient units (study 2). Participants of study 1 were randomly assigned to either assertive community treatment or a comparison group that consisted of traditional outpatient treatment or drop-in centers. Participants of study 2 were randomly assigned to either community treatment or brokered case management services. Survival analyses were performed on the data from both studies, with time-varying covariates utilized for the first time in a Cox regression analysis on treatment of homeless mental illness. Covariates included age,

gender, ethnicity, monthly income, DSM-IV Axis I disorder, DSM-IV Axis II disorder, severity of global psychiatric distress, treatment (a dichotomous variable), number of housing contacts, number of mental health service contacts (other than service contacts that occurred as part of the study groups) and number of supportive, housing-related contacts. Outcome variables were duration of homelessness and time to exit from homelessness/achieve stable housing, defined as 30 or more days in stable housing. Results indicated that in general, 70% of homeless spells ended during the twelve-month study period. With regard to client characteristics, women, those with higher income and those with lower Brief Symptom Inventory (BSI) scores (less psychiatric symptom distress) were more likely to exit from homelessness. The researchers also found that the longer the homelessness spell lasted, the less likely it was to end. Those in the assertive community treatment group with more housing contacts exited from homelessness sooner. Interestingly, more outside mental health contacts were associated with longer homelessness spells. The researchers interpreted this finding to mean that those with more outside contacts experienced more severe psychiatric symptoms to which the measure of psychiatric symptom distress was not sensitive.

Wong and colleagues (1998) reported on a three wave panel study of differences in residential transitions between homeless families and homeless single adults. The sample was derived from a pool of 564 individuals who had used either a homeless shelter or a free meal program. Of those individuals, data from the 201 who were determined to have been homeless for at least 30 days prior to baseline interviews were utilized in the study. Twenty-five consumers were lost to follow-up at the time of wave two assessments. Comparison of survival functions for the remaining participants

indicated that women with children exited from homelessness at a significantly faster rate than single people without children. Single men had the slowest rate of exit from homelessness. The authors speculated that single women may have received more family support than single men in the study. Women with children were also more likely to move from a state of homelessness to their own apartment. In the second wave, women with children had a significantly slower rate of return to homelessness than single individuals. The woman with dependent children were more likely to obtain government rent subsidies, perhaps because it is generally easier for people with dependent children to qualify for such benefits. The subsidies may, in part, account for group differences in the study. Interestingly, one third of the women with children who exited from homelessness in the first wave had another homeless spell during the duration of the study period, once again pointing to the fact that homelessness is never resolved easily.

Lipton and colleagues (2000) attempted to evaluate the long-term effectiveness of comprehensive housing programs designed for homeless, CMI individuals. Programs were defined as being of low, moderate, or high intensity. The researchers performed a survival analysis on five years worth of supportive housing data. A Cox regression analysis was used to determine both risk across time for the overall sample and possible predictors of housing stability for a sample of 2,937 consumers of 67 supportive housing programs in New York City. Tenure was defined as length of time enrolled in the program. Individuals who remained in programs or moved to stable housing arrangements were considered continuously housed. Individuals who became homeless, moved into unstable housing or were imprisoned during the course of the study were classified as discontinuous placements or treatment failures. Data from participants who

died, were hospitalized for physical reasons or who moved to stable housing but could not be contacted for follow-up were censored (see *Appendix 1* for a glossary of survival analysis terms). Covariates included initial housing type (low, moderate, or high intensity), client characteristics and interactions of the two. In general, across the entire sample, 75 percent of consumers remained continuously housed after one year, 64 percent after two years, and 50 percent after five years. The probability of becoming discontinuously housed was highest (1.5 percent) in the first four months of enrollment in programming. The likelihood decreased to approximately .05 percent thereafter and remained relatively stable. Across the five-year study period, individuals in high intensity housing showed the highest risk of becoming discontinuously housed. It was also found that older individuals experienced greater housing stability across the five year study period, individuals diagnosed with comorbid drug and alcohol abuse experienced lower stability, and individuals referred to supportive housing programs from state facilities were at greater risk for abbreviated tenure. In terms of interaction effects, participants in low intensity programs had less risk for discontinuation of housing tenure if they were diagnosed with bipolar disorder or another mood disorder as compared to thought disorder, and increased risk if they were referred by a community hospital. Among those placed in moderate intensity settings, African American consumers and those who had stronger adult daily living skills had a reduced risk for discontinuation, and those referred by a community mental health center had an increased risk. With regard to high intensity programs, a lack of income upon entry into the program was associated with decreased risk, and history of use of short-term shelters was associated with increased risk of discontinuation. Potential weaknesses of the study are the lack of randomization and the

fact that data were combined across transitional and permanent settings. Data were broken out only for level of intensity of services, despite that data were drawn from a large number of divergent treatment sites. It is suspected that variables may have predicted tenure differently depending on whether an individual was initially placed in transitional vs. permanent housing. In addition, despite the study's strong statistical methods and large sample size, many of the interaction effects are difficult to translate into practical information.

Tsemberis and Eisenberg (2000) compared 242 supported housing clients in the Pathways Program in New York with 1,600 non-supported housing New York City homeless controls using survival analysis of data. Results indicated that supported housing consumers had a higher likelihood of achieving housing tenure (i.e., remaining stably housed) for four and a half of the five years of the study. At final assessment, 88% of the supported housing group was stably housed as compared to 47% of the control group. A forward stepwise Cox regression was then performed. The following five covariates were selected for entry in the following order: age, program (dichotomous), dual diagnosis status (dichotomous – yes/no), ethnicity (dichotomous – white or non-white) and mood disorder (dichotomous – yes/no). Results indicated that when the effects of client characteristics were controlled, the supported housing group still achieved significantly greater housing tenure. The risk for abbreviated tenure in the control group was four times greater than the risk for supported housing participants. Also, being older and having a mood disorder increased housing tenure, and being dually diagnosed and white decreased housing tenure. Another forward step-wise Cox regression was then performed stratifying for dual diagnosis. With the exception of mood disorder status and

the interaction variables, the same variables were selected for entry into the analysis. The dual diagnosis group had reduced housing tenure once again, although due to the use of dual diagnosis as a stratifier, the statistical significance of the results could not be assessed. Within the dual diagnosis stratum, supported housing participants again retained housing at a higher rate than controls.

The above longitudinal studies were generally well designed and comprehensive. With the assistance of such studies, there has been an increase in our knowledge of factors involved in retention in programs, residential stability, and return to homelessness – knowledge that is based on dynamic data that more closely reflect the nature of homelessness itself. These factors include referral source, membership in supportive housing programs vs. referral to traditional follow-up care, provision of case management or integrated community services, age, gender, ethnicity, substance abuse, employment history, type of services utilized prior to entrance into programs, length of homelessness prior to treatment, length of treatment, psychiatric diagnosis and severity, consumer daily living skills level, income and entitlement benefit status and self perception.

4. General Overview of the Proposed Study

The present study examined rates of treatment failure via negative attrition from three Philadelphia-based supported housing programs, and explored some of the factors associated with such treatment failure. The data utilized for the study are the result of a federally funded program evaluation project. Data were gathered over a five year period, and collapsed across the three supported housing sites.

It is unfortunately a reality that, due to characteristics of local areas, replication of supportive housing models used by other researchers is rarely possible (Dennis et al., 1991). Supportive housing is not a treatment package with concrete elements that can be replicated exactly (Hurlburt, Wood, & Hough, 1996), and treatment models are often insufficiently specified by researchers. Nonetheless, the sites from which data for the present study were collected adhere largely to the mainstream/supported housing model of supportive housing as it was intended to be implemented.

The supported housing programs that are the subject of the present study provided immediate placement of consumers into permanent, independent housing rather than having them progress through a continuum of program intensity levels. It should be noted that, unlike many other supported housing programs, the three programs that are the basis of the present study assigned consumers to independent apartments rather than helping them to locate their own independent housing in the community. Consumers were assigned to existing sites that were refurbished or built with the assistance of the public property management company that acted as the program sponsor. Also, for all three programs, consumer apartments were clustered in single buildings, based on the belief of program developers that support networks for the homeless mentally ill should include

other, similar consumers in order to normalize their experience. However, apartment buildings were geographically spread out across Philadelphia. Finally, although coercion was never used, consumers of the three programs were required to follow professional advice regarding basic mental health service plans that included elements such as regular visits to psychiatrists, adherence to prescribed psychotropic medication regimens if prescribed, and attendance at outpatient or day treatment settings if individualized assessment by mental health practitioners in the consumer's continuum of care deemed it necessary. If consumers displayed a chronic pattern of non-adherence (i.e., several months), and did not respond to outreach by supported housing program staff or outside service providers over several weeks, they were discharged from their supported housing program, including their apartments. When this occurred, consumers were referred to alternative housing and treatment providers where possible, after which case managers attempted to follow up with the consumer for a period of six-months. Sincere efforts were made by all three programs to avoid such discharges.

5. Methods

5.1 Program

Data for the proposed study were pooled across three Philadelphia-based, supported housing programs. The three supported housing programs were provided by HUD with funding for a specified period of program evaluation. A team of evaluators from Drexel University (formerly MCP Hahnemann University) was employed to perform the evaluation. Evaluation activities began on January 1, 1997 and ended on December 31, 2001. Programs were sponsored by Philadelphia's 1260 Housing Development Corporation (1260 HDC). Housing consisted of mainstream, community apartments that were built or refurbished by1260 HDC. 1260 HDC also managed day-to-day operations during tenant stays. Consumer rent payments were subsidized by federal funds, particularly Section 8 certificates from HUD. Support services were individualized and ongoing, and were provided by supported housing case managers. They included (a) assistance in connecting with various community resources; (b) training or retraining of daily living skills and assistance with daily demands such as home-maintenance; (c) linkage with psychiatric care and monitoring of adherence to psychiatric treatment regimens; (d) crisis management; (e) linkage with psychological care such as outpatient, intensive outpatient, day treatment, or substance abuse programs; (f) assistance with physical health-related needs; and (g) assistance with educational, vocational, and financial needs. Case managers were sometimes assisted by adult daily living skill (ADL) aids or volunteers.

5.2 Design

The supported housing programs that form the basis of this study represent an attempt to demonstrate the effectiveness of the mainstream, supported housing model. The evaluation design of these demonstration projects does not inherently include random assignments or comparison groups. Therefore, the research may be considered ex-post facto. The design of the present research was a mixed, between and within subjects design, as hypotheses regarding both overall hazard risk and specific group differences in hazard risk along five covariates were tested in the analysis. Collection of evaluation data by the program evaluation team began on January 1, 1997. Evaluation progressed through to December 31, 2001. Participants were accepted for admission at varying times during a five year evaluation grant period. Consequently, actual calendar start dates for individual consumers vary. Taking this into consideration, the present analysis was run independent of actual start dates. Data for the analysis are those garnered from each participant's first three years/twelve quarters of engagement in the supported housing program, independent of his or her specific start date across the five year evaluation period. All data were gathered at quarterly time points following a retrospective design in that consumers were assessed by evaluation researchers regarding their functioning over the past quarter. In addition to quarterly consumer assessments, at the end of each quarter, supported housing case managers completed retrospective ratings of consumers' functioning during the previous three months.

5.3 Participants

Data for the proposed study were obtained from program evaluation assessments of voluntary supported housing participants that occurred across a five year period of

observation. The total sample size was 107 participants. Participants were formerly homeless, CMI individuals who received supported housing services. For initial entry into the programs, individuals had to have a history of major mental illness that was deemed to be chronic, and had to be experiencing a homelessness spell at the time of referral. Homelessness was defined in a manner that is consistent with the definition proposed by the Stewart B. McKinney Homelessness Assistance Act (Public Law 100-77). According to this definition, a homeless individual is someone who "lacks a fixed, regular, and adequate nighttime residence," has as a primary residence a temporary, public or private shelter, temporarily resides in an institution, or lives in a public or private place that is not designated as an adequate living and sleeping accommodation for humans (Federal Task Force on Homelessness and Severe Mental Illness, 1992). This included individuals who were living on the streets, and those who were housed in an unstable manner, such as those in shelters, prisons and jails, residential treatment facilities, unfit community housing, hotels, halfway houses, and hospitals prior to enrollment in the study. By not imposing an entry restriction in terms of number of homeless days, the homelessness definition utilized by the three programs included transitional, episodic and chronic homelessness.

Chronic mental illness was defined as being diagnosed with a persistent DSM-IV, Axis I major mental illness or Axis II personality disorder that was sufficient enough to cause functional impairment in social and vocational domains and for which professional assistance was needed. Such diagnoses included psychotic spectrum disorders, bipolar disorder, major depression and personality disorders that caused severe psychosocial disturbance. Participants had a wide range of primary DSM-IV psychiatric diagnoses that

included paranoid schizophrenia (21.5%), chronic undifferentiated schizophrenia (9.3%), psychotic disorder NOS (5.6%), schizoaffective disorder (18.7%), bipolar disorder (15%), major depressive disorder (26.2%) and major psychiatric disorder NOS (3.7%). Consistent with current estimates of psychiatric prevalence rates among the homeless (North et al., 2004), the most common primary psychiatric diagnosis in the sample was major depressive disorder. *Table 1* summarizes psychiatric breakdowns for the population.

Table 1. Primary Psychiatric Disorder Frequencies

Psychiatric Diagnosis	Frequency	Percent
Paranoid Schizophrenia	23	21.5
Schizophrenia CUT	10	9.3
Psychotic Disorder NOS	6	5.6
Schizoaffective Disorder	20	18.7
Bipolar Disorder	16	15.0
Major Depressive Disorder	28	26.2
Major Psychiatric Disorder NOS	4	3.7
Total	107	100.0

Approximately 38.3% of the sample had a history of dual diagnosis (i.e., both mental illness and a comorbid substance abuse disorder) as determined by records from previous psychiatric providers or consumer report. Participants with substance abuse disorders were only eligible to receive supported housing if they had previously

demonstrated six months of substance abstinence. Cross tabulation of gross psychiatric diagnostic category by substance use history indicated that 32.1% of those with thought disorder had a substance abuse diagnosis by history, and 34.1% of those with a mood disorder had a history of comorbidity. *Table 2* summarizes cross tabulation frequency data.

The sample consisted of 60 males and 47 females. Participants ranged in age from 18 to 63 years old, with a mean age of 39. Individuals in the sample were predominantly African American (79.4%). Demographic breakdowns for the sample are found in *Table 3*. Referral sources for sample participants included the ACCESS Program, the Philadelphia Office of Mental Health (OMH), Community Mental Health Centers, individual resource coordinators and intensive case managers.

Table 2. Psychiatric Category by Substance Use History Cross Tabulations

	Substance Abuse History		
Diagnostic Category	**No**	**Yes**	**Total**
Thought Disorder	40	19	59
Mood Disorder	23	21	44
Psychiatric D/O NOS	3	1	4
Total	66	41	107

Table 3. Demographics

Variable		Count	Percentage
Gender	Male	63	56.1%
	Female	48	43.9%
Ethnicity	African American	85	79.4%
	Caucasian	18	16.8%
	Hispanic	1	0.9%
	Missing	3	2.8%
Age	18-21	6	5.6%
	22-50	89	88.8%
	50-63	12	5.6%

5.4 Hypotheses

For the present study, it was hypothesized that:

1) Qualitative results would show a higher probability of treatment failure during the first year/four quarters of the three year observation period than during the remaining two years/eight quarters.

2) Results would show that female study participants experienced significantly less risk of treatment failure/event than males during the three year observation period.

3) Results would show that older study participants experienced significantly less risk of treatment failure/event than their younger counterparts during the three year analysis period.

4) Results would show that variations in consumers' substance use significantly affected risk of treatment failure/event during the three year observation period.

5) Results would show that variations in consumers' perception of the degree to which they were free to make independent choices in their treatment significantly affected risk of treatment failure/event during the three year observation period.

6) Results would show that variations in the degree of psychiatric symptom distress experienced by consumers had a significant effect on risk of treatment failure/event during the three year observation period.

5.5 Measures

Measures utilized in the present study are as follows:

The Brief Symptom Inventory (BSI): The BSI is a 53-item, self-report measure that was originally introduced in 1982 for use as both a psychiatric screening device and an outcome measure for various populations (Derogatis, 1993). Clients are asked to rate the level of psychiatric distress caused by various symptoms according to the following Likert scale: 0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit, and 4 = extremely. The instrument yields distress scores on nine symptom scales: somatization (SOM), obsessive-compulsive (O-C), interpersonal sensitivity (INT), depression (DEP), anxiety (ANX), hostility (HOS), phobic anxiety (PHOB), paranoid ideation (PAR), and psychoticism (PSY). The BSI also yields scores on three global indices: the global severity index (GSI), the positive symptom distress index (PSDI), and the positive symptom total (PST).

Based on a sample of 719 psychiatric outpatients, the internal consistency reliability of the BSI was found by the test's author to range from .71 to .85. Independent researchers have found comparable alpha (α) level ranges. Based on a sample of 60 non-patient individuals tested across a two week interval, the test-retest reliability of the BSI

ranged from .68 for the SOM scale to .91 for the PHOB scale. The BSI's alternate forms reliability was evaluated according to the test's correlation with the SCL-90-R, which is a test by Derogatis that measures identical symptom constructs in a longer format. Based on a sample of 565 psychiatric outpatients, correlations between the instruments across the nine primary scales ranged from .92 for the PSY scale to .99 for the HOS scale (Derogatis,1993; Derogatis & Savitz, 2000).

The BSI has been found to be sensitive in a broadband manner to changes in signs of psychiatric symptom distress (Derogatis & Savitz, 2000). The convergent validity between the BSI and the MMPI was found to be greater than .30 (Derogatis, 1993). Factor analysis of the BSI using varimax rotation identified nine interpretable factors that accounted for 44% of the variance in scores, showing evidence of the construct validity of the instrument (Derogatis, 1993). Regarding concurrent validity, Calsyn and colleagues (1997) found that based on self-report data from 165 homeless individuals, there was good agreement between participants' ratings on the BSI and case managers' ratings on the Brief Psychiatric Rating Scale (BPRS). The one exception to this was the BSI PSY scale.

In the present study, GSI scores were utilized as a means of tracking changes in consumers' subjective perception of distress brought on by psychiatric symptoms. Missing GSI data points in the middle of a time-dependent variable series would have prevented the running of an extended Cox regression analysis. Therefore, such data points were replaced once via carrying the previous data point forward, and subsequently by the mean GSI score, calculated for each consumer prior to carrying data points forward. Missing GSI data points at the ends of time-dependent variable series' were also

replaced with consumer-specific means when there were three or less such missing points. This method of handling missing data is consistent with that used by similar research projects (McBride et al., 1998).

Personal Choice-Making Scale (PCMS): The PCMS is a scale developed by a team of program evaluation researchers at Drexel University (formerly MCP Hahnemann University) for use in assessing perception of choice in case management consumers. The construct of perception of choice reflects the degree to which an individual consumer feels that he/she retains freedom to exercise free will in choices that are relevant to physical, mental and emotional self-care and general daily living behaviors. Consumers' scores will naturally be lower in cases in which they perceive that supportive housing case managers did not allow a sufficient level of freedom of choice regarding behavior in various domains. That is, consumers who believe that their case managers dictate what they should and should not do or who perform daily living tasks for their clients without consent will have a lower PCMS score than those with case managers who allow their clients to dictate their own self-care and daily living behaviors in an informed but independent manner. The PCMS is a 13-item, five-point Likert scale instrument that measures perceived choice across twelve areas of case management services. These twelve areas are: (a) clinical treatment; (b) employment; (c) money management; (d) volunteer work; (e) going to an educational/training program; (f) buying/preparing food and maintaining nutrition; (g) basic self-care (e.g., clothing, bathing); (h) transportation; (i) staying physically and mentally healthy; (j) keeping one's apartment safe and clean; k) socializing; and l) substance dependence treatment. The higher the perceived degree of

freedom of choice, the higher the consumer's score on the PCMS. Information regarding the psychometric properties of the PCMS is not available at this time.

Missing data points in the middle of a PCMS time-dependent variable series would have prevented the running of an extended Cox regression analysis. Therefore, such data points were replaced once via carrying the previous data point forward, and subsequently by the mean PCMS score, calculated for each consumer prior to carrying data points forward. Missing PCMS data points at the ends of time-dependent variable series' were also replaced with consumer-specific means when there were three or less such missing points. This method of handling missing data is consistent with that used by similar research projects (McBride et al., 1998).

Monthly Evaluation Checklist (MEC): The MEC is a program evaluation facilitation measure created in 1997 by a team of program evaluation researchers at Drexel University (formerly MCP-Hahnemann University) (Turner et al., 2000). The MEC is designed to be completed by case managers, and includes reporting of housing status, adherence to supported housing treatment plans, use of and adherence to non-supported housing services, supported housing case management crisis contacts, suicidality, substance use status, benefit status, employment status, income, volunteer status and educational status. The MEC also allows case managers to rate a consumer's functioning in eight domains of daily living on a Likert scale that ranges from 1 to 10, with 10 representing the highest level of functioning and 1 representing the lowest. Anchor point definitions for the scale vary for the different domains. The eight rating scale domains are money management, nutrition and food preparation, personal hygiene, mobility, personal health maintenance, apartment maintenance and safety, socialization,

and drug free status. Information regarding the psychometric properties of the MEC is not available at this time.

For the purposes of the present study, baseline MEC data were utilized in order to verify substance use history data provided by consumer referral sources. To provide time series data for the extended Cox regression component of this study, monthly, binary (0=no; 1=yes) substance use data for each consumer were averaged to obtain a quarterly, binary substance use variable.

Missing MEC data points in the middle of a time-dependent variable series would have prevented the running of an extended Cox regression analysis. Therefore, such data points were replaced via carrying the previous data point forward. Missing MEC data points at the ends of time-dependent variable series' were also replaced via carrying forward the previous data point. In all but five of the 107 cases in the sample, the data points that were carried forward for a case were also that consumer's modal value prior to carrying any points forward.

5.6 Procedure

Consumers were informed as they entered their respective supported housing programs of the confidential and voluntary nature of the quarterly program evaluation assessments that would occur as a stipulation of public funding of the three programs. Participants were told that situations that constitute exceptions to confidentiality included (a) if determination was made that the consumer was a danger to self; and (b) if determination was made that the consumer was a danger to another person. Clients signed consent forms in agreement with this procedure prior to the gathering of baseline data. Participants were assessed on a quarterly basis by clinical psychology doctoral students

who comprised a team of researchers contracted to perform ongoing program evaluation of the three supported housing programs. The research team was led by a licensed clinical psychologist who served as the primary investigator. In addition to the BSI and PCMS, consumers were also assessed by program evaluation researchers in the areas of suicidality, homicidality, consumer satisfaction with supported housing services, quality of life, and social adjustment. Quarterly program evaluation data gathering also included analysis of MEC's that were completed by supported housing case managers.

6. Statistical Analysis

6.1 Data Diagnostics

Prior to analysis of data, assumption checks and statistical diagnostics were performed on the data. The assumption of independent events was fulfilled as evidenced by the fact that each consumer was represented in the database only once. The status/event variable satisfied the assumption of mutual exclusivity in that no case is a member of both event and censored status simultaneously. Also, censorship via assignment of a value of "0" for the status/event variable was only dependent upon whether or not consumers left the study. For those consumers who left the study, censorship was dependent upon their reasons for leaving. Censorship status was assigned in the database prior to the analysis and is therefore independent of the probability of event occurrence.

Outliers were examined via examination of the casewise df beta weights that resulted from regressing baseline symptomatic distress score (BSI GSI from quarter one), choice score (PCMS score from quarter 1) and substance abuse history variable data on survival time. Examination of df betas is a process that assesses regression models differences after removal of each case in order to determine if any individual cases had a disproportionately influential effect on the regression estimate for the sample. All df betas were found to be less than 1, indicating a lack of influential cases in these variable sets. Therefore, no cases were removed from the analysis on the basis of residual examination.

The proportional-hazards assumption was then checked for the variables gender, age and substance abuse history (i.e., the hypotheses that hazard ratios for males and

females, for different ages, and for the two substance abuse history categories were constant over time were tested) in order to determine if these variables could be included in a Cox proportional hazards model. The variables were first checked via temporary conversion of each into a simply defined time-dependent variable and entry into independent extended Cox survival analysis models. Data from the entire sample (N=107) were used. The Wald statistic for the extended Cox regression analysis with gender as a covariate (defined as T_*gender where T_ is the system time variable) was nonsignificant at the .05 level (p=.114). This was also the case for the extended Cox analysis of age (defined as T_*age), which yielded a nonsignificant Wald statistic (p=.276). These results indicated that both variables met the proportional hazards assumption. A Cox proportional hazard model was then fitted to the data after stratifying for the two conditions of gender. Log-log survival curves for the two gender categories were observed and found to be reasonably parallel, which was consistent with the statistical analysis of proportionality of hazards for gender. Regarding substance use history, a Cox proportional hazards model fitted to the data after stratifying by substance use history produced reasonably parallel log-log survival curves. However, the Wald statistic for the extended Cox assumption check for the variable substance abuse history (defined as T_*dnahx) was significant (p=.008). Therefore, a decision was made not to perform a proportional hazards Cox regression. Instead, a new, time segmented substance use variable based on quarterly substance use was created for use in an extended Cox regression.

6.2 Analysis Description

A Kaplan-Meier survival analysis was first done in order to obtain ordered survival information and cumulative survival probability estimates for the overall sample. This allowed for qualitative evaluation of hypothesis 1. The use of Kaplan-Meier analysis is considered to be superior to Life Table analysis for obtaining survival and hazard descriptions for small to moderate samples (Luke & Homan, 1998). An extended Cox regression analysis was subsequently performed to test hypotheses 2 through 6. The decision to use time-varying covariates in an extended Cox regression was based on the fact that the constructs of symptomatic distress, perception of freedom of choice and substance use are not static in nature. Therefore, the use of baseline values for these variables did not seem theoretically sound. Use of time-dependent covariates allows for changes in the hazard function as a result of individual characteristics or behavior (i.e., does not require fulfillment of the proportional hazards assumption for these variables) and therefore maximizes the amount of predictive data (McBride et al., 1998).

The dependent variable for both analyses was the rate of occurrence of the terminal event - treatment failure via negative attrition as described previously. The covariates that were entered into the exponential, Cox regression model were gender (categorical), age at consumer's baseline, a time-segmented variable derived from quarterly, MEC substance use data, a time-segmented variable derived from quarterly, PCMS perceived freedom of choice data, and a time-segmented variable derived from quarterly, BSI global psychiatric distress level data. These variables were chosen from a list of variables for which the data were complete and reliable, and were judged by this researcher to hold the most promise as predictors of risk of treatment failure as based on

the previously reported literature review. Variables were entered into the regression model according to a forward stepwise strategy in order to obtain results of an exploratory nature that may build on future research that attempts to fit similar data to models specified in an *a priori* manner. The statistical criterion for entry into the model was .05. The maximum number of iterations for the analysis was set at 20, the statistical application default. Global symptomatic distress, choice and substance use were evaluated for entry into the model after being defined via syntax in a time-segmented manner, thus creating three new, time-dependent covariates. The use of time varying covariates in the model automatically leads to the violation of the proportional-hazards assumption of survival analysis. However, as stated earlier, an extended Cox regression model does not require fulfillment of this criterion.

6.3 Data Considerations

During the gathering of program evaluation data, every effort was made to complete functional assessments for all quarters during which a consumer was exposed to supported housing treatment. The original sample consisted of 122 cases. The decision was made to remove 15 cases that represented consumers who had no data points. Thus, the N for the overall study was 107. All 107 cases were utilized in descriptive analyses as well as a Kaplan-Meier analysis that was performed in order to describe survival time and test hypothesis 1. However, of these 107 cases, only 76 were utilized in an extended Cox regression analysis due to the fact that 31 cases were dropped from the analysis by the statistical application as a result of a disproportionate amount of missing data (greater than three data points) at the ends of the three time-dependent variable series.

Regarding statistical power for the analysis, this researcher found no published tables or calculators for determination of sample size needed for particular effect sizes in survival analysis. However, due to the fact that survival analysis is a regression-based analysis, the suggestion of Hair, Anderson, Tatham and Black (1995) of 15-20 participants per independent variable was followed. The overall sample size for the present study after deletion of cases with a disproportionate amount of missing data points (cases that had less than three data points for time series variables) was 107. All 107 of these cases were utilized in a Kaplan-Meier analysis that provided ordered survival information for the sample. The N for the extended Cox regression analysis was unfortunately smaller (N=76) as discussed above. However, the sample size of 76 cases was determined to provide sufficient power to detect significant effects on survival time of the five covariates in the extended Cox regression model.

Due to the use of survival analysis techniques in this study, it was necessary to define a status variable (see *Appendix 1* for a glossary of survival analysis terms). The status variable for the analysis was defined as a time-independent, binary variable. The terminal event for the analyses was defined as dropping out of the supported housing program against professional advice, being discharged for drug and/or alcohol use, being discharged due to non-adherence to treatment rules or being lost to follow-up. Thus, individuals who fell into one of these four categories were considered to be treatment failures and were coded as having experienced the terminal event. Data from those who became deceased during the course of the study, entered long-term psychiatric or medical hospitalization, developed long-term medical problems that compromised their ability to function in an independent housing program, or left the program but entered another form

of stable housing were not included in the same category as the above described treatment failures. Data for individuals whose reasons for leaving the study fell into one of these latter three categories were right censored from the point that they left the study. That is, data for such cases were only utilized in the analysis up to and including the time that the consumers left the program (for a formal definition of censoring, see *Appendix 1*).

The observation period of the study consisted of a total of three years. Time to terminal event was measured in quarters. A continuous time modeling technique was utilized in the main analysis despite the discrete time intervals represented by the data. Results were compared to those obtained when a discrete time method, logistic regression, was performed using gender and age, as well as baseline variables from the database that were similar to the time-dependent variables analyzed as part of the extended Cox regression analysis (substance abuse history, symptomatic distress in first quarter and perception of choice in final quarter). The dependent variable in this analysis was a dichotomous variable that represented whether or not consumers experienced negative attrition. Results were found to be similar to results obtained via Cox regression. Therefore, results of the logistic regression are not reported here, and a decision was made to utilize continuous time modeling on the data. A benefit of this decision is that employment of Cox regression analysis allowed for the use of time-dependent variables in the model.

Consideration was given to comparison of the results of the extended Cox regression analysis with results of an analysis attempting to fit a decreasing Weibull to the same data. This comparison was considered because use of a parametric survival

analysis technique may have provided more accurate parameter estimates and standard errors, and because according to the literature, rates of return to homelessness after a period of stable housing seem to decrease the longer one is in stable housing. However, estimation of the specific shape of hazard function should optimally be based on a very detailed understanding of the constructs in question and sound beliefs about their effects on functional shape. Since the present study is exploratory in nature, it was determined that such an analysis was ultimately beyond its scope.

As stated earlier in this document, time to terminal event was measured independent of consumers' actual, calendar start dates. Program evaluation began on January 1, 1997 and extended for a total period of five years. A potential data problem was posed by the fact that the program evaluation grant for one of the three agencies began one year earlier and ended one year later than the grants for the other two agencies. Thus, approximately one third of the dataset had the opportunity to be exposed to supported housing treatment for up to five years - from January 1, 1997 to December 31, 2001. This was inconsistent with the potential maximum exposure time of three years for consumers from the other two agencies (from January 1, 1998 to December 31, 2000). In order to equalize exposure time, only data from participants' first three years/twelve quarters in the supported housing program were analyzed. Data from evaluations occurring in quarters 13 through 20 (which could obviously only belong to cases from the agency with the five year grant) were right truncated. Cases for consumers from this agency who actually remained in the program past twelve quarters were categorized as remaining in the program throughout the entire three year observation period. Such cases were right censored to account for the fact that this group of consumers may have

experienced the terminal event after the end of the twelfth quarter, making their total survival time unknown beyond estimation that it was > t_j. The method chosen by this researcher of right truncating the data is a sound one (Kleinbaum, 2004). Consideration was given to attempting to fit separate regression models to data subsets based on agency. However, the small number of cases per group precluded such an analysis.

7. Results

7.1 Descriptive Statistics

The overall sample size for descriptive analyses was 107. *Table 4* summarizes sample means and standard deviations for data from the following time-dependent variables: symptomatic distress (bsi), freedom of choice (choice) and substance abuse (dna). The table values are broken out by quarter. Qualitatively speaking, there do not seem to be trends across time for any of these variable sets.

Table 4. Time Dependent Variable Means

	bsi	choice	dna
Q1	.8602	1.7917	.12
	(.6412)	(.5371)	(.33)
Q2	.9070	1.7652	.13
	(.6972)	(.5215)	(.34)
Q3	.9076	1.7374	.10
	(.7710)	(.5641)	(.30)
Q4	.8599	1.7396	.09
	(.7324)	(.4968)	(.29)
Q5	.8897	1.8707	.11
	(.7890)	(.5398)	(.32)
Q6	.8395	1.8334	.11
	(.6839)	(.6503)	(.32)
Q7	.8639	1.8458	.11
	(.6788)	(.6503)	(.31)
Q8	.8280	1.9056	.13
	(.6238)	(.5792)	(.34)
Q9	.8446	1.8454	.17
	(.6999)	(.5819)	(.38)
Q10	.8369	1.8116	.08
	(.7469)	(.6186)	(.28)
Q11	.8979	1.7922	.06
	(.7524)	(.6115)	(.24)
Q12	.7917	2.0359	.12
	(.6315)	(.6525)	(.33)

N=107; Parenthetical values are standard deviations.

As of the end the end of the observation period, an impressive 65 consumers of the overall sample (60.7% of the 107) remained in the supportive housing program. Reasons for exit from the supported housing program varied across the other 42 consumers and are summarized in *Figure 1*. Reasons include voluntary dropout from the program that was against professional advice (10 consumers; 9.3%), disappearance ("lost to follow-up"; 1 consumer; .9%), becoming disabled or diseased and thus resulting in an inability to continue on (2 consumers; 1.9%), persistent drug and/or alcohol use (4 consumers; 3.7%), becoming a persistent management problem via lack of adherence to rules (11 consumers; 10.3%), and graduating to some form of stable housing (e.g., moving to one's own apartment that was deemed a safe residence from which one could maintain healthy functioning; 14 consumers; 13.1%).

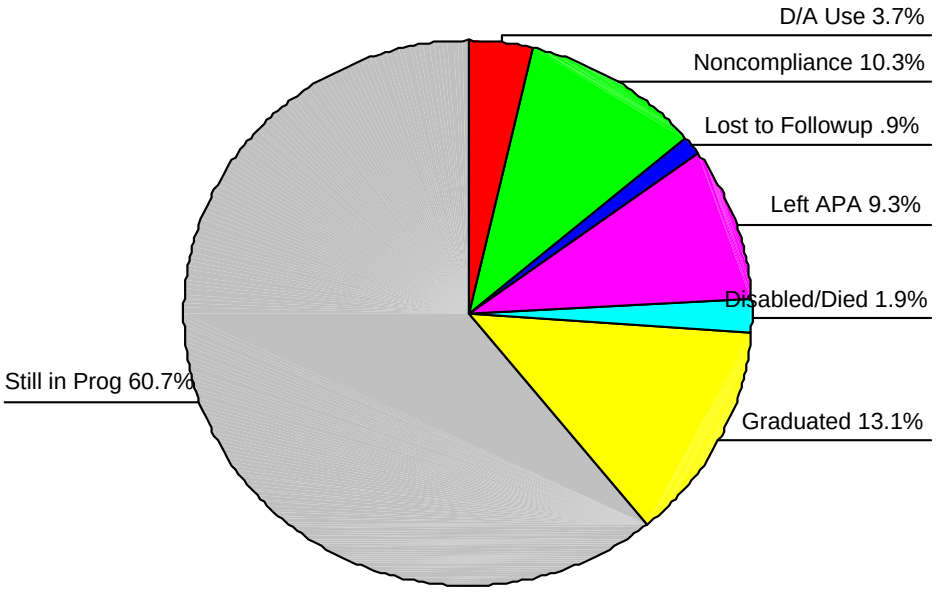

Figure 1. Reasons for Exit

7.2 Kaplan-Meier Results

The ordered survival table for the overall sample (N=107) can be found in *Appendix 2*. The Kaplan-Meier survival function and hazard function for the sample are shown in *Figure 2* and *Figure 3* respectively. The mean survival time for the sample was 8.98 quarters, and ranged from 1 to 12 quarters. The median survival time and interquartile survival range could not be determined as the cumulative survival probability did not go below 50% as of the end of the observation period. The modal survival time for the sample was 12 quarters. According to analysis results, there was a 74.1% probability of remaining in the program for 12 quarters. The probability of

survival past 12 quarters is unknown, but is assumed to be less than or equal to 74.1%. There were a total of 26 terminal events. Of the 81 consumers who did not experience the event, 65 (60.7% of the overall sample) were censored because they remained in the program as of the end of the observation period. The remaining 16 consumers (15% of the sample) were censored due to having left the program for nonnegative reasons (i.e., left the study due to disability, death or graduation to stable, independent housing), and are therefore not considered to be treatment failures. Rather, their data were utilized in the analysis up to the time of censorship.

Regarding Hypothesis 1 – that the probability of failure would be greater during the first 4 quarters/1 year of the observation period than during the remaining 8 quarters/2 years, the probability that a consumer would experience treatment failure within his/her first 4 quarters was 16% - (1.0 - .84) * 100. This was greater than the probability of experiencing failure during the second 4 quarters, which was 6% - [(1.0-.78) – .16] * 100. It was also greater than the probability of experiencing failure during the final 4 quarters – 4% - [(1.0-.74) – .22] * 100. Furthermore, it was greater than the combined survival probability of failure for the final 8 quarters of the observation period. It is therefore the conclusion of this researcher that Hypothesis 1 is true for the present sample. A qualitative comparison of changes in the slope of the survival function across time shows that, in fact, the curve appears to be steeper earlier in the observation period, particularly prior to the sixth quarter. There is no specific test to determine the statistical significance of the difference between the probability of treatment failure during the 4 quarters/first year vs. during the final 8 quarters/two years. However, qualitatively speaking, it appears to be a noteworthy difference.

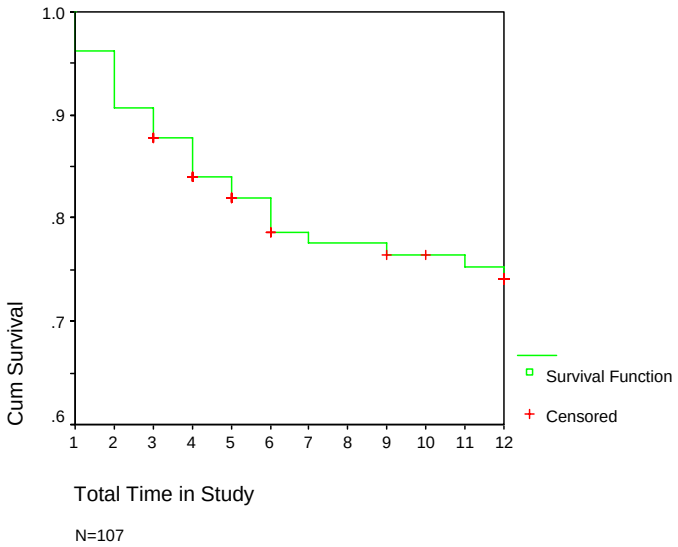

Figure 2. Kaplan-Meier Survival Curve for Overall Sample

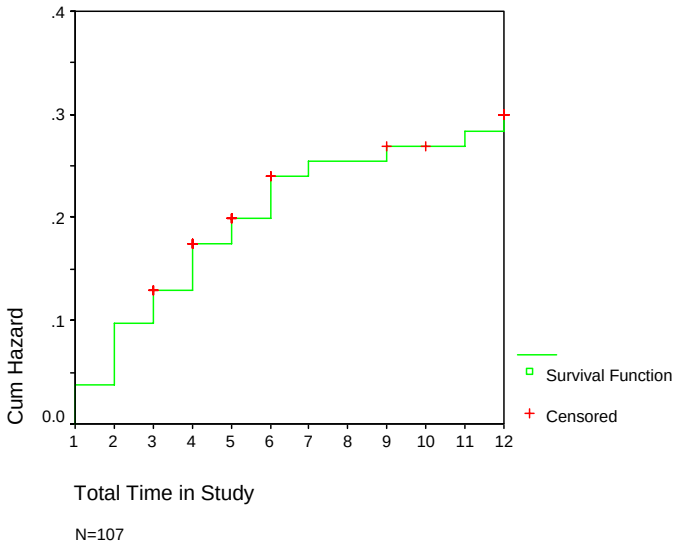

Figure 3. Kaplan-Meier Baseline Hazard Function for Overall Sample

7.3 Extended Cox Regression Results

The N for the extended Cox regression analysis was 76. As stated earlier, this was due to the fact that 31 cases were dropped from the analysis for insufficient time-series

variable data. Analyses were performed in order to determine if there were significant differences on key variables between cases used in the analysis and those that were dropped from the analysis. All dropped cases were those for consumers who were in the supported housing program for the full 12 quarters. However, dropped cases did not differ significantly in terms of symptom severity related variables. The two groups were similar in terms of baseline diagnostic category, substance abuse history (yes/no), and symptomatic initial symptomatic distress as measured by the BSI. The two groups also did not differ significantly in terms of demographic variables. Both groups were predominantly male (55% of the cases used in the analysis and 58% of the dropped cases). The mean age for dropped cases was 36.6. The mean age for cases utilized in the analysis was 39.3. Age ranges also did not differ significantly. Both groups of cases were predominantly African American (82% for cases used in the analysis; 82% for cases that were dropped). There were no significant ethnicity differences between the two groups.

The initial -2 log likelihood for the baseline model was 211.057. The first variable chosen for entry into the model was the time-dependent *dna* variable. The -2 log likelihood value for this model (Model 1) was 189.145. The Chi-square value (21.912; df=1) for the change in -2 log likelihood from the baseline regression model was significant at the .05 level (p = .000). The second variable entered into the model was gender, which resulted in a -2 log likelihood value of 184.117. The Chi-square value for the change from Model 1 to the best fitting model, Model 2 (5.028; df=1), was also significant at the .05 level (p = .025). No other variables were chosen for entry prior to the maximum number of application iterations (20). Therefore, the best fitting model for the sample data is one that includes quarterly time series alcohol use data and gender,

both of which had a statistically significant effect on survival estimates for the sample (N=76). Parameter estimates and related statistics for Model 1 and Model 2 are summarized in *Table 4*.

According to analysis results, when the data were adjusted for gender differences in survival probability, dna was positively associated with the time to event - treatment failure via termination for substance use, termination for nonadherance to program rules, leaving the program against professional advice, or being lost to follow-up. That is, when controlling for gender, there was evidence of time-dependence in the predictor in that the more substance use a consumer engaged in over time, the faster the rate of treatment failure. The hazard ratio for dna estimates that the failure rate increased 6.64 times for each unit of increase in substance use across the observation period. This effect was statistically significant at the .05 level ($p = .000$). Thus, Hypothesis 4 was supported.

When controlling for substance use, males experienced treatment failure at a significantly faster rate than females. This was also significant at the .05 level ($p = .037$), thus supporting Hypothesis 2. The hazard ratio for gender estimates that when controlling for substance use variation over time, males had .375 times the failure rate of females.

Table 5. Multivariate Extended Cox Regression Model Statistics

	Variable	B	SE	Wald	df	Sig.	e^b
Model 1	dna	1.974*	.394	25.082	1	.000	7.198
Model 2	dna	1.893*	.396	22.874	1	.000	6.640
	gender	-.982*	.470	4.364	1	.037	.375

*N=76; B = beta weight; SE = standard error; df = degrees of freedom; Sig. = statistical significance; e^b = exponent(B); * = statistically significant at the .05 level.*

8. Discussion

As discussed above, the best fitting model of predictors for the sample data is one that includes quarterly time series alcohol use data and gender. The fact that Hypothesis 4 was supported and substance abuse over time was strongly associated with treatment failure as hypothesized is quite logical. Other investigations have found that substance users have lower stable housing tenure and are at higher risk for returns to homelessness (Bebout et al., 1997; Drake, Wallach & Hoffman, 1989; Dickey et al., 1996; Goldfinger et al., 1999; Hurlburt, Hough & Wood, 1996; Kuno et al., 2000; Lamb & Lamb, 1990; Lipton et al., 2000; Olfson et al., 1999; Piliavin et al., 1996; Tsemberis & Eisenberg, 2000). Further investigation would be needed to determine the path by which substance use led to an increased risk of negative attrition for this sample. Nonetheless, it was qualitatively apparent in the sample that those who engaged in substance use were often discharged for noncompliance. Also, those who had less substance use or abstained altogether were overrepresented in the group that remained in the program until the end of the observation period.

Obviously, the response to such information cannot involve excluding those with substance abuse or substance use histories from residential programs such as supportive

housing as this would be blatantly unethical and produce yet another barrier to care for an already burdened homeless subgroup. An alternative would be to fine tune the connection between addiction treatment and residential programming. It is often the case that supportive housing programs do not inherently include substance abuse treatment, but rather provide case management to assist consumers in committing to such treatments adjunctively. Perhaps a better model would provide 12-Step groups or other substance abuse treatment 'closer to home', within clustered apartment buildings or case management home bases.

The fact that males in this sample experienced treatment failure at a significantly faster rate than females, thus supporting Hypothesis 2, was equally logical. The results are consistent with the literature. Other researchers have found that females, particularly females with dependent children, are more likely to exit from homelessness and remain in treatment programs, and have a slower rate of return to homelessness (Hurlburt, Hough & Wood, 1996; Kuhn, & Culhane, 1998; McBride et al., 1998; North & Smith, 1993; Piliavin, 1996; Wong & Piliavin, 1996; Wong et al., 1998). Again, more research would be needed to determine possible reasons for this effect. The women in the present sample were placed in supported housing alone. That is, none of the three programs across which data were pooled were specifically designed to house women with dependent children. Therefore, speculations from the literature about the subgroup of homeless mothers cannot be applied here. Nor can the effect be simply explained by the fact that women in the sample had less substance use across time than males in the sample because although this was the case, the gender effect on hazard rate remains statistically significant after partialling out the effect of substance use variations. It is possible that the effect occurred

because males in this sample tended to have more severe psychiatric diagnoses at baseline, as well as more subjective symptomatic distress as reported on the BSI. The effects of baseline diagnosis and symptomatic distress were not controlled for, the former because it was not a part of the analysis and the latter because it did not meet the statistical criterion for inclusion in the best fitting model for this sample's data. Perhaps the effect of gender for this sample would disappear if these two constructs were partialled out of the equation. The effect is, after all, considerably smaller than the effect for substance abuse. However, again, the reduced tenure for males seems consistent with the results of other homelessness research.

The main result of this investigation – the fact that for this sample, substance abusing males had the highest rate of negative attrition – is consistent with the literature on the homeless, CMI population. Substance abusing males have been overrepresented in the "skid row" chronically homeless subpopulation for quite a long time (Baxter & Hopper, 1981). This subgroup clearly remains in need of particular attention in terms of outreach, engagement and ongoing support during crises that are likely to result in relapse to homelessness.

Some discussion is warranted regarding the null results related to age, symptomatic distress and freedom of choice. The effect of age on time to terminal event may have been non-significant for this sample due to the fact that 88.8% of the sample were ages 22 to 50. Data from such a sample may not have provided adequate variance to detect an age effect. It may also be the case that the effect of age becomes negligible when the effects of other, more important variables such as substance abuse are controlled.

The effect of symptomatic distress as measured by the BSI may have been similarly washed out after other variables were controlled. It is also possible that the construct may simply be a less important factor. There is confusion in the literature about the constructs that are represented by the BSI. The construct of symptomatic distress is different from psychiatric diagnosis and symptom severity. Consumers who experience a high level of distress are not always more severely impaired. At times, a consumer experiences greater distress due to increased insight that is linked with decreased severity. It is possible that, consistent with the literature, severity is linked with negative attrition for this sample but distress is not. It is feasible that a consumer who experiences a great deal of subjective distress may in fact feel *more* in need of assistance and may actually be more likely to remain engaged in supported housing.

Finally, the fact that freedom of choice was not chosen for entry into the Cox regression model appears to be counterintuitive. It seems obvious that if a consumer feels coerced or does not feel like a collaborative partner in treatment he will be more likely to attrit. However, there is not a great deal evidence in the literature for this effect. It may be that beliefs among practitioners about the positive outcome effects of performance improvement variables such as freedom of choice and consumer satisfaction are the result of clinical lore. It is also possible that freedom of choice is far too complex to measure with a Likert scale measure as was done in the evaluation from which data for the present study were obtained. One consumer who has an apartment assigned to her, contributes to her own treatment plan and has frequent direct case management services provided to her may have very positive outcomes, while another consumer may feel insulted by such assistance and have more positive outcomes if left alone.

It is an impressive and unusual outcome that 60.7% of the sample remained in the supportive housing program through the entire observation period. It was my experience as a member of the team that evaluated the three programs represented in this study that the supportive housing case managers that staffed them were patient and compassionate individuals who stayed true to the mission of providing individualized care and strived to create treatment plans collaboratively with the consumers. The overall survival outcome may therefore be attributed to outstanding staff. Ultimately, however, this outcome may come as a disappointment to many service providers in a "glass is half empty" manner. There were, after all, many consumers who left the program against professional advice or were terminated. It is for this very reason that analyses such as the one discussed presently that explore factors related to program success and failure are invaluable.

There are admittedly statistical weaknesses in this study. The Cox regression analysis results reported earlier do not "prove" that a model that includes substance abuse and gender is the best fitting one for the overall population from which the present sample was derived, nor do they provide evidence for causal interpretation. The results are simply consistent with that particular model. Also, the lack of use of survival analysis techniques that are better suited for data across discretely defined time intervals, the possible inflation of type 1 error that may have resulted from the use of a forward stepwise Cox regression entry method, the use of two unvalidated assessment instruments and the pooling of data across three supported housing agencies to ensure sufficient power for the analysis may have all affected the validity and generalizability of the results in unknown ways. In addition, the 15 cases removed from the dataset may have actually been treatment failures. Similarly, the 31 cases that were dropped from the

extended Cox regression by the statistical application were all cases representing consumers who had significant tenure in the program. Therefore, if these cases had been available for the analysis, parameter estimates may have been quite different.

Other problematic issues may have resulted from the fact that the sample was a combination of transitionally, episodic and chronically homeless individuals, and the fact that the analysis did not research programmatic factors such as frequency and intensity of direct services, case management caseload size and case manager-client alliance. Utilizing these constructs as factors or strata variables was simply not possible due to the fact that the consumer background/history and service data that were provided by agency directors were very incomplete. All of these issues may have affected standard error estimates in unknown ways. Finally, the definitions utilized for categories of the status variable may be problematic in terms of interpretation of the outcomes of this study. For example, terminal events may not have all represented treatment failures in that all individuals who left the program against professional advice or were terminated may not have returned to homelessness. Unfortunately, follow-up tracking data were not available to this researcher. Anecdotally, agency directors may not have had good follow-up data anyway as this population is notoriously difficult to track once they leave services. Likewise, individuals who “graduated” to stable, independent housing may have remained at risk for subsequent homeless spells and may have become treatment failures. Again, follow-up data were not available to determine the rate of subsequent homelessness spells for this subgroup.

Due to the above issues and the fact that the present study is not randomized, controlled research, results should not be generalized to other homeless groups. Rather,

the results discussed in the following sections are considered to be sample specific. Nonetheless, the outcomes discussed here may provide important and practical information to be considered in attempts to improve programs designed to treat homeless individuals with severe mental illness.

In addition to correcting the above imperfections, future research should strive to determine programmatic factors that contribute to increased failure rates for particular subgroups of the homeless, CMI population, as the results of such research would contribute more readily to program improvement. Dismantling research that examines individual supportive housing components and their relative effectiveness would also significantly aid program improvement. It is the hope of this researcher that investigation into such promising programs as supportive housing continues and follows a self-correcting trajectory that leads, ultimately, to a decrease in the rate of homelessness among the mentally ill.

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Appendix 1. Survival Analysis Definitions

Adjusted Survival Function: The relationship between a predictor and the survival probability when taking into account the effects of other predictors in the multivariable model.

Baseline Hazard Function: Estimates the instantaneous risk of event occurrence over time for the sample as a whole (i.e., assumes that covariates are set to 0).

Breslow Test: A nonparametric test used to compare survival distributions. This test is sensitive to group differences at early time points.

Censored Data: Durations that are known only to exceed some value because the start or end of the time interval is unknown. Often this means that the event being monitored occurs outside the study observation period.

Conditional Probability: The probability that an individual survives beyond a particular time point given that he remained at risk after the previous event.

Continuous-Time Survival Model: Survival model designed for analysis of duration data that are measured precisely. In practice, continuous-time models are often used when times are recorded in small units.

Cox Regression Model: A semiparametric survival model that relates one or more variables to the risk that an event will occur at a particular time. There are two kinds of Cox models: the standard model and the extended model.

Deviance (-2LL): Computed as –2 times the natural logarithm of the sample likelihood. Generally a positive number, the deviance decreases as the likelihood increases (when the likelihood is 1, the deviance is 0).

Discrete-Time Survival Model: A survival model for analysis of duration data that are grouped into intervals (e.g., months, years, or semesters).

Extended Cox Regression Model (Time-Dependent Cox Regression Model): A generalization of the standard Cox regression model that incorporates time-dependent predictors.

Event (Terminal Event, Failure): A change from one of two mutually exclusive and exhaustive states to another.

Hazard: A measure of the risk that an event will occur for an individual at a particular time. For continuous-time models, the hazard rate is a rate that ranges from zero to infinity. For discrete-time models, the hazard is a probability.

Hazard Function: A mathematical relationship that describes changes in the risk of event occurrence over time.

Hazard Ratio [HR, exp (b)]: An effect strength measure computed as the ratio of estimated hazards for individuals with different covariate values. For proportional-hazards models, the hazard ratio is assumed to be fixed over time. Also known as relative risk.

Independent-Censoring Assumption: An assumption that censoring mechanisms are unrelated to the probability that an individual will experience an event. The independent-censoring assumption is violated if persons withdraw from a study because they are at high risk or low risk of experiencing the event. If the assumption is violated, survival estimates may be biased.

Likelihood: The probability of obtaining the observed data given a set of coefficient estimates. The likelihood ranges from 0 to 1.

Likelihood-Ratio Statistic (LR): A chi-square statistic used to test whether one or more survival model coefficients differ from 0. When the likelihood-ratio statistic is large compared with its df's, the hypothesis that the population coefficients are zero is rejected. A likelihood-ration test is analogous to an F test in linear regression.

Log Likelihood (LL): The natural logarithm of the sample likelihood. Generally a negative number, the LL increases as the likelihood increases (the LL = 0 when the likelihood is 1).

Log-Minus-Log Survival Plot: A graphical tool used to examine whether the proportional-hazards assumption is met.

Model Coefficient (b): Parameter estimate for a predictor variable. In a Cox regression, a partial-likelihood criterion (a variant of the maximum likelihood method that takes censoring into account) is used to determine model coefficients.

Observation Period: The time interval during which study participants are followed by the researcher. Also known as the follow-up period.

Proportional-Hazards Assumption: The assumption that the hazard ratio is invariant over time. The most severe violations of this assumption occur when group hazard or survival functions intersect.

Right Censoring: A type of censoring that occurs when the end of a time interval is unknown to the investigator.

Semiparametric Model: A model that has both parametric and nonparametric components. The Cox regression model is a semiparametric survival model.

Standard Cox Regression Model: A Cox regression model that relates one or more time-independent predictors to survival. The standard model assumes proportional hazards.

Survival Analysis: A set of statistical methods used to analyze the time to occurrence of an event. Survival methods are designed to incorporate censored data without bias.

Survival Function: A mathematical relationship that describes the cumulative probability of surviving (i.e., being event free) past a given time point.

Terminal Event: The event of interest in a longitudinal study.

Time-Dependent Covariate (Time-Varying Covariate): An explanatory variable whose values may change over time for an individual. Time-dependent covariates may be "inherent" (e.g., marital status) or "defined" (e.g., an interaction between an explanatory variable and time).

Z Test: Tests that determine whether a model coefficient differs from zero. Large Z values (in absolute value) mean that the population coefficient probability differs from zero.

Note. Reading and Understanding More Multivariate Statistics (pp. 401-406), by L. G. Grimm and P. R. Yarnold, 2000, Washington, DC: American Psychological Association.

Appendix 2. Kaplan-Meier Survival Table

Number of Cases: 107; Censored: 81 (75.7%); Events: 26 (24.3%)
Note: Cum Prob = cumulative probability; SE = standard error; Cum Events = # of cumulative events; N at Risk = # of consumers at risk.

TIME	STATUS	CUM PROB	SE	CUM EVENTS	N AT RISK
1	left for negative reason			1	106
1	left for negative reason			2	105
1	left for negative reason			3	104
1	left for negative reason	.9626	.0183	4	103
2	left for negative reason			5	102
2	left for negative reason			6	101
2	left for negative reason			7	100
2	left for negative reason			8	99
2	left for negative reason			9	98
2	left for negative reason	.9065	.0281	10	97
3	left for negative reason			11	96
3	left for negative reason			12	95
3	left for negative reason	.8785	.0316	13	94
3	still in program or left			13	93
3	still in program or left			13	92
3	still in program or left			13	91
4	left for negative reason			14	90
4	left for negative reason			15	89
4	left for negative reason			16	88
4	left for negative reason	.8399	.0356	17	87
4	still in program or left			17	86
4	still in program or left			17	85
4	still in program or left			17	84
4	still in program or left			17	83
4	still in program or left			17	82
5	left for negative reason			18	81
5	left for negative reason	.8194	.0376	19	80
5	still in program or left			19	79
5	still in program or left			19	78
5	still in program or left			19	77
5	still in program or left			19	76
5	still in program or left			19	75
6	left for negative reason			20	74
6	left for negative reason			21	73
6	left for negative reason	.7866	.0406	22	72
6	still in program or left			22	71
6	still in program or left			22	70
7	left for negative reason	.7754	.0415	23	69
9	left for negative reason	.7642	.0424	24	68
9	still in program or left			24	67
11	left for negative reason	.7526	.0433	25	65
12	left for negative reason	.7410	.0442	26	64

TIME	STATUS	CUM PROB	SE	CUM EVENTS	N AT RISK
12	still in program or left			26	63
12	still in program or left			26	62
12	still in program or left			26	61
12	still in program or left			26	60
12	still in program or left			26	59
12	still in program or left			26	58
12	still in program or left			26	57
12	still in program or left			26	56
12	still in program or left			26	55
12	still in program or left			26	54
12	still in program or left			26	53
12	still in program or left			26	52
12	still in program or left			26	51
12	still in program or left			26	50
12	still in program or left			26	49
12	still in program or left			26	48
12	still in program or left			26	47
12	still in program or left			26	46
12	still in program or left			26	45
12	still in program or left			26	44
12	still in program or left			26	43
12	still in program or left			26	42
12	still in program or left			26	41
12	still in program or left			26	40
12	still in program or left			26	39
12	still in program or left			26	38
12	still in program or left			26	37
12	still in program or left			26	36
12	still in program or left			26	35
12	still in program or left			26	34
12	still in program or left			26	33
12	still in program or left			26	32
12	still in program or left			26	31
12	still in program or left			26	30
12	still in program or left			26	29
12	still in program or left			26	28
12	still in program or left			26	27
12	still in program or left			26	26
12	still in program or left			26	25
12	still in program or left			26	24
12	still in program or left			26	23
12	still in program or left			26	22
12	still in program or left			26	21
12	still in program or left			26	20
12	still in program or left			26	19
12	still in program or left			26	18
12	still in program or left			26	17
12	still in program or left			26	16
12	still in program or left			26	15
12	still in program or left			26	14
12	still in program or left			26	13
12	still in program or left			26	12
12	still in program or left			26	11

12	still in program or left			26	10
TIME	**STATUS**	**CUM PROB**	**SE**	**CUM EVENTS**	**N AT RISK**
12	still in program or left			26	9
12	still in program or left			26	8
12	still in program or left			26	7
12	still in program or left			26	6
12	still in program or left			26	5
12	still in program or left			26	4
12	still in program or left			26	3
12	still in program or left			26	2
12	still in program or left			26	1
12	still in program or left			26	0

Vita

JULIET G. BROWN, M.S.

EDUCATION

Drexel University — **Aug. 1997 to Jan. 2005**
School of Health Professions — Philadelphia, PA
Ph.D. Candidate in Clinical Psychology
Master of Arts Degree in Clinical Psychology granted Jun. 2000

Penn State University — **Aug. 1987 to May 1991**
Bachelor of Science Degree in Psychology granted May 1991 — State College, PA

SUPERVISED CLINICAL EXPERIENCE

Predoctoral Psychology Intern — **Aug. 2002 to Sept. 2003**
Reading Hospital and Medical Center — Reading, PA

Addictions Therapist — **Apr. 2001 to Jul. 2002**
Womanspace (Resources for Human Development) — Ardmore, PA

Student Counselor Intern — **Sept. 2000 to May 2001**
Temple University Tuttleman Counseling Center — Philadelphia, PA

Partial Hospital Therapist — **Nov. 1992 to Sept. 1997**
JFK Community MH/MR Center — Philadelphia, PA

Psychiatric Aide — **Jan. 1992 to Jul. 1992**
Haverford State Hospital — Haverford, PA

RESEARCH EXPERIENCE

Project Co-Investigator — **Jul. 2000 to Apr. 2001**
MCP/Hahnemann University — Philadelphia, PA

Site Evaluation Coordinator — **Jan. 1999 to Jul. 2000**
MCP/Hahnemann University — Philadelphia, PA

Student Psychiatric Assessor — **Jan. 1998 to Jan. 1999**
MCP/Hahnemann University — Philadelphia, PA

Master's Degree Thesis — **Jun. 2000**
MCP/Hahnemann University — Philadelphia, PA
Multivariate regression analysis of supportive housing consumer satisfaction data

OTHER RELEVANT EXPERIENCE

Adjunct Psychology Professor — **Sept. 2001 to Jan. 2002**
Drexel University — Philadelphia, PA

Quality Assurance Supervisor — **Sept. 1997 to Sept. 1998**
JFK Community MH/MR Center — Philadelphia, PA