Mental Health and Health Care Utilization among Transition Age Youth

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Abstract

Many individuals experience mental health problems during the transition from adolescence to adulthood. For most persons, this experience is a temporary departure from otherwise good mental health. However, persistent mental health problems during young adulthood have serious implications for the life course, as such problems can interfere with educational, employment and social opportunities. There has been little research that examines the persistence of mental health problems during young adulthood, and limited research using multiple dimensions of mental health (rather than one specific condition). And further, little is known about the extent to which young adults with mental health problems use mental health care and other medical care. This study used nationally representative household survey data spanning a two-year period and latent class models to identify transition age youth (age 18 to 27) with persistent mental health problems, to identify their patterns of mental health and other medical care use, and to examine the socio-demographic and physical health correlates of poor mental health and health care use. Results indicated that about twelve percent of young adults have persistent mental health problems. But about half of these young adults rated their mental health as good, and this group was less likely to be in poverty, had fewer physical health problems, and used less health care overall compared to those with persistent problems and poor self-rated mental health (severe persistent problems). Two in five young adults with severe persistent mental health problems did not receive mental health care during the study period; however, nearly ninety percent of these young adults received other medical care, suggesting stronger integration of mental and physical health care is needed. Among young adults with persistent severe problems, those who were uninsured, poor, and Black or Hispanic were substantially less likely to use mental health care, compared to their insured, wealthier, and White counterparts. Removing barriers to mental health care could reduce disparities in wellbeing between social groups during the transition to adulthood, and potentially in life course outcomes.

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Chapter 1 Introduction

The "transition" between adolescence and mature adulthood is recognized by government agencies, medical practitioners and researchers as a critical stage. Individuals transition between the social and legal status of adolescent to adult. The boundaries of the transition age are not concretely defined, with the widest range between 14 years to 30 years.[1–3] For many purposes in the legal and civil sectors, the status of adult begins abruptly at age 18. However, health care professionals and social scientists have recognized that adulthood is not a stage, but a process through which one moves. In sociological theory, particularly among life course scholars, the transition to adulthood is conceptualized as structured by social institutions and marked by many role changes and new responsibilities.[4–7] These include changes in education and work capacity, greater flexibility of social relationships (marriage and parenting), and increased social rights (voting and drinking). The transition to adulthood is often accompanied by changes in peer groups, greater levels of independence, and exposure to new environments.[8,9]

The transition from adolescence to adulthood has also been called a "critical juncture in the course of psychopathology and mental health."[10(p.799)] The transition is viewed as critical because the ability to navigate the many developmental changes (biological, emotional and cognitive) as well as socially structured changes can have consequences on a variety of domains of life. Disruptions in functioning at this age can interfere with the development of social relationships, educational goals, and reduce the capacity for school or work.[11–13] Mental health problems during the transition age can have a negative cyclical effect on well-being, whereby such problems bring about

circumstances, such as unemployment and poverty, that increase the risk for the persistence of mental health problems.[14] For example, a recent study showed that serious mental illness can reduce an individual's earnings by $16,306 (averaged between men and women), with an estimated total loss at the societal level of around $193.2 billion a year.[15]

Mental health improves the capacity to navigate the transition to adulthood, yet the changes and stresses that occur during this development period can exacerbate mental health problems. The transition from adolescence to adulthood is a time of peak risk for the emergence of new cases of mental disorders[16] and roughly three-fourths of all lifetime mental disorders start by the mid-20s.[17] There is also a marked increase in suicide rates during the transition to adulthood: the suicide rate more than triples between ages 12 to 17 to ages 18 to 26, from 3.9 to 12.9 per 100,000 population.[18]

Rates of mental disorder are high among transition age young people. At the same time, research shows that poor mental health can be a transient problem, but young adults with persistently poor mental health are most at risk for adverse consequences in adulthood. Identifying the typologies of mental health status during the transition age and describing the risk factors for persistent and functionally limiting mental health problems can inform interventions to better reach those most in need of treatment. The first aim of this study was to identify distinct patterns of mental health problems among young adults over a two-year period, and to describe the socio-demographic and physical comorbidity characteristics associated with each pattern.

Timely receipt of mental health care can improve wellbeing and social functioning. However, many young adults with poor mental health do not obtain any

treatment.[19,20] While persons with a mental disorder may not seek mental health care, they may seek medical care. The second aim of this project was to identify patterns of health care utilization by young adults and examine how mental health status, socio-demographic factors and health status are associated with the use of mental health and other medical health services. The identification of patterns and correlates of mental health care use enables an understanding of how the need for treatment is aligned with receipt of mental health care, and what targets policies can address to improve the delivery of care.

In sum, this project addresses two questions focused on young adults over a two year period:

1.
a) What are the transitions in severity and persistence of mental health problems?
b) How do transitions in mental health problems vary by social group and health status characteristics?

2.
a) What are the patterns of mental and other medical health care utilization over a two-year period?
b) How do patterns of health care utilization vary by mental health patterns?
c) How do patterns of health care utilization vary by social group and health status characteristics?

Chapter 2 Literature Review

2.1 Conceptualization and Measurement of Mental Health

An important challenge in addressing the mental health needs of transition age youth (albeit any age group) is the conceptualization and measurement of mental health and illness. There are no biomarkers or biological tests that can verify the presence of a psychological condition.[21,22] Conceptualizations of mental illness vary with social, cultural, economic and legal contexts, there is no single definition of mental illness. Researchers, medical professionals, and patient interest groups have also taken divergent views on what constitutes mental illness.

Sociological views on mental health problems (mental illness) broadly focus on aspects of the social causes and contexts of symptoms of disorders or the social responses to disorders. Attention to the social causes and contexts provides a framework of understanding how different prevalence rates can occur across social groups. Attention to the social response to problems provides a means to examine how diverse symptoms can arise across populations and how the definition of mental illness is a cultural or social product. In one very strict sociological view of mental illness, termed *social constructionism*, mental illness is a label that is assigned by members of a social group to behaviors that do not fit with social norms. Labeling nonconforming behaviors is society's means to encourage entry into treatment, and the return to normative behaviors. The social constructionist perspective draws attention to how the conceptualization of mental illness varies according to social contexts about expected behaviors: problems are defined by the context and expected roles of person.[23–25]

Other researchers have noted that disorders should not be viewed as categorical indicators of mental states; rather disorder and distress have a continuum of severity. In this perspective, disorder is one dimension of mental functioning, and other measures are needed to capture aspects of mental well-being.[9,26] In other words, not meeting the criteria of having a clinical mental illness may not equate with mental health.

At the other extreme in the debate about what constitutes mental illness are proponents of a medical model, reflected in the Diagnostic and Statistical Manual (DSM) of Mental Disorders, now in its fifth revision.[27] In the United States, the DSM is the most commonly used and accepted model for defining specific mental illness.[28] The DSM identifies mental illness by categorical indicators of whether a particular disorder is present or not. A disorder, such as major depression, is defined by the occurrence of particular symptoms that persist over a defined period of time and interfere with functioning. While widely used, it is not without criticism. For one, the DSM conceptualizes disorder as a,

> "pattern that occurs in an individual and that typically is associated with present distress (e.g., a painful symptom) or disability (i.e., impairment in one or more important areas of functioning) or with a significantly increased risk of suffering death, pain, disability, or an important loss of freedom."[29, p.1760]

This definition necessitates that the disorder must be a dysfunction that poses harm to the individual. The psychological problem is only a disorder if it causes distress or disability, but it is unclear who decides whether harm is evident or possible. Critics have commented that the definition does not sufficiently account for the context of the distress or that reduced functioning may be an appropriate response to serious life events, such as loss of a spouse or job.[30,31] Others have noted that the increased "medicalization" of behaviors in the DSM exaggerates the role of biology at the expense of the social and

cultural factors associated with illnesses.[32] The number of conditions and behaviors classified as disorders has also increased with each revision, although this increase does not correspond directly to new knowledge or scientific evidence about psychological functioning.[33]

The sociological view on the importance of context and the medical view of categorically defined conditions each contribute to different methods of measurement of mental disorder in the population. Debates about what constitutes mental illness are important as the conceptualization and accurate measurement of mental health is instrumental in defining need for treatment and designing policies and supports to meet those needs. While these debates cannot be resolved, they suggest the need to better understand when problems are serious enough that health care resources should be allocated for care. For example, a cross-sectional assessment of mental health status of a person may indicate a temporary period of distress due to social circumstances such as the end of significant relationship or loss of parent, rather than persistent distress and low mental functioning. The conceptualization of poor mental health should consider persistence of disorders as well as dimensions of functioning, as chronic and severe impairments are more detrimental to wellbeing than transitory mental illness.

Prevalence of Mental Disorder in Community Surveys

Much of our current understanding of the mental health problems of transition age youth comes from community samples that use diagnostic assessments based on the DSM, such as the Epidemiological Catchment Area (ECA) Program,[34] the National Comorbidity Survey (NCS),[35] and a recent replication of the National Comorbidity Survey (NCS-R).[36] These surveys use instruments, such as the Diagnostic Interview

Schedule (DIS) or the Composite International Diagnostic Interview (CIDI), that are designed to be used by trained lay interviewers for the assessment of mental disorders according to the DSM criteria. Other surveys use lay-administered or self-administered questions that comprise a checklist of symptoms and define mental illness as a score above a defined threshold. Table 2.1 summarizes estimates of the prevalence of mental disorder among young adults between the ages of 15 and 29 gathered from the most important of these surveys.

The estimates presented on Table 2.1 range widely partly due to the specific measures of mental illness that were assessed. The range raises questions about the clinical significance of meeting DSM criteria or whether such criteria indicate mental health problems that impact daily functioning and will be persistent over time.[37] The highest estimates are from the Great Smoky Mountains Study which followed youth in 11 counties in the Southeastern U.S. from age 9 to 21.[38] The observed prevalence of 61 percent does not capture functional impairment. In contrast, the estimate of 6.5 percent in the Government Accountability Organization (GAO) report required that respondents meet more stringent criteria and included functional impairment in the definition of disorder, such as a serious suicide attempt; a work disability or other substantial limitation from a mental or substance disorder.[39] Results from these surveys demonstrate that differentiating between transient and persistent distress is important when drawing conclusions about the prevalence of severe and limiting problems and the population that may benefit from treatment.

Table 2-1: Prevalence of Mental Disorder among Transition Age Youth in Observational Surveys in the United States

Source	Survey, Year Conducted	Age	Measure	Percent
Copeland et al., 2011[38]	GSMS (1992-2003)	By age 21	DSM: Lifetime, any disorder	61.1 percent
Kessler, Berglund, et al., 2005[42]	NCS-R (2001-2003)	15-24	DSM: Lifetime, any disorder	52.4 percent
NCS-R website[41]	NCS-R (2001-2003)	18-29	DSM: 12.mo., any disorder	43.8 percent
GAO, 2008[3]	NCS-R (2001-2003)	18-26	DSM: 12 mo., any disorder	31.8 percent
Robins and Reiger,[40] 1991	ECA, 1991	18-30	DSM: 12.mo. any disorder	25.0 percent
SAMSHA, 2008[44]	NSDUH (2007)	18-25	SPD / Depression, 12., mo.	17.9 / 7.5 percent
Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993[43]	NCS (1990-1992)	15-24	DSM: Life time, depression	15.7 percent
Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993[43]	NCS (1990-1992)	15-24	DSM: 12.mo. depression	12.8 percent
Broman, 2012[45]	Add Health (2001-2003)	21	Depression (self-reported diagnosis)	11.0 percent
GAO, 2008[3]	NCS-R (2001-2003)	18-26	DSM: 12 mo. SMI	6.5 percent

ECA = Epidemiologic Catchment Area; NCS= National Comorbidity Survey; NCS-R = National Comorbidity Survey-Replication; GSMS = Great Smoky Mountains Study; NSDUH = National Survey on Drug and Alcohol Use; Add Health = National Longitudinal Survey of Adolescent Health. DSM= Diagnostic and Statistical Manual of Mental Disorders; SPD = Serious psychological distress; SMI = serious mental illness.

Several longitudinal studies which have followed persons from adolescence into young adulthood and beyond have provided insight on the persistence of disorder.[46–50] These studies show that mental health problems may peak during young adulthood and diminish with age, and for many people, mental health problems do not persist across the transition years.[38,51–57] For example, a birth cohort study that followed persons from birth to age 45 found that only 9.8 percent of persons with a mental illness diagnosis at age 16 had any diagnosis at age 45.[58] In contextualizing the high prevalence rates, the researchers in the GSMS noted that three-month prevalence rates were much lower (5.2

percent for depression), indicating that most young persons in the study experienced only temporary problems. They concluded, "Only a small percentage of young people meet criteria for a DSM disorder at any given time, but most do by young adulthood. As with other medical illness, psychiatric illness is a nearly universal experience."[38(p.7)] In the Oregon Adolescent Depression Project (OADP) (N=719), nearly 55 percent of adolescents (mean age 16.6 years) with depression had no recurrent episode of depression in young adulthood (age 19–24 years) (diagnoses were made using DSM–IV criteria*)*, though many reported other mental health problems.[47]

The lack of continuity of disorder into adulthood is consistent with what many researchers have noted about the persistence of disorders. The majority of persons with any mental disorder may only experience one episode, while recurrence may occur only in sub-classes of persons with disorders.[59–61] In the ECA, the lifetime prevalence of any disorder among persons age 18 to 29 was 37 percent but only 25 percent of these individuals had experienced their disorder within the previous year. Thus, nearly one-third of the 37 percent had at least a year of remission or recovery.[34] In the Dunedin Multidisciplinary Health and Development Study (DMHD), a prospective longitudinal cohort from Australia which assessed mental health status seven times from age 11 to 32, 44 percent of respondents experienced at least one depressive disorder by age 32 years; slightly more than half (56 percent) of persons with any disorder had recurrent episodes.[62]

Disorders which persist in young adulthood are particularly strong predictors of mental health problems and poorer psychosocial outcomes in later adulthood.[58,63] For example, Jonsson et al. (2010) followed sub-types of depressed adolescents in Sweden

over 15 years, from age 16-17 to age 30-33.[64,*] Adolescents with long-term depression had significantly higher rates of every type of mental disorder and suicide ideation in adulthood compared to three other sub-types of depression. Reinherz et al. (1999) also examined recurrent problems in young adulthood and later outcomes in a non-nationally representative sample (a mostly White working-class community) and found that individuals depressed at age 18 and at age 21 demonstrated extensive psychosocial impairments in early adulthood, including poor overall functioning, interpersonal and behavioral problems, low self-esteem, and suicidality.[65]

Some researchers have sought to identify subgroups of persons with different levels of mental disorder based on their responses on measures of mental health over time. One way to identify such patterns is to *a priori* define categories of mental disorder, and assign persons to these defined categories based on their responses. Other researchers have used latent class methods. The latent class method has the advantage of using statistical modeling to classify persons into subgroups of mental health status. The accuracy of the classification can be assessed by statistical fit indices and by fit with other theoretical and empirical understanding of variation of mental illness. The latent class approach is a model-based approach—in contrast to *a priori* categorization which presumes hypothetical categories of individuals. The latent class approach also allows other characteristics, such as gender or poverty to have unique associations for each subgroup, which enables a better understanding of the differences among subgroups.

[*] Long-term major depression (MD) was defined as MD during most of the last year, MD followed by remaining symptoms that met the criteria for dysthymia, or MD superimposed on a state of dysthymia

In contrast, other approaches assume that the effects of characteristics on each subgroup are the same. Table 2.2 summarizes the major studies that have used a latent class approach for understanding the persistence of mental health problems in adolescence or young adulthood.

Table 2-2: Latent Class Studies of Change of Mental Health Status During the Transition Age

Author, year	Sample	Mental Health Measure	Measures & Age	# of classes (percent in each class)	Method
Stoolmiller, Kim, & Capaldi, 2005[49]	Oregon Youth Study (N=206)	Depressive symptoms	10 annual assessments on boys from age 14-15 to 23-24.	Four classes: very low (5.8 percent); moderate-decreasing (34.0 percent); high-decreasing (35.9); high-persistent (24.3 percent).	Growth mixture model
Costello et al., 2008[66]	Add Health (N=11,559)	Depressive symptoms	Three assessments, two at age 14/15 and 15/16 and one at age 22.	Four classes: no depression (28.7 percent); stable low depressed mood (59 percent); early high declining (9.4 percent) and late escalating (2.4 percent).	Growth mixture model
Olino et al., 2010[67]	Oregon Adolescent Depression Project (N=1,653, based on first assessment)	Depressive and anxiety disorders.	4 assessments, two during adolescence; one at age 24 and once at age 30.	Six classes: persistent depression (1.3 percent); persistent anxiety (2.1 percent); anxiety with increasing depression (3.7 percent); increasing depression (22.8 percent); anxiety with early recovery (5.0 percent); no disorder (65.1 percent).	Latent class growth analysis

Table 2-2 continued: Latent Class Studies of Change of Mental Health Status During the Transition Age					
Author, year	**Sample**	**Mental Health Measure**	**Measures & Age**	**# of classes (percent in each class)**	**Method**
Wickrama & Wickrama, 2010[68]	National Longitudinal Study of Adolescent Health (Add Health) (N= 11,500)	Depressive symptoms	Three assessments at ages 13-14, 15-16 and 22- 23.	Four class: low levels over (63 percent); high initial and rapidly decreasing (8 percent); low initial rapidly escalating (3 percent); chronically moderately high (13 percent).	Latent class analysis
Frye & Liem, 2011[69]	Students from 9 public high schools in the Boston area (N=1,143).	Depressive symptoms	Three assessments between age 18 and 22.	Four classes: low stable (75 percent); decreasing (17 percent); increasing (7 percent) and high stable (1 percent).	Growth mixture model
Yaroslavsky et al., 2012[55]	Oregon Adolescent Depression Project (N=719)	Depressive symptoms	Four assessments between age 16 to 30	Three classes: high stable (32 percent), moderate decreasing (44 percent), and low decreasing (24 percent).	Growth mixture model

The studies in Table 2.2 demonstrate that young adults can be classified into distinct subgroups of mental health which differ on the severity of symptoms and persistence over time. All studies find a group with persistent distress, regardless of the measures or time interval between assessments. These studies are consistent with literature which describes a decline in depression into adulthood for many people, but most studies in Table 2.2 also show a class of youth with increasing or persistent symptoms. The identification of the youth with persistently elevated symptoms allows further characterization of these high-risk groups by their social or physical health characteristics.

Several conclusions can be drawn from this body of literature on the continuity of mental health problems over the transition age. Poor mental health affects many young adults, but many persons experience no recurrence of mental illness. Nonetheless, the severity and duration of a disorder during young adulthood is likely to have consequences across the life course [46,58,70,71]

However, most longitudinal studies cited in Table 2.2 often have long intervals between waves of data collection. Reoccurrence of symptoms at distant time points may be less able to capture the chronicity of impairment during the transition years. Data with more proximal assessments may provide a better understanding of the persistence of poor mental health and functional impairment. Most longitudinal studies on mental health have focused on depression, rather than other dimensions of mental illness, including other forms of distress, functional impairment and self-rated mental health. The focus on the continuity of one diagnosis may reduce identification of problems which change over time (e.g. from anxiety to depression). Further, although some studies have identified

sub-groups of youth with persistently poor mental health, few have examined the characteristics of each group, (a few studies in Table 2.2 include *some* socio-demographic measures, e.g., Yaroslavsky et al., 2012; Stoolmiller et al., 2005; and Frye and Liem, 2011). The first aim of this study is to identify patterns of change and persistence of poor mental health among young adults and to describe the social and health status characteristics of young persons in different types of patterns.

Predictors of Persistent Mental Health Problems

In general, research has demonstrated that the interaction of genetic factors with environmental exposures puts one at risk for having a mental health disorder. Genetic factors affect mental health by shaping one's neuroanatomy and neurochemistry, which have a role in many disorders, though these roles are not clearly defined.[72] Genes also produce the hormones and neurotransmitters which can shape how persons respond to stress.[73–75] At the same time, a person's interactions with other people and environmental exposures, can modify genetic expression. Difficulties in one's social and physical environment can also induce stress responses which can have detrimental effects on hormonal pathways that may have a role in altering brain chemistry linked to some mental disorders.[75–77]

A person's exposure to environmental adversity and stress is shaped by social structures, such as race, gender and poverty. These structures can also affect one's likelihood of experiencing physical limitations and health conditions. Structures also provide access to coping resources that may modify the impact of stress on mental illness. Cross-sectional data indicate that structures are related to one's likelihood of mental illness,[42,78] but less is known about the contribution of these factors to persistent

and severe problems for young adults. Chronic difficulties are also greater for those with physical disabilities and chronic conditions, and ongoing challenges due to health or physical limitations are one explanation for the greater likelihood of mental disorders among people with physical limitations.[79,80]

This study focuses on the characteristics and physical health problems that may increase risk for persistent mental disorder. Less attention has been paid to the role of social characteristics during the transition age, compared to such factors as personal and family histories of disorders. Understanding the relationship of social characteristics and persistently poor mental health is important to reduce disparities between social groups. The next section provides a review of the literature of the influences of social characteristics and health status characteristics (relevant for this study) on the persistence of mental illness. It also provides findings from studies that use latent class approaches on the distinct differences in mental health transitions by social and health characteristics.

Gender

There is a large body of research from studies of children, adolescents, and adults which indicate that mental health problems vary with gender. However, differences in the prevalence of disorders between the sexes vary by the type of disorder and the age at assessment. Throughout adolescence and early adulthood, boys and girls may be equally likely to experience mental illness, but rates of externalizing and internalizing disorders vary by gender during this period, with boys more likely to have externalizing disorders.[58,81,82]

In adulthood, women are more likely to have any mental disorder and comorbid mental health disorders, though such findings may be affected by whether substance

abuse is included as a disorder, the latter of which predominantly affect men. The higher levels of some disorders, such as depression, among adult women have been attributed to differences in exposures to risk factors, such as adverse life events and social role strain. Although biological factors are thought to explain some differences, the expression and regulation of these factors are influenced by exposures to environmental stressors.[83,84]

In general, research is equivocal about the role of gender in the persistence of mental health problems. Some researchers have found that the association between childhood or adolescent disorder and adult disorder does not vary by gender.[63] Women may be more likely than men to experience depression in adulthood if they experienced depression as adolescents[85] but others have noted that men who experienced any mental illness in young adulthood were more likely to have a recurrent mental health problems in later adulthood than women.[58] Among NCS respondents as well as respondents in the Dunedin Cohort, there were no gender differences in the recurrence of depression,[43,86] consistent with a review of the literature on continuities of disorders.[87] Similarly, the review by Rutter and colleagues found that while antisocial behavior occurred at higher levels for males compared to females, the risk of poor psychological health later in life was the same for men and women.[87]

Several studies that used latent class analysis (Table 2.2) examined gender differences between subgroups of persons with mental illness, although results were not consistent. Most studies indicate that from adolescence into young adulthood, women are more likely than men to have persistently elevated levels of symptoms.[55,66,69,88] However, Olino et al. (2010) found that between age 15 and 30, the probability of persistent depression was not statistically significantly different.[67] Other studies using

latent class models also suggest that while women are more likely to have any symptoms, they are also more likely to experience a decline in symptoms into adulthood compared to men while men are more likely to have increasing symptoms into young adulthood, though studies vary in this conclusion (Costelllo et al. (2008) and Frye & Liem (2011) support this conclusion; Yaroslavsky et al. (2012) found no difference in rates of decline).

Socio-economic Status

Socio-economic status (SES) is a measure of a person's level of economic and social resources available through income, education or occupation, and is usually assessed relative to others in a society. Income, poverty status, educational attainment, and occupation are typical measures of SES, although researchers often include only one of these indicators in their analyses. Mental illness is inversely associated with socio-economic status (SES).[89–92] There are two explanations for the relationship between SES and mental illness: social causation and social selection. In a social causation model, disparities in social resources are at the root of differences in the prevalence of mental illness in SES.[94] Many studies have shown that persons with low SES are exposed to more risk factors for mental distress and at the same time, low SES can directly reduce the availability of coping resources.[95,96] The social selection model posits that persons with mental illness select into lower SES due to mental health problems that limit educational or occupational status attainment.[97,98] Although the evidence for many disorders is not conclusive, there is much evidence for the role of social causation in mental illnesses, except for severe psychoses, where social selection may be more important.[99]

Poverty is one dimension of SES that is associated with higher rates of occurrence of mental illness. Persons with mental disorders are more likely to have lower incomes and be living in poverty than persons without any disorder. For example, using Medical Expenditure Panel Survey (MEPS) data, Zuvekas and Selden found that incomes for families with a person who had poor self-rated mental health were one quarter to one third lower than for families without a member with poor mental health.[100] Vick and colleagues found that families with someone who had a psychiatric condition had 1.8 higher odds of poverty and 8.9 percent lower incomes compared to families without any disorder. More severe levels of disorders were associated with greater poverty (Vick, Jones, Mitra & Hall, 2010).[101] Other measures of SES, such as parental occupation or education, are also inversely associated with mental illness.

Few longitudinal studies on the mental health of transition age youth have examined the association of SES with changes in mental health over time. Studies that have incorporated measures of SES typically have used parental SES (i.e., occupation or education) at the baseline assessment of mental health, which is typically in childhood or adolescence. Most studies do not incorporate SES measured contemporaneously with mental health in young adulthood.[69,102,103] Such analyses find mixed evidence for parental SES and the persistence of mental illness in young adulthood, with most indicating little evidence of the influence of childhood SES on young adult psychiatric outcomes.[85,103,104]

Several studies using latent class approaches (Table 2.2) that examined social characteristics associated with patterns of change in mental health during the transition age indicate that among persons with any disorder, poverty is inconsistently associated

with change over time. For example, Add Health data suggested that higher family income and parental education were associated with low depressive symptoms between adolescence and young adulthood compared to any elevated symptoms, but SES did not affect the likelihood of having either *decreasing* or *increasing* symptoms.[66] In the OADP, family income was associated with persistently high levels of depression, but was not predictive of transitory symptoms (increasing or decreasing levels of depression).[49,55]

Race and Ethnicity

Cross-sectional data indicate rates of mental illness are higher among Whites and Native Americans[105] and lower among African-Americans, Hispanics and Asians.[102,106,107] Most of these data reflect the adult population and use measures based on DSM. Add Health data from young adults at age 21 indicated few differences across racial groups in the prevalence of suicidal thoughts or feelings of depression.[108] However, others using Add Health data found that symptoms of depression, as assessed using the Center for Epidemiologic Studies Depression Scale (CES-D), were higher among African-Americans and Hispanics compared to Whites, but more Whites reported being *diagnosed* with depression.[45]

Little is known about the persistence of mental disorder among racial and ethnic groups, particularly for young adults. Research among adults in the NCS (which used retrospective recall to measure persistence) found that despite lower prevalence rates, non-White racial groups had more persistent disorders.[109] Studies using Add Health data (focused on young adults) found that African-Americans and Hispanics were more likely to have consistently elevated symptoms of depression between ages 15 and 21 compared to Whites,[50] but there no differences among racial/ethnic groups in the likelihood of

increasing or decreasing symptoms.[50,56] At the same time, one study found lower rates of reoccurrence of depression among African-Americans between age 18 and 39.[102]

Researchers that have used a latent class approach (Table 2.2) have found that African-Americans and Hispanics are more likely to be in subgroups with elevated levels of depression.[66] Frye and Liem (2011) found that African-Americans, compared to Whites were more likely to have increasing symptoms between age 18 and 22, but were not more likely to have few symptoms, declining or persistently high symptoms.[69]

Comorbidities

There is a strong association between poor mental health and poor physical health, such that persons of all ages with chronic physical conditions or limitations have higher rates of mental disorder.[110–112] For example, in the National Health Interview Survey (NHIS), in the period 2001-2004, compared to persons without serious psychological distress (SPD), persons with SPD had more than three times the rate of visual impairment, seven times the rate of limitations in activities of daily living (personal care needs, such as eating, bathing, or dressing), six times the rate of instrumental activities of daily living (routine needs, such as everyday household chores or shopping), and about five times the rate of physical limitations (walking up 10 steps). The prevalence of diabetes, heart disease, chronic lung disease, arthritis, stroke and the occurrence of two or more chronic conditions was at least twice as high in persons with SPD compared to persons without SPD.[113] In the NCS, rates of severe depression were about four times higher among those with two or more chronic conditions compared to those with none (12.5 percent compared to 3.1 percent).

Physical comorbidities may also increase the risk of recurrence of disorders, [53,60,114,115] but results are not consistent as to the causal direction. Few longitudinal

studies on youth have incorporated physical comorbidities as a predictor of contemporaneous or later mental status. Evidence from the Add Health survey suggest that persistent depression during young adulthood contributes to physical comorbidities, rather than the opposite. Youth with any depressive symptoms had higher rates of onset of physical health problems from age 15/16 to age 21/22 compared to youth with consistently few depressive symptoms. Among persons with any depression (mild to severe), physical limitations can also limit recovery.[116]

Of the studies using latent class analysis to characterize change in mental health (Table 2.2), only one examined health status characteristics. Yaroslavsky et al., (2012) found that health impairments (injuries or conditions that limited normal activities) did not predict variation in change in mental health status between age 14 and 30. In addition, Lamers et al., (2012) (using a latent class approach) found that higher body mass index and chronic pain was associated with more severe and chronic depression over a two-year period, in a sample of 18 to 65 year olds.

To summarize, prior research on young adults has typically assessed mental health status at one time point or with measurements several years apart, and few have included multiple dimensions of mental health. Critical questions also remain as to how changes in mental health status varies across social groups of young adults.[61] In my first aim, I used latent class methods and data from a national survey with repeated assessments of mental health problems over a two year period to address the following questions:

> **1a.** What are the transitions in severity and persistence of mental health problems?

1b. How do mental health problems vary by social group and health status characteristics?

This will enable a better understanding of which youth are at risk for persistent and limiting problems and inform policies targeting resources for treatment and prevention.

2.2 Health Care Use During the Transition Age

Treatment Rates and the Treatment Gap

The two most common forms of treatment for mental disorders are psychotropic medication and psychotherapy. Treatment with psychotherapy in conjunction with medication is recommended for many mental health conditions,[117] and most people with disorders prefer both forms of treatment.[118–120] However, the prevalence of treatment with medication has increased over the past two decades while outpatient therapy has declined, though such changes vary by disorder.[121,122] For persons with any mental health condition, treatment with psychotherapy declined from 15.9 to 10.5 percent between 1998 and 2007, while the percent of patients using medication alone rose from 44.1 to 57.4 percent.[123] The decline in psychotherapy and growth in the use of medication has been partially attributed to the many newer and safer psychotropic drugs available, and the growth in managed care for mental health, a financing arrangement which is more restrictive on psychotherapy visits than for prescriptions.[122] Expansions in insurance coverage for medication also contribute to the growth in use prescriptions.[124]

The growth in managed care has also been linked to the increased use of the general medical sector for mental health care. Managed care coverage may have lower copays for care in the non-specialty sector, though patients receive fewer visits.[125] The limited availability or access to psychiatrists may also shift care from the specialty sector

to the general medical sector. One study of primary care physicians found that nearly two-thirds of primary care physicians were unable to provide referrals for outpatient specialty mental health care.[126] Psychiatrists are also unlikely to accept insurance, particularly public insurance, which may contribute to access issues.[127]

Overall treatment rates for most mental disorders are low among young adults. Estimates of treatment vary by disorder and the definition of treatment.[*] Nonetheless, many surveys show consistently low rates of use. Analyses of MEPS data indicated that 8.6 percent of young adults ages 18–26 with any self-reported diagnosed mental disorder received any treatment in the health sector between 2007–2009.[128] NESARC data indicated that treatment in the past year for youth age 19 to 25 with a mood disorder was about 35 percent, and about 14 percent for anxiety disorder.[129] Treatment may be lower for young adults compared to other age groups, though studies are not consistent with this finding. In the NCS-R, age was not associated with variation in treatment among adults with any disorder.[19] However, in the NSDUH, young adults age 18 to 25 had the lowest treatment rate for depression (46.9 percent) compared to all other age groups, (all over 60 percent).[44,130] Findings from the MEPS also indicated a lower rate of anti-depressants use among adults 18-34 compared to adults in older age categories.[131]

Low rates of treatment have also been found among young adults with persistently poor mental health: in a survey of college students, fewer than half of the students with persistent depression received treatment between freshman and junior

[*] For example, treatment in the NSDUH is "seeing or talking to a medical doctor or other professional or using prescription medication, while in the National Epidemiologic Study on Alcohol and Related Conditions (NESARC), treatment for mental illness also includes emergency room use (along with seeing health professional and prescription use). Others have used a broad definition of care as "treatment for self-defined problems with "emotions, nerves, mental health, or use of alcohol or drugs."[137, p. 846]

year.[132] Rates of treatment also appear to decline between adolescence and young adulthood.[133,134] In a study using the 1997 Client/Patient Sample Survey, the annual rate for inpatient, outpatient, and residential services fell from 34/1,000 for 16 to 17-year-olds to 18/1,000 for 18 to 19-year-olds.[135] However, although nationally representative, this study reflects receipt of specialty mental health care and does not capture changes in treatment delivered through other sectors.

An important aspect of treatment is the sector in which care is delivered (e.g. specialty, general medical or human services). Treatment varies by condition but for serious conditions, care from psychiatrists or psychologists (specialty care) may be most optimal as treatment received outside the specialty mental health sector is associated with higher rates of dropout from care.[136–138] For those with less serious conditions, the specialty sector may still provide the most optimal care but adequate treatment for many mental health conditions can be managed through general medical doctors. Compared to older adults, young adults with mental health problems obtain more care outside the health care sector (such as through religious leaders, social workers in any a non- mental health setting, or through on-line support groups). However, those that seek care within the health sector are as likely or more likely to obtain specialty care.[19,20]

While specialty care may provide better quality treatment, dropout rates from specialty care may be higher for young adults: in the NCS-R, young adults age 18 to 29 were 7.9 times as likely to drop out of care from a psychiatrist after the first two visits compared to persons age 60 and over.[139] Young adults with severe mental illness in the NCS had 25.9 the odds of dropout from specialty mental health treatment compared to

adults age 45 to 55,[17] and other data also indicate young adults have higher odds for dropout compared to older adults.[137]

The use of *general* health services among persons with mental health problems is also important. Persons with mental illness often use medical services at higher rates compared to those without mental illness. A primary reason for this is the higher rate of comorbidities of chronic conditions among those with mental disorders which contribute to higher rates of medical care use.[140–144] For example, Dismuke & Egede (2011) found that persons with SPD had an average of 8.3 more prescriptions, 3.1 more office visits, and more emergency room and inpatients visits (for any reason, mental or medical) compared to persons without SPD.[145] A second reason is that many persons with mental disorders may identify physical health symptoms related to the mental illness and seek non-mental health services for these.[146]

Research on the use of medical care among young adults with a mental disorder is limited. Haarasilta et al. (2003) conducted one of the few studies that examined health care use among young adults with mental illness (albeit in Finland).[147] The authors examined medical care use in the previous year among 15 to 24 year olds in the 1996 Finnish Health Care Survey and found that young adults with major depression were more likely to use medical but not mental health services compared to their non-depressed counterparts: of youth with depression, around 59 percent used non-mental health care while only 20 percent used mental health services.

In summary, the low rates of mental health care use, high rates of dropout from treatment and the decline in the use of mental health care services that occur over the transition age warrant closer examination. Examination of the level and sector of

utilization over time (rather than with cross-sectional data) for young adults with different patterns of mental health problems can provide a better understanding of how mental illness aligns with mental health care. Identifying such typologies of care also enables the examination of how utilization varies by socio-demographic characteristics, and informs health care policies for improved delivery of care. However, few studies have examined how young adults with disorders use the health care system during the transition age.

Some researchers have used latent class methods to examine typologies of care-seeking among *adults* and characterize types of health care users. These typologies represent shared care-seeking characteristics among classes. Table 2.3 summarizes relevant studies that use a latent class approach to identify typologies of mental health service use or use of health services by persons with mental health problems.

In summary, findings from the studies in Table 2.3 indicate that distinct typologies of mental health care utilization exist. Although each study examined different types of utilization, a limited number of patterns emerged from the data. Studies that examine mental health care use tend to find a small class of high utilizers, a moderate sized class of infrequent users, and a class with almost no use during the study period. Studies that examine continuity in treatment tend to find three to four classes that vary by adherence and persistence of symptoms. Distinguishing typologies of use among young adults allows for identifying different ways in which young adults seek health care and mental health care. Moreover, the latent class approach enables the examination of how such typologies are related to different subgroups of mental health, and how demographic and socioeconomic resources are related to each pattern of utilization.

Table 2-3: Latent Class Studies of Health Care Use Among Persons with Mental Disorders or Behavioral Health Care Use					
Authors	**Survey**	**Measures**	**Method**	**Patterns of Use**	**Class variation**
Fink, Jenson and Poulson, (1993)[148]	Two Danish municipalities: persons age 27 to 59 admitted at least once to a hospital; followed for 5 years.	Non-psychiatric and psychiatric hospital admissions.	Longitudinal Latent Class Model and Latent Markov Model	Three classes: chronically ill (1.9 percent), healthy persons with up to 1 readmission (74 percent); high users (23.7 percent).	The chronic class had much higher rates of mental illness.
Deb and Holmes, (2000)[149]	NMES (1987), persons age 18 and older; persons who had any medical encounter related to and ICD-9 code for BD.	A count of outpatient mental health visits	Finite Mixture Model and Hurdle Model	Two classes: low utilizers (66 percent) had an average of 1.1 visits and $102 expenditures; and the high (34 percent) averaged 9.5 visits and $750;	Age was related to high use but not low use.
Xie, Drake and McHugo (2009)[150]	New Hampshire Dual Disorders Study (N=177)	Substance abuse remission (6 months use) measured over a period of 10 years.	Finite Mixture Model	Four patterns: Treatment resistant (25 percent): improving but unstable (21 percent); unsustained remission; (23 percent); steady improvement (31 percent).	Alcohol and drug behaviors over the study period and physician visits predicted class membership.

Table 2-3 (continued): Latent Class Studies of Health Care Use Among Persons with Mental Disorders or Behavioral Health Care Use					
Authors	**Survey**	**Measures**	**Method**	**Patterns of Use**	**Class variation**
Carragher et al., (2009)[151]	NESARC: a subsample of persons with MDD age 18 and older	Four measures of mental health care: saw a professional; hospitalization; ER visit; psychotropic drug use.	Latent Class Analysis	Three classes: highly active (13.4 percent); partially active (51 percent); and inactive (35.2 percent) -- no forms of treatment.	Treatment varied by gender, insurance, severity and race.
Reid et al., (2011)[152]	Children age 4 to 11 in Six Ontario Community Mental Health Centers (N=358)	Visits to community mental health care centers over a five year period.	Latent Class Analysis	Five treatment patterns: minimal (50 percent), acute (21 percent), intensive (11 percent), delayed / episodic (13 percent), and ongoing/episodic (6 percent).	Boys and wards of the state were more likely to be in ongoing /episodic class
Brecht et al., (2012)[153]	Los Angeles County --persons treated for methamphetamine (n=348)	Treatment defined by "any formal treatment participation…" over a 10 year period.	Finite Mixture Models	Three treatment classes: low (49.1 percent); quicker-to-recovery (27.3 percent); slower-to-recovery (23.6 percent).	Men were more likely to be in low treatment. Age at first treatment and duration of treatment varied by class.

Table 2-3 (continued): Latent Class Studies of Health Care Use Among Persons with Mental Disorders or Behavioral Health Care Use					
Authors	**Survey**	**Measures**	**Method**	**Patterns of Use**	**Class variation**
Neelon, O'Malley and Normand, (2009)[154]	Federal Employees Health Benefits Program	Mental and medical care over a 4 year period covering the enactment of parity law.	Latent Class Analysis with Random Effects	Three classes: low spenders (67 percent, low use & decline); moderate spenders (23 percent, increased use & moderate spending); high spenders (10 percent, high use and constant spending).	Low spenders tended to be male; moderate spenders tended to be female.
Ramo & Brown, (2011)[155]	Four inpatient psychiatric and substance abuse treatment in San Diego area.	Measures of predictors of relapse in adolescents (N=180) and adults (N=160) assessed 8 times over 1 year.	Latent Class Analysis	Classes of situations for relapse: for adults: *social*/*urges* (67 percent) and *negative /urges* (33 percent); for adolescents: *social / positive urges* (69 percent) and *complex situations* (31 percent).	Adolescents were more likely than adults to relapse due to a positive emotional state, temptations, or social pressure. Adults were more likely than adolescents to relapse due to a negative physiological state.

Factors Associated with Treatment

Most studies indicate that need, defined as having any mental disorder or distress, is a strong predictor of treatment, however need is not the only predictor. As with all age groups, the presence of a mental illness is neither a necessary nor sufficient condition for entry into treatment. Often symptoms are poorly understood, and a person's coping mechanisms and cognitive and social influences shape an individual's entry into treatment.[156] Traumatic life events, such as violence, may lead to care seeking, but treatment even for these such exposures varies among social groups.[157] Persons with sub-threshold disorders (defined as meeting all but one of the DSM criteria for diagnosis) may also seek treatment.[158] However, severity is strongly associated with use of the psychiatric sector for care, with around 74 percent of all visits to psychiatrists made by persons with a recent mental disorder.[158] In an analysis of the NCS-R that uses a broader measure of need (i.e., stressful life events or lifetime diagnosis, or hospitalization due to mental illness), 61 percent of treatment delivered in the past 12 months was to persons with a 12-month disorder, 21 percent was to persons with a lifetime disorder, around 10 percent was to persons with some indicator of possible need (but no diagnosis), while 8 percent was to persons with no disorder.[158]

Treatment varies with social group characteristics, even when the level of need may be the same. Researchers have cited various factors to explain social group differences in treatment, including differences in perceived need, problem recognition and coping mechanisms, beliefs about the efficacy of services, as well as structural factors, including the affordability of care.[159–165] This study focused on social and economic resources that affect care.

Gender

Results from the NCS-R indicated that among adults 18 and older with any disorder, women were more likely to receive any mental health treatment, but less likely to receive care in the specialty sector as compared to men.[19] Differences in treatment levels may also occur between men and women may occur for specific disorders. For example, in the NCS-R, women were more likely than men to receive any treatment for mood disorders, but not most anxiety disorders, impulse control or substance abuse disorders.[166] Among Add Health respondents at age 21, there were no differences in the use of services, controlling for depressive status.[45] Evidence from the MEPS suggests that among adults 18 and over, more women than men are treated for depression, though women and men with depression have comparable rates of medication use (i.e. number of antidepressant prescriptions),[167] as well as similar rates of discontinuity of medication.[168]

Several studies using a latent class approach (Table 2.3) examined how gender is associated with patterns of use. Although these studies used different outcomes measures, for the most part, gender differences were not consistently related to patterns of use. Deb & Holmes (2000) found no differences in mental health care use among persons with a disorder, and Fink, Jensen, and Poulson (1993) found no differences in non-psychiatric in-patient admissions by gender among persons with a disorder. In contrast, Carragher, et al., (2010) found that women were more likely than men to be frequent or moderate users of mental health care, compared to infrequent users.[148,149,151] In Reid et al.'s analysis (2011), boys were more likely to have intensive service use compared to girls, but no gender differences were found for the other types of use.[152]

Among patients with schizophrenia, Ahn and colleagues (2009) found women were more likely to be *non-adherent* to medication then men.[169]

Race and Ethnicity

Research indicates that African-Americans and Hispanics with mental health problems are less likely to obtain mental health care compared to Whites.[19,133,170] This general finding, however, obscures racial variation in treatment for specific disorders and treatment modality. In the NCS-R, race was associated with lower likelihood of receipt of treatment for eight of 17 conditions (mostly anxiety disorders), with African Americans and Hispanics less likely to use services than Whites,[166] but there was no racial variation in treatment for the nine other conditions. Among young adults, Add Health data indicated that, controlling for depressive status, African-Americans are less likely to receive any mental health counseling for depression than Whites, but all other groups (Hispanics, Asians, Native Americans and others) are as likely to receive care as Whites.[45] Analysis with MEPS data found that Hispanics have higher rates of antidepressant discontinuity, after adjusting for mental health status, compared to Whites,[168] and in the NCS-R, Hispanics received less specialty care, but did not receive less care in the general sector compared to Whites.[19]

While racial groups may differ in the receipt of *any* treatment, some studies have found few differences in the treatment quantity or quality among those receiving care.[171] In other words, conditional upon obtaining any care, racial groups may not differ on the frequency of visits to specialty care, social service providers or general medical doctors for mental health–related reasons,[172] the use of prescription drugs,[164] or treatment delays.[20]

Nonetheless, the finding of lower rates of treatment for some disorders among some racial groups compared to Whites may indicate higher levels of unmet need due to more barriers to care. NHIS data indicated that African-Americans and Hispanics are more likely to report cost barriers to care,[173] but NCS-R data indicated that only Hispanics reported more overall structural barriers (cost, transportation, availability, convenience) to care[174]

Few studies that use the latent class approach have examined how racial /ethnic characteristics are associated with patterns of use (Table 2.3). Controlling for mental illness and medical conditions, Carragher et al., (2009) found that African-Americans, Hispanics and Asians were less likely than Whites to have moderate use of mental health care (in contrast to non-use), while Native Americans were as likely as Whites to be moderate users. However, only African-Americans were less likely than Whites to be high users of mental health care (compared to non-use). Ahn et al. (2009) found that among patients with schizophrenia, Whites were more likely to be adherent to treatment than non-adherent compared to African-Americans; no differences were found in adherence for other racial groups.

Some of the differences among race/ethnic groups in utilization may be attributed to differences in enabling factors, such as income and insurance.[175,176] African-Americans, Hispanics and other ethnic groups are more likely to have lower incomes and lack insurance, which contribute to less access to care, but disparities still persist even when controlling for such factors. In summary, treatment rates are lower for non-White racial groups compared to other racial groups when controlling for mental health status, but among persons that seek care, race is not a consistent indicator of continuity of

treatment. This suggests that health system barriers are also a critical determinant of the ability to enter care.

Socioeconomic status and insurance

Poverty affects access to care as it reduces the ability to afford care. However, because of public insurance programs, the poorest in the population may have more access to care than the near-poor. In the NCS-R, controlling for mental health status, the near-poor (1.5-3 times the Federal Poverty Line, FPL) were less likely to receive any care compared to high income (>6 times FPL), but no differences were observed for the other income groups. NHIS data indicate that adults age 18 and over who are between 100 percent and 200 percent of the FPL have 2.9 times the odds of forgoing mental health care due to cost compared to adults over 200 percent FPL, and nearly 7.8 times the odds for forgoing medication. However, persons below the 100 percent of the FPL were *as likely* as those cost above 200 percent FPL to report barriers to care.[173]

Poverty has not been consistently related to the modality of care (specialty, the general medical sector, human services or complimentary medicine /alternative care) among those who seek care. Income was not associated with the use of specialty care in the NCS-R,[19] and poverty (below 200 percent FPL) was unrelated to the use of psychotherapy in an analysis with MEPS data.[175] Low income (below 150 percent FPL) was unrelated to drop out from outpatient treatment (though middle income, 150 percent to 200 percent, was positively associated with dropout),[139] but low income was related to higher rates of antidepressant discontinuation in the first month of treatment.[168] Controlling for insurance, income was not strongly related to visits to health

professionals among those with depression[160,*] or persons with serious mental illness (SMI).[177] However, other research has found poverty to be associated with a higher likelihood of treatment with medication rather than psychotherapy,[178–180] and shorter treatment duration.[181] The relationship between poverty and *frequency* of mental health service use is not also linear; in other words, having a higher income is not consistently associated with more treatment[151,182] or perceiving fewer structural barriers.[183]

One reason why poverty is not directly related to utilization of care is that persons with low incomes may have access to care through public insurance. Insurance coverage lowers out-of-pocket (OOP) costs, which are major concern for many persons seeking care. Understanding the relationship between insurance and service use is complex, and variation in the measurement of service use, as well mental illness and utilization, complicates comparisons between studies. But a general conclusion is that insurance facilitates access to health care among those with mental illness,[184] and some evidence that insurance is important for specialty care.[178,185]

Having any insurance is associated with lower rates of drop-out from treatment (not sector specific),[137] and lower use of social services.[172] However, while insurance may reduce dropout, effects may decline after three or more visits, which suggests that insurance is insufficient in preventing cost burdens.[139] Moreover, insurance may not increase the frequency (beyond ever use) of treatment from mental health specialists.[172]

Persons with public health insurance coverage have higher rates of mental health care use, particularly in the general medical sector, compared to person's with private coverage or no coverage.[164,175,185–188] In the MEPS (2004-2006), 48.4 percent of persons

[*] In Dobalian et al., the near poor ($10,000 to $29,000) with depression were slightly less likely than the poor (< $10,000) to obtain care but other incomes groups did not vary in receipt of care.

with severe mental disorders covered by public insurance received mental health services during the previous year, compared to 38.2 percent of persons with private coverage (and 21.5 percent of persons who were uninsured for a full year).[189] In the NHIS (2009-2010), about 67 percent of persons with SPD and a mental health limitation saw a mental health care specialist, compared to 60 percent with private insurance and 45 percent of those with no insurance.[190] However, among NSDUH respondents with self-reported depression, treatment rates were not statistically different across insurance types.[191] The author of this latter study suggested the lack of association of insurance and use may explained by differences in clinical or socio-demographic characteristics across insurance types.

As with other age groups, there is evidence that uninsured young adults are less likely to use mental health care as compared to those that are insured.[2,192] The lower rates of insurance coverage among young adults may partly explain differences in treatment in the health sector among young adults compared to older adults. Many youth lose insurance coverage when they turn 18 due to ineligibility for public programs they may been covered by as adolescents or through coverage provided under their parent's plan.[193] Young adults also may not be able to afford private insurance due to periods of unemployment or low-incomes. Others may not qualify for employer-sponsored coverage until after a certain probationary period of employment or may decline coverage due to the high cost relative to perceived benefits.[194]

Of the studies that have used latent class methods to identify typologies of use in Table 2.3, none have examined patterns of treatment by poverty levels or SES, and only Carragher et al. (2012) examined the role of insurance. Carragher et al., found that

persons with public insurance were more likely to have high or moderate mental health care use than low use compared to the uninsured but private insurance was not associated with typology of use.

Physical Comorbidities

Among adolescents and adults with a mental disorder, those who also have poor physical health, chronic conditions or physical limitations use more mental health services compared to persons with without physical comorbidities.[195–198] Co-morbidities of mental and physical illness, particularly chronic conditions, also increase non-mental health care use.[199–201] Persons with chronic conditions often have co-occurring mental health problems that require mental health care, though not all chronic conditions may increase the use of mental health care.[188] However, others have found that comorbid physical and mental health problems may only increase perceived need for mental health care,[202] and chronic conditions may not be independently associated with specialty mental health care, controlling for mental health and other socio-economic characteristics.[177] Co-morbid chronic conditions may be part of other circumstances of disadvantage that create barriers to health care. For example, among children and adolescents with mental disorders, physical disability increases barriers to mental health care.[203]

Of the studies using latent class methods, Carragher found associations between mental health care utilization and five out of 11 chronic conditions; persons with at least one of these five chronic condition were more likely to be high or moderates users of mental health care compared non-users. Fink et al. (1993) found the prevalence of

psychiatric disorder was three to five times higher among the moderate and higher users of inpatient care compared to the lower users.

To summarize, there has been little research the use of mental and general medical care among young adults with different levels of mental health care needs. Given the particular challenges young adults may face in accessing care, such examination is warranted. The second aim of this project address the questions:

> **2a)** What are the patterns of mental and general health care utilization among young adults over a two-year period?
> **2b**) How do patterns of health care utilization vary by mental health pattern?
> **2c)** How do patterns of health care utilization vary by social group and health status characteristics?

Identification of types of users can demonstrate where gaps in services occur. Understanding social group differences in how young adults use the health care system could help identify risks for unmet need.

While this study examines several social structures associated with treatment and health care use, it recognizes that other factors such as the availability of providers and cultural and psycho-social factors, such as stigma, perceived need, and beliefs about treatment efficacy also may discourage care.[174] But the extent to which such factors mediate the relationship between need and variation in utilization across social groups is not the focus here. Rather this study examines select social and economic structures factors that shape access.

2.3 Summary and Conceptual Model

In summary, there is a need to identify young adults who have persistently poor mental health, characterize these youth by socio-demographic and health status characteristics, and understand the extent to which they obtain mental and medical health

care. Such analyses can inform policy makers how to target interventions for mental health care. The preceding review of the literature informs the conceptual model, shown in Figure 1.

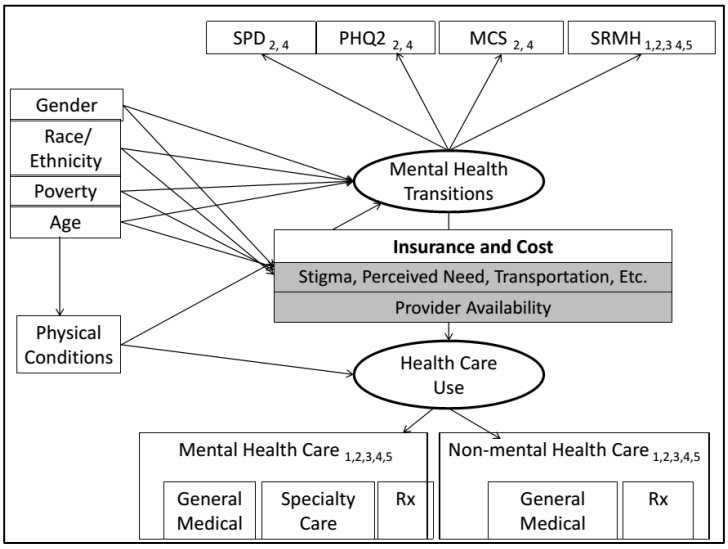


Figure 1: Conceptual Model
Notes: SPD = Serious Psychological Distress; PHQ-2= Patient Health Questionairre-2; SRMH= self-rated mental health; MCS= Mental Component Sore of the Sf-12 v.2.0. Subscripts refer to the round during which the measure is collected.

This model draws attention to how social characteristics (gender, socio-economic status, and race) and physical health status shape one's mental health, and how mental health and social structures shape utilization. The model also acknowledges other factors, such as stigma, perceived need, and transportation barriers, which influence problem recognition and care seeking and are potential mediators between demographic characteristics and mental health care use. These are shown in grey, as they are not examined in this study. The ovals represent unobserved mental illness status and care seeking behaviors that can be identified by observed measures over time. These observed measures (e.g., SPD, PHQ2, general and specialty care) capture the subgroups of youth that exist in the population due to variation in social structures and mediating factors.

2.4 Research Questions

This study uses data from the Medical Expenditure Panel Survey, a nationally representative household survey, and latent class methods and regression models to identify types (or classes) of mental health status and health care use over a two year period.

Research Question 1:

1a) What are the transitions in severity and persistence of mental health problems?
1b) How do transitions in mental health problems vary by social group and health status characteristics?

Significance: For some young people, mental health problems are transitory during young adulthood, however persistent problems have the greatest impact on functioning and treatment priorities should focus on the most severely affected. Identifying typologies of mental health status provides insight on the different levels of problems that exist among young adults. Characterizing the typologies by social characteristics provides a qualitative description of these groups to better inform which youth are at risk of poor mental health and who may be targeted for interventions.

Research Question 2:

2a) What are the patterns of mental and general health care utilization among young adults?
2b) How do patterns of health care utilization vary by mental health pattern?
2c) How do patterns of health care utilization vary by social group and health status characteristics?
Significance: Identifying types of care seeking provides an understanding of how young adults with mental illness seek care, and how well utilization is aligned with need. Identifying social group differences in use enables researchers to study and modify organizational structures and policies that contribute to improving the use and delivery of services.

Chapter 3 Methods

3.1 Data

Data for this study come from the Medical Expenditure Panel Survey (MEPS), which is designed to provide nationally representative estimates of health care use, expenditures, sources of payment, and health insurance coverage for the U.S. civilian non-institutionalized population.[204] The MEPS is sponsored by Agency for Healthcare Research and Quality (AHRQ), in the Department of Health and Human Services. The sampling frame draws households that participated in the previous year's National Health Interview Survey (NHIS). The NHIS is sponsored by the National Center for Health Statistics in the CDC.[205] Both agencies contract with the Census Bureau to field each survey. The NHIS uses is a stratified, multistage cluster sample design and this design is carried through into the MEPS. The first stage of selecting the sample starts with the primary sampling units (PSU) which represent a "single county, a group of contiguous counties, or metropolitan areas."[206] Within each PSU, area segments (strata) are formed based on the density of the demographic make-up of the population as determined from Census blocks or groups of blocks. Households containing Hispanics and African-Americans (and Asians for 2006 forward), as well as families with incomes less than 200 percent FPL, were oversampled to meet sufficient levels of precision to allow for national estimates**.** College dorms represent ineligible dwelling units for MEPS but full time students living away from home and not present for the interview are considered household members. Military personnel not living in the same household as civilians are ineligible. Other institutionalized persons, including those in health care institutions, are also not eligible.

The MEPS follows each household selected for two years (a panel) and collects data through in-person interviews. Approximately 9,000 households (16,000 persons) are interviewed every four to five months for a total of five rounds over a two-year period. Most data for a sampled household are reported by a single household respondent who is knowledgeable about the family's health care. However, this person may vary from round to round, depending on availability at the time of the interview. The household interview collects information such as basic demographics, health care, insurance status and the like for each household member. It also includes a measure of self-assessed mental health. In addition, all adults in the household are asked to complete a mail-backed self-administered questionnaire (SAQ) during rounds two and four that asks about attitudes, feelings, and impairments. In some cases, if a person is not able to complete the SAQ, a proxy may complete it.

This study uses data from seven panels conducted from 2004-2005 to 2010-2011 (panels 9 to 15). Data were pooled to have sufficient sample size for statistical analysis and to decrease the standard errors of the estimates. The household panel response rate averaged 60.4 percent for the seven panels; about 91 percent of persons in each panel have data for all five rounds of data; the remaining persons were out of scope for one or more rounds. Survey weights were adjusted for full-year respondents to compensate for differential selection and non-response. To account for the pooled analysis, the survey weights were divided by seven, the number of panels. Standard errors are adjusted for the complex sampling design using the Taylor Series method.

Respondents are eligible for my analysis if they were *inscope* (i.e., a member of the U.S. civilian, non-institutionalized population) during round one, at least age 18 and

less than age 28 years old (N=14,412).[*] The sample is also restricted to household respondents (4,518) to avoid having proxy reports for self-assessed mental health[†,207] and further restricted to respondents with no missing data.[‡] This leaves a sample size of 4,177. The percent of respondents with missing data on the selected characteristics is low (less than 3 percent on any measure).

The result of this inclusion criteria is that findings are generalizable to persons who are likely to be household respondents. I conducted a bivariate analysis to test for significant differences in the background characteristics of youth who were household respondents and those who were not household respondents, and to examine differences in household respondents who missing on specific questions (item non-response) and those with no missing data (see Appendix A). Because the MEPS administrators impute age, gender, marital status, race, poverty and insurance, there were no missing data on these variables. Those excluded because they were not the household respondent were more likely to be male, Hispanic, be above 200 percent of the FPL compared to below 125 percent of the FPL, have less than a high school education, be unemployed, uninsured, a student, have good self-rated health, have no chronic conditions or limitations and have less depression and impairment at baseline. Those excluded due to missing data were more likely to be Black and in poverty.

3.2 Measures

Table 3.1 summarizes the measures used in this analysis and the rounds from which they were taken.

[*] At least 18 by round 2 (and therefore eligible for the SAQ).
[†] However, I conducted sensitivity analysis on a sample including young adults whose data were proxy reported (see Appendix B).
[‡] No missing data other than data that were imputed by the survey administrators.

Table 3-1. Summary of Measures and Time at Assessment					
	Year 1			Year 2	
	Round #				
Measure	**1**	**2**	**3**	**4**	**5**
Mental Health Status					
Self-rated mental health	X	X	X	X	X
Serious psychological distress (Kessler-6) (from SAQ)		X		X	
Depression (Patient Health Questionairre-2) (from SAQ)		X		X	
Impairment (SF-12 v.2 Mental Component Summary Score) (from SAQ)		X		X	
Physical Health Status					
Self-rated health	X				
Select health conditions		X			
Any limitation (functional or activity limitation)		X			
Socio-demographics					
Age		X			
Gender	X				
Race/Ethnicity	X				
Poverty status (annual)		X			
Income		X			
Health Insurance		X			
Marital status	X				
Employment	X				
Educational attainment	X				
Health Care Utilization Measures					
Prescription drug use for mental illness	X	X	X	X	X
Prescription drug use for other medical conditions	X	X	X	X	X
Ambulatory treatment for mental illness	X	X	X	X	X
Ambulatory treatment for other medical conditions	X	X	X	X	X

Mental Health Status

Four measures of mental health are included. First, serious psychological distress (SPD), measured by the Kessler-6,[208] was assessed at two rounds in the SAQ. The K-6 includes six items that ask respondents about frequency of symptoms of such as sadness, nervousness, and hopelessness in the past 30 days. Response categories range on a 4-point scale "none of the time" to "all of the time." A score of 13 or higher (out of 24) on the K-6 scale is used to indicate the presence of SPD.[208] This cut-point identifies 92 percent of respondents with a 12-month DSM-IV disorder and impaired functioning, with

a higher specificity (96 percent) and lower sensitivity (36 percent).[208,209] The high specificity indicates that most persons without SPD are correctly categorized and there are few false positives. However, the low sensitivity indicates that many persons *with* a disorder may go undetected (false negative). Cronbach's alpha was 0.86 in the first year and 0.88 in the second year.

A second indicator of mental health status included in the SAQ was depression, measured by the Patient Health Questionnaire-2 item Depression Screener (PHQ-2). Respondents are asked how often over the past 2 weeks they little interest or pleasure in doing things" or were "feeling down, depressed, or hopeless." Responses options include (3) nearly every day; (2) more than half the days; (1) several days; and (0) not at all. The items are summed and scores range from 0 to 6. A score of 3 or above suggests further screening for major depression.[210] The instrument has a sensitivity of 83 percent and a specificity of 92 percent for major depression, indicating more false negatives than false positives. Cronbach's alpha was 0.79 in the first year and 0.82 in the second year.

The third measure of mental health status included in the SAQ was the Mental Health Component Score (MCS) of the Short From-12. The SF-12 is derived from the SF-36, an instrument that uses symptom-scales to capture health status and functional impairment due to physical and mental health problems. The reference period is the last four weeks. The SF-12 consists of 12 items assessing physical and mental health and functioning. Scores on this scale ranged from 2 to 12, with higher scores indicating greater impairment. All questions are used to score each component, but are weighted differently; questions weighted heavier for the mental component are related to mental health (e.g., "How much of the time during the past 4 weeks have you felt down?" and

"How much of the time during the past 4 weeks have you felt calm and peaceful?") (the questions are provided in Appendix A). The 12 items are reduced to 2 summary scores: the MCS and Physical Component Score (PCS). Persons are then given a percentile score, with a mean of 50 (SD = 10; range 0-100); higher percentiles indicate better health. The SF-12 components have been shown to be reliable in general and medical populations and highly stable with correlations over a 2-week period of 0.89 (PCS) and 0.76 (MCS).[211,212] Validation of the MCS in the SF-36 was able to discriminate persons with physical conditions and those with psychiatric conditions, and to capture severity in mental health and role impairment due to emotional problems (McHorney, Ware and Raczek, 1993). Validation of the MCS based on a measure of area under receiver operating characteristic curves (AUC), a scale in which 1 indicates perfect discriminatory power to diagnose and 0.5 indicates chance-level, demonstrated that the AUC for depression was 0.92 and 0.83 for anxiety disorders.[212] This suggests that the MCS is accurate in identifying persons with these conditions. Cronbach's alpha was 0.79 in the first year and 0.78 in the second year.

The fourth measure was self-rated mental health (SRMH) which was asked in the household interview (not the SAQ) at each round (3 times in year 1 and twice in year 2). Respondents are asked to rate their mental on a scale from excellent (1) to poor (5). Responses were dichotomized into good/very good/excellent compared to fair or poor. Other research using MEPS data suggests that SRMH is a good indicator of self-awareness of a mental condition.[207] Researchers using the Canadian Community Health Survey (2002) found that approximately 45 percent of persons (age 15 and over) in the community meeting *any* DSM criteria (assessed with the WHO-CIDI) for a mental

disorder in the past month rated their mental health as fair or poor and 46 percent with a self-reported diagnosed disorder reported poor self-rated mental health.[213] Poor SRMH was highest among those with multiple disorders, at 73.4 percent. Overall, SRMH may underestimate the level of mental disorders in the community according to DSM criteria.[213]

Table 5 shows the tetrachoric correlations between each of the measures of mental health. There was a moderate positive correlation between year 1 and year 2 for each measure (<.5). The measures that are most strongly correlated are SPD and depression (Year 1 = .87; Year 2 =.84). Mental health functioning (MCS) and self-rated mental health (SRMH) are less strongly correlated with SPD and depression. Exploratory factor analysis (EFA) was used to examine the factor structure of the measures of mental health (provided in Appendix A). The analysis confirmed that each of the four measures captured different dimensions of mental health. Although the factor loadings indicated that some items from the K-6 loaded on the same factor with items from the PHQ-2, the proceeding analysis did not recombine the measures into new constructs. Previous studies have assessed the reliability and validity of the existing scales in identifying mental illness; removing or adding measures would alter the scales.

Table 3-2: Tetrachoric Correlations of Mental Health Measures

(N=4,177)	SRMH R1	SPD R2	Depress. R2	Impair. R2	SRMH R2	SRMH R3	SPD R4	Depress. R4	Impair R4	SRMH R4	SRMH R5
SRMH R1	1.000										
SPD R2	0.590	1.000									
Depression R2	0.515	0.856	1.000								
Impairment R2	0.500	0.813	0.793	1.000							
SRMH R2	0.717	0.669	0.621	0.627	1.000						
SRMH R3	0.681	0.594	0.565	0.599	0.740	1.000					
SPD R4	0.583	0.715	0.636	0.595	0.554	0.582	1.000				
Depression R4	0.501	0.604	0.524	0.606	0.517	0.583	0.836	1.000			
Impairment R4	0.458	0.622	0.610	0.538	0.519	0.571	0.892	0.793	1.000		
SRMH R4	0.686	0.557	0.497	0.503	0.675	0.784	0.674	0.667	0.620	1.000	
SRMH R5	0.654	0.555	0.497	0.531	0.685	0.726	0.602	0.562	0.575	0.736	1.000

R# = round number; poor SRMH= Poor self-rated mental health; SPD =serious psychological distress.

Use of Health Services

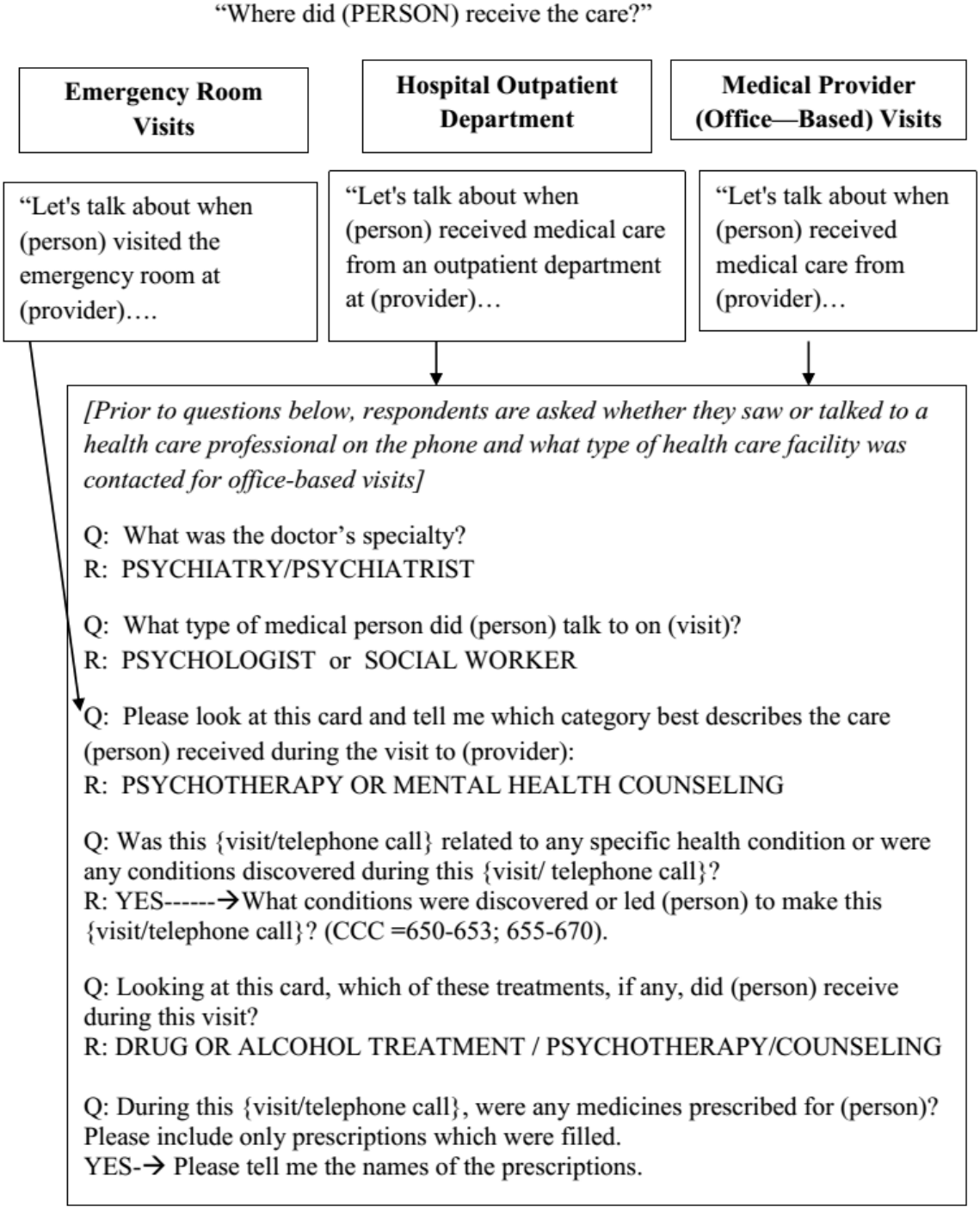
Prior to the initial round of data collection, MEPS administrators provide respondents with a health events calendar for use in recording all health care services sought by all family members, including prescription drug fills, outpatient and office-based visits, hospital stays, emergency services, and other health care events. At each round, the household respondent is asked to produce the calendar to use as a reference for information about the health care services sought since the last interview (or in the past 4 to 5 months for the first interview). MEPS administrators supplement and validate information on medical care events reported by household respondents by contacting medical providers and pharmacies identified by household respondents.[214]

Figure 2 provides the questions used to collect data on ambulatory care used in this study.[*] Preliminary analyses indicated too few inpatient visits to consider including these in the analysis (<10). For each event, respondents are asked the health condition that it was associated with it. These are recorded by interviewers as verbatim text, and professional coders translate them to ICD-9-CM codes. These codes are then grouped into broader clinically meaningful categories known as clinical classification codes (CCC). (A cross-walk of the CCC codes and ICD-9 codes is provided in Appendix D). This analysis used CCC codes to indicate whether the respondent was being treated for mental health condition (excluding 653, dementia-related disorders, and 654, developmental disorders, e.g., developmental or intellectual disabilities). No administrative verification was made (by the survey administrators to validate the self-

[*] After collecting data on health care visits, respondents are asked to take out any prescriptions or pill bottles they have and the interviewer proceeds to ask details for those that were not already mentioned in the interview.

report of conditions. Each event was dichotomized as either mental health care or non-mental (medical) care use, as described below. The number of each type of event over the two-year period was then summed.

Figure 2: Collection of Health Care Events in the Medical Expenditure Panel Survey



Ambulatory mental health care: Interviewers asked respondents the type of care received for each office and outpatient visit. Respondents were handed a card with categories of treatments and asked to indicate which type of care best described the care received during the visit. Respondents who reported "psychotherapy or mental health counseling" were considered to have psychotherapy. Office-based, outpatient visits and emergency room visits were coded into four mutually exclusive variables indicating whether the respondent received: a) only psychotherapy; b) only a mental health prescription; c) both psychotherapy and a prescription and d) some other reason related to a mental health condition (diagnosis, follow-up, not-specified) or drug or alcohol treatment.

Specialty mental health care (4 measures): Visits to psychiatrists, psychologists or social workers for: a) only psychotherapy; b) only a mental health prescription; c) both psychotherapy and a prescription and d) some other reason related to a mental health condition (diagnosis, follow-up, not-specified) or drug or alcohol treatment (1); otherwise (0).

General mental health care (4 measures): Visits to doctors other than psychiatrists and visits to health personnel other than psychologists or social workers for: a) only psychotherapy; b) only a mental health prescription; c) both psychotherapy and a prescription and d) some other reason related to a mental health condition (diagnosis, follow-up, not-specified) or drug or alcohol treatment. Visits to the emergency room for mental health conditions were included as general mental health care. Coded (1) for general mental health care and (0) otherwise.

Ambulatory medical care (2 measures): Office, outpatient and emergency room visits that were not for any mental health treatment were coded into two mutually exclusive variables indicating whether the respondent received: a) any treatment without a prescription; b) any treatment with a prescription. Coded (1) for ambulatory medical care and (0) otherwise.

Prescription mental health care (1 measure): Prescribed medicines were considered mental health treatment if the drug name matched a list of commonly prescribed mental health medications, the National Drug Code (NDC) developed by the National Institutes of Mental Health[215] (2010) *and* the person reported a mental health condition (per the CCC code). Prescriptions for mental health that could not be linked to any office or outpatient visit were included as a prescription-only mental health care event. All prescriptions that could be linked to an office or outpatient visit were included in (b) or (c) of ambulatory visits (in either specialty or general sector) that included a prescription. Coded (1) for mental health prescription and (0) otherwise.

Prescription medical care (1 measure): Non-mental health prescriptions that could not be linked to office and outpatient visits were included as prescription-only medical events.

The preceding measures were collapsed into summary measures:

Modality-specific types of care: 1) visits for therapy only, 2) visits for therapy with prescriptions, 3) visits for medical care without prescriptions, 4) visits for medical care with prescriptions, 5) mental health prescriptions only, 6) medical prescriptions only).

Sector-specific mental health care: 1) mental health visits in the specialty sector, 2) mental health visits in the general sector.

Social and Demographic and Health Status Measures

Socio-demographic characteristics: *Unless otherwise noted, measures are based on information collected in Round 1:* **Age** was a continuous measure and ranges from 17 to 27 years. **Gender** and **marital status** were dichotomous measures, with the reference category male and married. **Race/ethnicity** was categorized into White, Black, Hispanic and other. Hispanic ethnicity was first categorized and those not identified as Hispanic were assigned to the other three categories (consistent with the U.S. Office of Management and Budget method). Sample sizes limited analysis of separate categories for Asians, American-Indian/ Alaska Natives, and persons of multiple races. **Education** was categorized as less than high school, high school and any college. I used a binary measure of student status at any point during the first year. This was constructed from two variables. A direct question on **student status** was asked only of persons age 17 to 23. However, persons who indicated any change in employment due to a return to school were considered to have been a student during year 1. **Poverty** status during year 1 (reflecting total family income) was constructed by the MEPS administrators using total family income, family size, and the U.S. Census Bureau poverty thresholds (poverty status is assessed annually in the MEPS). Because of sample size limitations, poverty was categories were collapsed into: less than < 125 percent, 125 percent to <200 percent), and 200 percent above. **Employment** status was a dichotomous measure of either having a job at the time of the interview, having a job to return to at the end of the round, or employed during the round *versus* not employed with no job to return and no work during the round. I also constructed a measure for an adverse change in employment during year

one. This included job loss that resulted from a business closure, a lay-off, becoming ill or sick or taking unpaid leave.

I categorized **insurance status during the first year** into mutually exclusive categories of full-year private, full-year public, part –year uninsured, full-year uninsured. If an individual had both public and private coverage with no spells of uninsurance, they were assigned to the type of insurance for which they held for the majority of the year. Private coverage included any employer-sponsored or self-purchased coverage and TRICARE. Public coverage includes Medicare, Medicaid, SCHIP and other public programs.

Physical health status: Health status was measured using indicators of whether the respondent had any limitation, physical chronic condition, and their self-rated health. Limitation status was a dichotomous indicator: persons were asked if they were limited in *any way* and also asked to report limitation in activities of daily living (ADLs), and Instrumental Activities of Daily Living (IADL, such as using the telephone, paying bills, taking medications, preparing light meals, doing laundry, or going shopping), as well as functional limitations, which are defined as difficulty in performing nine specific physical actions, (e.g., walking, climbing stairs, reaching overhead, bending or stooping) collected during the first year. Respondents were asked to rate their health compared to others their age, from excellent, to poor. Responses were dichotomized into a binary measure of poor health (fair or poor) versus good, very good and excellent.

I included a binary measure of whether the respondent had any of eight chronic conditions including diabetes, asthma, arthritis, heart disease, high blood pressure,

emphysema, stroke or joint pain in the first year of the study. These health conditions were asked of all respondents consistently during the study period.

3.3 Analytic Strategy

Research Question 1

Latent Class Construction

To identify subgroups with different mental health status at year one and year two, I used a latent class model (LCM) approach. Latent class analysis is a model-based, data driven approach to estimating distinct subpopulations in data, rather than classifying persons *a priori.* (In Appendix C, I also report all analyses using the *a priori* approach). Like an *a priori* approach, a useful property of LCM is that the subgroups identified can be included as outcomes in regression analyses. The subgroups can be compared for unique associations with characteristics of interest.

One assumption of LCM is that the correlations of the observed measures are due to membership in the latent class. Conditional on class membership, all observed measures are assumed to be uncorrelated and the *within class* variance is assumed to be zero. This assumption may not be tenable for mental health, for which severity may vary within class. One way to examine possible within-group variance is through the application of factor mixture models. These models allow for variance of a continuous factor within each class.[216] Factor mixture models have been used, for example, to examine the categorical and dimensional nature of autism spectrum disorder (ASD).[217] In this study, a factor mixture model were compared to the latent class model to examine

if allowing for variability within class significantly improved model fit.* In addition, confirmatory factor analysis (CFA), which allows for covariance among measures, could have been used to estimate factor scores for respondents. However, a CFA does not identify subgroups, and I would have to decide how to classify respondents based on the factor scores.

There is no consensus on how to identify the appropriate number of latent classes and users of LCM generally apply multiple approaches.[218] The fit statistics used were the log likelihood value, and the Bayesian Information Criterion (BIC)[219] for the factor mixture model and for the LCA, the sample-size adjusted BIC (SSABIC), and Lo–Mendell–Rubin likelihood ratio test (LMR-LRT).[220] Information criteria are based on the log likelihood value of a given model with a penalty for the number of parameters relative to sample size; lower values of the BIC and SSABIC indicate a better model.[218] The LMR-LRT evaluates whether a model with more classes is a significantly better fit than a model with fewer classes. In addition to information criteria, *entropy*, was examined. Entropy is a measure of class separation, with a higher value indicating less overlap or more distinct classes. Values of .80 and greater are indicative of 90 percent or more correct classification.[221,222] I also examined the overall bivariate standardized Pearson residuals. An overall score greater than 1.96 indicates some violation of the assumption of local independence.[223]

Alongside fit statistics, equal attention was given to the sample size and substantive interpretation of the classes.[218,224] Prior to estimation of the latent class and factor mixture results, it was decided, based on literature, that class sizes of less than 1

* The factor loadings were held invariant across classes, the factor mean was fixed at zero to allow for identification, while the factor variance was allowed to differ across classes.

percent would not be useful. After examination of an initial one-class model, the model fit was assessed for additional classes, and the final number was guided by fit statistics and consideration for whether there were meaningful differences among classes.[218,224]

Latent Transition Analysis

The first central question was to describe the change in mental health status over the two years. Several models exist to examine change in a latent construct over time, including variations of mixture models, such as growth mixture models and latent transition models. These approaches are different from conventional growth curve modeling approaches in that they assume subgroup heterogeneity in initial status and change over time. Conventional growth models (i.e., hierarchal linear models, multi-level models, or random effects models) assume a trajectory of change for the entire population under study, with random effects normally distributed about the mean.[225]

In contrast, I used a latent transition analysis (LTA), which examines changes between states. These models characterize subgroups of distinct change profiles.[226] A LTA is an autoregressive model: the status of the preceding time point influences the status at the next time point. The LTA approach was chosen for two reasons. First, with only two assessments of mental health, it is not possible to identify a trend, rather it is only possible to estimate a change. Secondly, modeling transitions between states may better fit the multi-dimensional nature of the data (i.e, self-rated health, SPD, impairment), compared to a latent growth model of change in one outcome over time.

Latent transition models produce three key parameters: the size of the class (distribution in the population); the probability of the observed variables given the latent class membership (response probability), and the class membership probability for each

respondent. The assignment of individuals to classes is *probabilistic* and following recommended practice, I report the means of the posterior probabilities of class membership. Class membership cannot be empirically tested and misclassification error is inherently part of the latent class approach.[227] I imposed measurement invariance of the response probabilities over time; this is typically used in latent transition analysis to ensure that at each time point, the measures have the same meaning.[228,229]

Following the probabilistic class assignment, class membership was then included as the outcome in multinomial regression models to examine how covariates are associated with each class.[*]

Research Question 2

As with Research Question 1, here I used a latent class approach. To identify groups of respondents with similar patterns of health care use, I used 6 variables indicating the total count of the following events of two-year period: 1) specialty mental health visits; 2) general mental health visits; 3) medical care visits without prescriptions; 4)medical care visits with prescriptions; 5) prescription-only mental health care; and 6) prescription-only health care. I used a negative binomial distribution (the negative binomial provided a better fit compared to a zero-inflated Poisson model). Based on previous studies examining typologies of health care use, I estimated models with 2, 3, 4, and 5 classes to determine the model with the best fit. Also drawing from previous research, I compared the latent model fit statistics to alternative models (a two-part

[*] Covariates can be used to predict class membership after class identification or included in the identification of classes to improve model fit, if the covariates most able to distinguish classes are known. A goal of this study was understanding differences in the characteristics of classes, thus they are used as predictors in the regression model.[301]

hurdle model, which would only classify ever-users) and a factor mixture model to understand if the latent class approach provided a better fit to the data.[230,*]

To identify the socio-demographic, physical and mental health correlates of the health-care use groups, I entered the health-care use groups as a categorical outcome measure in a multivariate regression, with the low-use group as the reference. I tested for violation of the independence of irrelevant alternatives assumption using a Hausman test.[231] I examined the association of socio-demographic and physical health characteristics with health care use within each mental health class. In addition, for characteristics associated with health care use, I examined the effect of the characteristic in pair-wise contrasts for each outcome.

All mixture models were estimated with M*Plus*, version 7.2 [232] and descriptive statistics and regression models were estimated in Stata, version 12.0.[233]

3.4 Limitations

There are important limitations to using MEPS data. Because it is a household survey of the non-institutionalized general population, it excludes all persons with long-term inpatient stays at hospitals, psychiatric centers, and residential treatment facilities. It also excludes incarcerated and homeless persons, a population that has a higher rate of metal disorders than the population average. Households who initially refused to participate in the survey were more likely to be urban, living in the Northeast region, white non-Hispanic, elderly, in excellent health, have some high school education and a family size of 2 or more.[234] Underreporting of medical events is also a concern, though this may be minimized by the short recall period of five months on average.[235]

[*] I also tried several variations of finite mixture models but the models failed to converge after more than 20 hours of computation time.

The survey also does not collect data on other measures that would be desirable to include in this analysis, such as the availability of providers, attitudes towards care, perceived need, quality of care received, and measures of social support. These measures may not directly influence mental health status, but could influence mental health care use. Low perceived need for care and the denial of symptoms is a critical barrier to mental health care,[236] and these may vary by socio-demographic factors. However, in 2010, 53.1 percent of young adults with serious mental illness ages 18 to 25 reported an unmet need for mental health care.[237] National data also suggest that young adults (age 15 to 24) are *more likely* to perceive a need for mental health care than adults over age 24, but are not more likely to seek help.[238]

In addition, biological processes and genetic predispositions are known to influence mental health,[239,240] and family effects such as parental discordance and parental abuse adversely affect the occurrence and persistence mental health of young adults.[68,241] All such unmeasured social and familial factors may vary by socio-economic and demographic factors, and if available, it would be of interest to examine if they mediate health care use. However, these are not likely to be confounders in the research aims under taken here.

There are also some limitations to the measurement and modeling methods used in this study. While the mental health symptoms used here reflect different dimensions of mental health, they lack clinical specificity, and understanding the severity of the constellation of symptoms is difficult. Using multiple dimensions of symptoms, rather than one disorder or diagnosis, also hampers comparison with other studies. In addition,

the latent class model assumption that there is no variation of symptoms within each class may not be tenable, and the classes identified cannot be empirically tested.

Chapter 4 Results

Research Question 1

a) What are the transitions in severity and persistence of mental health problems?
b) How do transitions in mental health problems vary by social group and health status characteristics?

Descriptive Characteristics of Sample

Table 4.1 describes the socio-demographic characteristics of the sample at baseline. The analytic sample represents approximately 15.3 million non-institutionalized young adults age 18 to 27. The average age was about 23 years, there were more women (61 percent) than men (39 percent), most were not married (81 percent), and the majority were White (65 percent). The larger percent of women reflects that women were more likely to be household respondents. Almost half of the sample had private health insurance for the duration of the first year, and about 43 percent were uninsured at one point during the first year (more than twice as high as the adult population age 18 to 65). Approximately 53 percent of the sample were above 200 percent of the Federal Poverty Line, during the first year, while 22 percent were at or below 125 percent of the FPL. About three in five of young adults have had some college education and about 80 percent were employed at the first interview. Over two-thirds of young adults report very good or excellent self-rated health (SRH); about 8 percent report poor or fair SRH and 37 percent had at least one physical health condition. About one in seven young people had any activity or work limitation during the first year.

Mental health status

My first research question was to understand the status of mental health of young adults, and to understand change over time. Table 4.2 describes the mental health status of young adults for each measure.

Table 4-1: Descriptive Characteristics of Sample at Baseline

	Percent	SE
Demographics		
Age (mean years)	23.4	0.1
Female	61.4	1.2
Race/Ethnicity		
White non-Hispanic	65.0	1.1
Black non-Hispanic	12.9	0.6
Hispanic	15.3	0.9
Other	6.9	0.6
Single/divorced/separated	80.6	0.5
Poverty Status (% of FPL)^		
< 100% to 125%	22.0	1.0
125% to 200%	19.1	0.7
200% +	53.4	1.1
Health Insurance^		
Uninsured full year	21.5	0.9
Uninsured part-year	21.1	0.8
Public full year	8.5	0.6
Private full year	49.0	1.1
Education		
No high school	11.9	0.3
HS graduate	28.1	0.8
Some college	60.0	0.9
Employed	79.0	1.0
Loss of job^	14.4	0.7
Any time a student^	20.8	0.8
Health Status		
Poor self-rated health (fair or poor)	7.9	0.8
Any chronic physical condition^	36.5	0.5
Any limitation^	15.1	1.5

Notes: ^ =data collected during the first year; otherwise collected at round 1. Low-self rated health is fair or poor compared to good, very good, and excellent. Chronic conditions include asthma, arthritis, hypertension, diabetes, joint pain, stroke, emphysema, and heart disease. Limitations include any functional or activity limitation. SE = standard error.

In each year, 4 percent to 5 percent of young people had serious psychological distress (SPD), 7 percent to 8 percent had depression, and between 14 percent and 16 percent reported some social or functional impairment or disability due to poor mental health. Across the five assessments, 4 percent to 5 percent of young adults reported poor or fair self-rated mental health (SRMH).

Table 4-2: Descriptive Measures of Mental Health Status of Sample

(N=4,177)	**Percent**	**SE**
Year 1		
Round 1		
Poor SRMH	4.7	0.3
Round 2		
SPD	4.7	0.3
Depression	8.4	0.6
Impairment	16.4	0.5
Poor SRMH	4.6	0.5
Round 3		
Poor SRMH	4.9	0.5
Any mental health problem, Year 1	22.3	0.8
Year 2		
Round 4		
SPD	4.1	0.3
Depression	7.3	0.5
Impairment	14.3	0.5
Poor SRMH	4.1	0.4
Round 5		
Poor SRMH	4.1	0.5
Any mental health problem, Year 2	18.5	0.8
Any time during Y1 or Y2		
SPD	6.9	0.4
Depression	12.6	0.6
Impairment	23.7	0.8
Poor SRMH	12.9	0.7
Any mental health problem, Year 1 or 2	29.9	0.9

SPD= serious psychological distress; SRMH= self-rated mental health; SE = standard error.

Overall, about 30 percent of young adults had reported poor mental health on at least one measure over the two-year period. However, annual rates are about one-third lower, an indication that mental health problems for many young adults changes from year to year.

Results of Model Fit for Latent Class and Factor Mixture Models

To classify young adults into subgroups by mental health status, I used a latent transition analysis, for which the first step was the estimation of latent class models. Table 4.3 presents fit statistics for the latent class models for 2, 3, and 4 classes, and the factor mixture analyses for 3 and 4 classes, for year one. The best fitting LCM has 4 classes, as does the best fitting factor analysis. The Bayesian Information Criteria (BIC) is lower for the LCM, but the Sample Size-Adjusted BIC (SSABIC) is lower for the factor mixture. The bivariate residuals are higher for the latent class model, suggesting that there is some violation of the local independence assumption. Several indicators may still be correlated within class. Examination of the specific residual correlations indicated this occurred most for SPD and depression. Although there was a slight improvement in the log likelihood and SSABIC of the FM model compared to the LCA model, the LCA provides an easier interpretation of the classes with fewer parameters, higher entropy (better probable class assignment)[218] and the class size and item response probabilities are similar. I decided the latent class fit the data as well or better than the factor mixture models and examined models with 3, 4, and 5 classes for year two.

Table 4-3: Latent Class and Mixture Model Fit Statistics, Year 1 and 2							
Model	**# FP**	**LogL**	**BIC**	**SSABIC**	**Bivariate χ^2**	**Entropy**	**LMRT p-val**
Year 1							
LCM, 3C	20	-4992	10151	10087	110.7	0.81	0.008
LCM, 4C	27	-4934	10092	10006	4.2	0.91	0.010
LCM, 5C	34	-4917	10118	10010	2.8	0.87	0.191
FMM, 3C	28	-4913	10059	9970	4.2	0.41	0.000
FMM, 4C	36	-5195	10124	10010	1.2	0.76	0.810
Year 2							
LCM, 3C	17	-3911	7964	7910	36.2	0.87	0.000
LCM, 4C	23	-3854	7950	7877	1.6	0.99	0.000
LCM, 5C	29	-3876	7994	7902	0.4	0.93	0.000

FP = free parameters; LCM = latent class model; FMM = factor mixture model; LogL = Loglikelihood; SSABIC= Sample Size adjusted Bayesian Information Criterion; BIC = Bayesian Information Criterion; LMRT = Lo-Mendell-Rubin Likelihood Ratio Test.

I next looked to how respondents fell in terms of the distribution on mental health measures in both years (Table 4.4). Class one (Good Mental Health) describes youth who have the lowest probability of having a mental health problem on any of the measures; on average for the two years, about 89.4 percent of the young adults are in this class. At the other extreme, class four (Severe Distress) characterizes young people with the most severe mental health problems, as they have a high probability of being experiencing each dimension of poor mental health, and account for about 2.1 percent of the respondents each year.

In between these extremes are two classes that describe moderate mental health problems. The first (class two) captures respondents who have a higher probability of

poor SRMH and functional impairment, but these youth have a relatively low probability of depression or SPD.

Table 4-4: Latent Class Analysis Results: Year 1 and 2 Mental Health Status

Probability of endorsing item, given latent class membership

	Class 1 Good Mental Health		Class 2 Poor SRMH & Impairment		Class 3 Severe Distress, Good SRMH		Class 4 Severe Distress	
Year 1	**%**	**SE**	**%**	**SE**	**%**	**SE**	**%**	**SE**
SRMH 1	1.1	0.2	26.8	3.6	4.9	1.7	85.4	4.4
SPD	0.2	0.1	1.0	0.5	46	3.6	77.2	5.1
Depression	1.3	0.2	3.5	1.2	81.7	2.7	87.6	4.2
Impairment	5.6	0.5	53.8	3.5	91.3	1.8	96.6	1.7
SRMH 2	0.6	0.2	21.6	2.9	17.6	2.6	78.8	5.3
SRMH 3	0.0	0.0	36.7	3.5	15.4	2.7	67.9	6.0
Year 2								
SPD	0.9	0.2	9.9	2.0	20.5	2.8	69.1	5.8
SRMH 4	0.6	0.2	27.8	3.3	5.1	1.2	68.6	6.4
Depression	2.8	0.3	18.0	2.8	35.4	3.4	74.4	5.6
Impairment	6.2	0.5	58.3	3.5	50.7	3.5	81.8	5.4
SRMH 5	0.7	0.2	23.9	3.1	11.5	2.4	61.8	6.3
Class Counts and Proportion*								
Year 1 No.	3,621		202		258		96	
Year 1 %	87.3%		5.1%		5.3%		2.3%	
Year 2 No.	3,785		119		187		86	
Year 2 %	91.5%		2.5%		4.1%		1.9%	

*Based on estimated posterior probabilities. SRMH = self-rated mental health; SPD = serious psychological distress.

In contrast, class three has a high probability of SPD, depression, or impairment, but relatively good SRMH. These two classes each account for 3.8 percent and 4.7 percent of respondents on average for the two years.

The cross-sectional latent class models indicated that each time point, four classes best represent the data. However, researchers have suggested when examining change

over time in a LTA, fewer classes than what resulted from the latent class model may suffice to summarize the data.[216*]

Change in Mental Health Status

Next I examined change in mental health status between the two years. Table 4.5 shows the change in mental health status of the respondents from year one to year two. Over the two years, most young adults reported better mental health in the second year compared to the first, regardless of their status in the first year. Most young adults who were in good mental health in the first year remained so in the second year; 2.9 percent of these young adults became distressed. Apart from the most severely distressed, those with some mental health problems also largely improved in the second year. However, one-third of those with less severe problems had no improvement in the second year, and about one-quarter had worse symptoms in the second year. About 45 percent of young adults with severe distress in the first year indicated no improvement in the second year, while only 30 percent had good mental health in the following year.

Table 4.6 shows the item response probabilities, and estimated class size and proportions from the latent transition analysis. The results indicated 13 possible groups. Five groups were transient, each with good mental health at one time point and some dimension of poor mental health at another—one with poor SRMH and/or impairment, another with distress with good SRMH, and the third with severe distress at one time point. Together, these transient groups accounted for 10.6 percent of the population.

[*] In addition, the cross-sectional results indicated that a substantial segment of youth do not experience problems at any time point. Some researchers have used a "mover-stayer" model if it is theorized that movers are qualitatively different than stayers.[228,302] Thus, in addition to the LTA model with four classes at each time point, a 3-class model and a mover-stayer model was also implemented to see if these better represented transitions over time. These did not fit the data better than an unrestricted LTA.

Table 4-5: Change in Mental Health Status Between Year 1 and Year 2						
		Good Mental Health	**Poor SRMH & Impairment**	**Distress, Good SRMH**	**Severe Distress**	**Total**
Year 1				**Year 2**		No.
Good Mental Health	*No.*	3,450	35	106	16	3,607
	Row %	96.1	1.0	2.5	0.4	
	Cell %	*83.7*	*0.8*	*2.2*	*0.4*	
Poor SRMH & Impair	*No.*	130	36	15	18	199
	Row %	69.3	13.6	10.1	7.1	
	Cell %	*3.5*	*0.7*	*0.5*	*0.4*	
Distress, Good SRMH	*No.*	181	2	53	20	275
	Row %	64.1	8.9	19.8	7.2	
	Cell %	*3.6*	*0.5*	*1.1*	*0.4*	
Severe Distress	*No.*	24	14	13	45	96
	Row %	29.9	11.0	13.9	45.3	
	Cell %	*0.7*	*0.2*	*0.3*	*1.0*	
Total N		3,785	106	187	99	4,177
Total Percent		91.5	2.3	4.1	2.2	100

Respondents were defined as persistent if they had a higher probability (compared to the good mental health group) on some measure of poor mental health at both time points. Seven groups (11.7 percent) had some degree of persistently poor mental health; some groups had very few respondents. About 2.5 percent of young adults were characterized as having a high probability of poor mental health on all measures at both points in time. Six percent of youth reported some distress, depression, impairment but comparatively good SRMH at both time points. The other five groups varied in their responses on the measures between the two years. A final group (77.4 percent) had good mental health on all measures at both time points.

Correlates of Mental Health Transitions

The next step was to understand who was at risk for having persistent, transitory or no mental health problems. I examined bivariate associations and odds ratios from a

multinomial, multivariate regression of transition group membership with selected baseline or year-one socio-demographic and health status characteristics. Mental health transition group was regressed on baseline characteristics, with the group with persistently severe mental health as the reference. The odd ratios indicated that a covariate was associated with increased or decreased likelihood of being in another class compared to the class with persistently severe poor mental health.

For purposes of the regression analysis, the latent patterns were condensed due to sample size limitations. Several different possibilities for combining the transitions were examined. I considered various combinations of the seven classes with persistent distress to accommodate using a "persistent moderate" group and a "persistent severe" categorization.[*,†] I compared the results of the regression analysis for different combinations of persistent classes and found few differences depending on categorization. I chose to keep the group with persistent distress or impairment but good SRMH as one "persistent" group and combined the remaining groups into a persistent severe class, as this was conceptually meaningful and provided enough sample for empirical analysis of the correlates of interest.

[*] Besides collapsing the persistent groups, other options were to include proxy-reported records and reduce the categories of the covariates. Using the larger sample still left some cells with low frequencies in the regression. Collapsing the covariates further would leave a less-nuanced understanding of how (or if) the groups differ on SES characteristics.

[†] An alternative conceptualization of heterogeneity is to classify patterns based on getting worse or getting better between year one and two. I also examined the correlates of this classification and found the correlates for getting better were the same as getting worse and so the transient classification was preferred.

Table 4-6: Latent Transition Results: Probability of endorsing item, given latent transition class membership													
Class Description	**P Good Mental health**	**T Impair**	**T Distress**	**T Poor SRMH + Impair.**	**T Depress. + Impair.**	**T Distress + Good SRMH**	**P Poor SRMH + Impair.**	**P Distress + Good SRMH to Poor MH + Impair**	**P Distress + Good SRMH**	**P Poor SRMH + Impair. to Distress**	**P Distress + Good SRMH to Distress**	**P Severe Distress to Good SRMH**	**P Severe**
Year 1													
SRMH	1.3%	0.0%	0.0%	75.0%	11.6%	44.4%	40.3%	13.0%	8.7%	33.3%	0.0%	37.8%	50.0%
SPD	0.0%	0.0%	0.0%	0.0%	33.6%	88.9%	0.0%	21.7%	18.3%	0.0%	11.1%	75.7%	81.7%
Depression	1.5%	0.0%	0.0%	0.0%	71.0%	83.3%	2.8%	43.5%	39.6%	6.7%	44.4%	86.5%	93.3%
Impairment	5.9%	0.0%	0.0%	18.8%	81.3%	100.0%	29.2%	82.6%	79.1%	46.7%	100.0%	91.9%	96.2%
SRMH	0.6%	0.0%	0.0%	68.8%	11.6%	83.3%	48.6%	0.0%	8.7%	13.3%	0.0%	59.5%	54.8%
SRMH	0.5%	0.0%	0.0%	75.0%	10.3%	44.4%	70.8%	0.0%	6.5%	86.7%	0.0%	59.5%	53.9%
Year 2													
SPD	0.0%	7.5%	91.7%	0.0%	0.0%	0.0%	4.2%	8.7%	14.4%	100.0%	100.0%	0.0%	87.5%
SRMH	0.8%	6.2%	25.0%	0.0%	0.0%	0.0%	62.5%	26.1%	2.2%	60.0%	55.6%	51.4%	53.9%
Depression	1.2%	18.1%	100.0%	0.0%	0.0%	0.0%	16.7%	4.4%	40.0%	100.0%	100.0%	5.4%	95.2%
Impairment	0.0%	96.5%	100.0%	0.0%	0.0%	0.0%	48.6%	21.7%	85.2%	93.3%	100.0%	59.5%	92.3%
SRMH	0.8%	3.1%	19.4%	0.0%	0.0%	0.0%	65.3%	87.0%	1.7%	46.7%	55.6%	59.5%	43.3%
*No**	3,235	227	36	16	155	18	72	23	230	15	9	37	104
Percent	77.4%	5.4%	0.9%	0.4%	3.7%	0.4%	1.7%	0.6%	5.5%	0.4%	0.2%	0.9%	2.5%

*P = persistent; T= transient; SRMH = self-rated mental health; Impair = impairment; SPD= Serious Psychological Distress.*Based On Estimated Posterior Probabilities.*

Table 4.7 provides the descriptive profiles for the latent transition groups. In these bivariate analyses, females compared to males, and young adults with lower income, lower education and poor health were more likely than their counterparts to have more severe and persistent problems. In contrast, age, race and marital status were not related to mental health status.

Table 4-7: Descriptive Characteristics of Latent Transition Groups

	Good MH		Transient		Persistent, Good SRMH		Persistent, Severe		F or Wald Test*
(N = 4,177)	%	SE	%	SE	%	SE	%	SE	
Age	23.4	0.6	23.1	0.1	23.2	0.2	23.4	0.2	0.154
Female	58.3	1.1	72.7	2.8	76.0	3.6	71.6	3.5	0.000
Race									0.583
White	65.5	1.2	62.8	2.9	66.6	3.5	59.7	3.8	
Black non-Hispanic	12.7	0.8	12.9	1.8	10.9	1.9	16.7	2.6	
Hispanic	15.0	0.9	17.8	2.1	15.9	2.7	14.3	2.5	
Other	6.8	0.6	6.5	1.5	6.7	1.8	9.2	2.4	
Single	80.3	0.9	79.3	2.2	84.2	2.6	84.6	2.5	0.250
Poverty (%FPL)									0.000
<125%	24.8	0.9	33.2	2.6	37.3	3.7	47.7	3.7	
125% to 200%	18.6	0.8	20.2	2.3	18.6	2.9	25.3	3.7	
>= 200%	56.7	1.2	46.6	2.8	44.1	4.1	27.0	3.6	
Insurance									0.000
Uninsured full year	20.8	0.9	24.8	2.5	24.2	3.3	23.3	3.3	
Uninsured part year	20.6	0.9	20.9	2.4	26.4	3.3	22.8	3.2	
Public full year	7.2	0.5	10.6	1.5	10.4	2.1	21.6	3.1	
Private full year	51.5	1.2	43.6	3.3	39.1	3.8	32.3	4.0	
Education									0.000
< HS	10.2	0.7	16.5	1.9	18.8	3.1	20.3	2.8	
High school grad	26.9	1.1	30.7	2.7	26.0	3.2	43.2	4.3	
Some college	62.9	1.2	52.7	3.0	55.2	3.9	36.5	4.0	
Student^	21.5	1.0	20.2	2.4	19.3	3.7	13.1	2.8	0.147
Employed	80.2	0.8	79.4	2.1	74.0	3.3	65.9	3.3	0.000
Lost a job^	13.1	0.8	19.2	2.5	14.4	2.8	24.2	3.6	0.000
Poor SRH	5.6	0.5	12.2	1.9	15.4	2.7	27.4	3.4	0.000
Chronic condition^†	33.1	1.1	46.8	3.0	38.2	3.8	64.9	4.0	0.000
Limitation^	11.7	0.8	17.2	2.2	27.9	3.4	48.5	3.7	0.000

*Design-based F-test or adjusted Wald test. FPL =poor/near poor, family income as % of Federal poverty line; SRH = self-rated health; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, and heart disease.

Table 4.8 shows the results from the multinomial logistic regression of mental latent class on the selected covariates. Some general patterns are remarkable.* Overall, there were very few differences between the transient and persistent class. But some differences between those with good mental health and persistent distress. Women were more likely than men to have persistent mental health problems than good mental health (44 percent lower odds), but women were not more likely than men to have to have transient problems). Being single was related to having persistent distress comparing to good mental health over the two years.

Relative to youth at or below 125 percent of FPL, youth above 200 percent of the FPL were more likely to have good mental health rather than persistent problems. Young adults with jobs at the start of the survey were more likely to have good mental health or transient problems compared to persistent problems, while those who lost a job were less likely to have good mental health or moderate persistent problems. Finally, transitions in mental health were strongly associated with physical health status. Poor self-rated health (SRH), having a chronic condition or limitation substantially lowered the odds of being in the group with good mental over the two years compared to having persistent problems. Moreover, having a chronic condition was associated with lower odds of moderate relative to severe persistent problems, and having a limitation was associated with lower odds for any category other than severe persistent distress.

* Results for the sample which included proxy-respondents are provided in the appendix. Differences are as follows: Hispanic and Black youth, and college educated youth were more likely to have good mental health compared to persistent severe distress, and those with part-year public coverage were less likely to have good mental health.

Table 4-8: Multinomial Logistic Regression of Mental Health Groups on Demographic and Health Characteristics						
Reference Group = Persistent Severe (N=239, 5.7%)						
	Good Mental Health (N=3,235)		**Transient (N=452)**		**Persistent, Good SRMH (N=251)**	
	OR	**P-val**	**OR**	**P-val**	**OR**	**P-val**
Age	0.97	0.345	0.96	0.296	0.94	0.224
Female	0.57	**0.006**	1.16	0.551	1.37	0.270
Race (ref = White)	0.95	0.806	0.87	0.593	0.64	0.133
Black non-Hispanic	1.02	0.916	1.15	0.592	0.94	0.833
Hispanic						
Single	0.64	0.059	0.67	0.140	1.15	0.680
Poverty (ref = <125% FPL)						
125% to 200%	0.94	0.817	0.78	0.398	0.75	0.369
>= 200%	2.71	**0.000**	2.2	**0.007**	1.88	0.066
Insurance (ref = full year uninsured)						
Part year uninsured	1.04	0.855	0.84	0.539	1.02	0.935
Public full year	0.90	0.702	0.82	0.497	0.66	0.268
Private full year	0.79	0.380	0.66	0.176	0.64	0.172
Education (ref = < HS)						
High school grad	1.02	0.946	0.74	0.274	0.65	0.200
Some college	1.6	0.079	1.03	0.932	1.21	0.594
Student^	1.43	0.264	1.48	0.300	1.09	0.845
Employed	1.58	**0.027**	1.76	**0.021**	1.20	0.502
Lost a job^	0.51	**0.007**	0.75	0.330	0.56	0.061
Poor SRH	0.37	**0.000**	0.59	**0.045**	0.79	0.417
Chronic condition^†	0.37	**0.000**	0.64	0.068	0.37	**0.000**
Limitation^	0.24	**0.000**	0.27	**0.000**	0.54	**0.010**
Percent	77.4%		12.5%		6.0%	

MH = mental health; SRH = self-rate health. FPL =family income as % of Federal poverty line; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, heart disease.

Research Question 2

a) What are the patterns of mental and general health care utilization over a two-year period?
b) How do patterns of health care utilization vary by mental health pattern?
c) How do patterns of health care utilization vary by social group and health status characteristics?

The second aim of this study was to identify subgroups of youth with different types of health care use, characterize the socio-demographic and mental health status of each subgroup, and examine the extent to which young adults with mental health problems received mental health care. As with Research Question 1, here I used a latent class approach. To identify classes of utilization, I used six measures of counts of health care received over the two years: visits for therapy, prescriptions or refills, mental health care sought from mental health specialists (i.e., psychiatrists, social workers and psychologists) and from other health personnel, and other medical (non-mental health) prescription and ambulatory health care.

Table 4.9 shows the mean and range of values for the sample for types of health care use. The measures are not mutually exclusive. For each measure, the mean is substantially smaller than the standard deviation, suggesting significant variation in use and some very high use. Slightly more young adults received any prescription for mental health (8.9 percent) compared to any therapy (6.3 percent). More young adults visited a general health care provider for mental health care (8.9 percent) compared to a specialist (7.0 percent). However, the mean number of visits was higher in the specialty sector compared to general care, suggesting specialty care was concentrated in a smaller group of users. Overall, about 1 in 7 young adults received any mental health care. The use of other medical care (non-psychiatric care) is much more prevalent. Slightly more than half of the respondents had any prescription (54.5 percent), and about four in five young

adults had an ambulatory visit (82.8 percent). About 16 percent of young adults did not use any health care services.

Table 4-9: Summary Measures of Mental Health and Other Medical Care

Type of event	Mean events	SD	Range	% 1+ events
Mental Health Care				
Mental Health RX				
Specialty	0.3	2.0	0 to 41	2.8
General	0.3	2.6	0 to 94	5.3
Only RX^ (refills)	0.6	3.1	0 to 140	8.4
Any RX	0.8	0.9	0 to 140	8.9
Mental Health Therapy				
Specialty	0.7	4.9	0 to 240	5.4
General	0.2	2.7	0 to 112	1.9
Only therapy	0.7	4.8	0 to 233	5.7
Any therapy	0.8	5.8	0 to 240	6.3
Therapy and RX	1.3	1.9	0 to 290	4.1
Any specialty care	1.0	6.1	0 to 247	7.0
Any general care	0.6	4.3	0 to 146	8.9
Any mental health care	2.3	9.6	0 to 290	14.8
General Medical Care				
Ambulatory visit, no RX	5.6	8.2	0 to 230	76.4
Ambulatory visit + RX	6.5	2.3	0 to 188	54.5
Only RX (refill)	3.8	7.0	0 to 107	46.0
Any medical care	12.0	3.3	0 to 285	82.8
Any Health Care	14.2	4.2	0 to 294	83.6

Notes: RX = prescription; ^includes ambulatory visits for mental health care for which there was no therapy but a mental health medication was prescribed. Specialty mental health care includes office-based and hospital outpatient visits; general mental health includes office-based and hospital outpatient, and emergency room visits. Any mental health care includes visits for prescriptions, therapy, both and visits that did not have prescriptions or therapy (some other care was received).

Table 4.10 reports selected health care measures for the latent mental health classes. Young adults with poor mental health have higher levels of both mental and non-mental health care. The range and the standard deviation of each type of use increases with severity. Young adults with persistent, moderate problems (persistent

problems, but good SRMH) use mental health care at much lower rates than those with severe persistent problems (Class 4), but still had about twice as many visits compared to those with transient problems (Class 2). For example, the mean number of mental health prescriptions is more than five times lower for Class 3 ($x = 1.1$) compared to Class 4 ($x = 5.9$), but not different from Class 2 (x =1.0). The mean number of specialty care visits for Class 3 is almost twice that compared to Class 2 (x =2.5 compared to 1.3) , but more than 3 times lower than Class 4 ($x = 8.3$). In each mental health class, there are some young adults who have no use of any health care. However, for the three groups with any problems (the persistent severe, persistent moderate, and transient), 42.2 percent, 61.1 percent, and 76.3 percent do not receive any mental health care, respectively.

Not only does mental health care increase with severity, so does medical care for other conditions. Overall, there were a total of 3,072 visits that included therapy, 52.0 percent of which were provided to the most group with persistent problems. Young adults with good mental health received just under one-third of all therapy (28.6 percent), which reflects the larger size of this class. Just 8.7 percent of all therapy was provided to the class with persistent, moderate problems. Overall, the sample received 2,963 prescriptions for mental health: 48.1 percent went to the most severe group, while 32.0 percent went to young adults with good mental health, and 7.8 percent to the group with persistent moderate problems. A similar pattern was observed for any mental health care: 45.1 percent, 30.8 percent and 10.3 percent, respectively for persistent severe, good mental health, and persistent moderate classes.

Table 4-10 : Mean Number of Visits, Standard Deviation and Percent with Any Use, by Mental Health Class

		Mental health care						Medical care		
		Therapy	**Any RX**	**Any Therapy+ RX**	**Any Specialty**	**Any General**	**Any mental health**	**Any RX**	**Any medical**	**Any health care**
Good Mental Health (Class 1)	*Mean*	0.3	0.3	0.4	0.4	0.3	1.0	6.0	11.2	12.2
	SD	0.6	0.5	0.7	0.6	0.5	1.0	2.1	2.9	3.3
	1 + visits	3.4%	5.1%	1.7%	3.5%	5.2%	9.1%	52.5%	81.8%	82.3%
Transient (Class 2)	*Mean*	0.8	1.0	1.9	1.3	0.8	2.9	6.4	12.2	15.1
	SD	0.9	0.8	1.9	1.5	0.6	2.0	1.9	3.4	4.2
	1 + visits	10.1%	14.6%	7.4%	11.2%	15.4%	23.7%	59.5%	83.2%	84.9%
Persistent, Moderate (Class 3)	*Mean*	1.9	1.1	2.6	2.5	1.5	4.9	9.2	16.3	21.3
	SD	1.5	0.7	1.7	1.7	0.9	2.2	4.3	5.8	6.3
	1 + visits	15.3%	22.1%	12.1%	20.6%	24.8%	38.9%	60.9%	88.7%	90.0%
Persistent Severe (Class 4)	*Mean*	7.0	5.9	12.1	8.3	4.3	16.4	10.7	18.5	35.0
	SD	4.7	3.0	6.8	4.5	3.4	7.1	3.1	4.2	9.2
	1 + visits	32.0%	42.3%	24.2%	37.1%	34.1%	57.8%	68.3%	90.1%	94.1%

RX = prescription; SRMH = self-rated mental health.

Among young adults with persistent problems, 32.2 percent received a prescription for mental health and 23.6 percent had any psychotherapy.[*] Among young adults with persistent problems, more visits were made to specialists, but about the same percent of these youth had at least one visit to a general health professional for mental health care. In contrast, young adults with good mental health received 72.3 percent of all non-psychiatric visits for medical care, those with transient problems received 11.3 percent, while those with persistent problems but good SRMH and severe problems received 7.3 percent and 9.1 percent respectively.

Table 4.11 reports treatment modality by mental health status. For the three groups with any mental health problems, the rate of prescription only treatment is between 1.6 and 2.1 times as high as the rate of treatment with therapy only. The rate of treatment through both therapy and prescription is highest among the most severe class (21.3 percent). These data also indicate that those with more severe problems use more mental health care, but nearly 1 in 10 young adults characterized as having good mental health also seek mental health care.

Descriptive measures on the type and sector of health was informative for understanding the average use of each type for each mental health group, but it is hard to ascertain how different persons seek different mixtures of services. The aim of this research question was to identify subgroups of youth with different levels and mixtures of health care use, and characterize the socio-demographic and mental health status of each class. Classifying persons by their health care use and the association of use with mental health and other characteristics can inform us as to where and with what frequency young

[*] In comparison, national data indicate 25.5% of young adults age 18 to 25 with any mental illness received a prescription in 2010 and 19.9% received any counseling (HUS, 2013).

adults with mental illness access health care, and what factors are important for mental health care delivery to young adults.

Table 4-11: Mental Health Treatment Modality by Latent Mental Health Class

	Therapy Only	RX Only	Therapy + RX	Any Mental Health Care
Good Mental Health	2.1%	4.0%	0.9%	9.1%
Transient Problems	4.7%	8.0%	5.3%	23.7%
Persistent, Good SRMH	10.6%	17.2%	3.1%	38.9%
Persistent Problems	9.4%	19.3%	21.3%	57.8%

I classified patterns of care using a latent class model. I modeled the total number of each type of health care over the two-year period according to a negative binomial distribution (the negative binomial provided a better fit compared to a zero-inflated Poisson model). Based on previous studies examining typologies of health care use, I estimated models with two, three, four and five classes. Also drawing from previous research, I compared the latent model fit statistics to a mixture regression model to understand if the latent class approach provided a better fit to the data (B'ago d'Uva, 2005).[*] Table 4.12 reports the fit statistics for the latent class and two-part models mixture model.

The five class model provided the best fit according to the SSABIC, but with lower accuracy (based on the entropy measure) then the four class model. Both the four and five-class models identified a class of persons with very low use, a class who only used medical care, a class which used moderate mental health care and other medical

[*] I also tried several variations of finite mixture models but the models failed to converge after more than 20 hours of computation time.

care, and a class which high mental and medical care. However, the 5-class model further separated persons who only used medical care into moderate and high-use classes.

Table 4-12: Model Fit Statistics, Latent Class and Mixture Model for Health Care Use

	BIC	SSABIC	Entropy	LMRT p-val
Negative binomial 5C	50929	50821	0.691	0.000
Negative binomial 4C	50966	50877	0.751	0.000
Negative binomial 3C	51044	50973	0.709	0.000
Negative binomial 2C	51605	51553	0.948	0.000
Zero-inflated Poisson 2C	142570	142503	0.915	0.000
Two-part negative binomial mixture model	52848	52594	NA	NA

C = number of classes; BIC= Bayesian Information Criteria; SSABIC = Sample-Size Adjusted BIC; LMRT= Lo-Mendell-Rubin test statistic. NA= not applicable.

Table 4.13 reports the number of events by the five-class latent health care model. The five classes included: Class 1, which had very low use of any type of healthcare, two classes with mostly other medical (non-psychiatric) health care (Class 2--moderate use, and Class 4-- high use), and two classes who used both mental health and other medical care (Class 3--moderate use, and Class 5-- high use). The mean number of visits and the percent with any visit demonstrate the sharp difference in use for the low, moderate and high classes of users. For example, the class which used moderate amount of mental health care and medical care (Class 3) have 60 percent fewer visits for therapy then the class with high levels of mental and other medical care, and about half as many visits in the general sector for mental health care. Class 3 also has substantially fewer visits for medical care then Class 5. The class which used moderate amounts of other medical care only (Class 2) had an average of 6.5 ambulatory visits in the two-year period, while the high medical only class had about four times as many (24 visits).

Table 4-13: Mean and Range of Utilization Measures, by Latent Health Care Class						
		Low Use (Class 1)	**Moderate Medical Only (Class 2)**	**Moderate Medical + Mental (Class 3)**	**High Medical Only (Class 4)**	**High Medical + Mental (Class 5)**
		N=1,126, 27.0%	N=1,404, 33.6%	N=221, 5.3%	N=1,144, 27.4%	N=282, 6.8%
MENTAL HEALTH CARE						
Any Therapy	*Mean*	0.0	0.0	4.3	0.0	6.6
	SD	0.0	0.0	2.0	0.0	2.8
	1 + visits	0.1%	1.1%	39.2%	0.5%	45.7%
Any RX	*Mean*	0.0	0.0	5.0	0.0	5.8
	SD	0.0	0.0	1.6	0.0	2.0
	1 +	0.0%	0.0%	66.3%	1.6%	62.4%
Any Specialty	*Mean*	0.0	0.0	5.5	0.0	8.4
	SD	0.0	0.0	2.3	0.0	2.7
	1 + visits	0.0%	1.3%	48.1%	0.0%	50.5%
Any General	*Mean*	0.0	0.0	2.9	0.0	5.5
	SD	0.0	0.0	1.5	0.0	2.5
	1 + visits	0.9%	0.0%	52.5%	1.9%	67.6%
MEDICAL CARE						
Any RX	*Mean*	0.6	4.1	4.6	11.8	17.0
	SD	0.6	1.2	1.5	2.6	3.2
	1 +	0.0%	66.1%	46.0%	81.2%	87.8%
Any medical	*Mean*	1.0	6.5	6.3	24.2	30.3
	SD	0.6	1.2	1.5	3.2	4.2
	1 + visits	34.5%	99.9%	82.6%	100.0%	99.8%

Notes: SD standard deviation. RX = prescription. Any RX includes prescriptions received during ambulatory visits and refills.

I then examined cross-tabulations of the classes of use with mental health status to understand how use aligns with need (Table 4.14). Nearly one-third of young adults with persistent severe problems are classified as high users of mental health and other medical care, and 19 percent are classified as moderate users of both mental health and other medical care. However, this leaves 48 percent of young adults with persistent problems with low levels of mental health care, about half of whom are high users of medical care. In contrast, young adults with persistent, moderate mental health problems are most

concentrated in the high medical care only class (30.3 percent), while just over a third (35.3 percent) receive any mental health care. Young adults with transient problems are concentrated in the moderate medical care only class (29.8 percent), and 22.4 percent receive any mental health care. A large proportion of young adults with good mental health are also in the moderate medical care only class (37.1 percent) and nearly 8 percent are in the classes with moderate or higher mental health care use.

Table 4-14: Mental Health Status by Latent Health Care Use Class

		Low use	Moderate Medical Only	Moderate Medical + Mental	High Medical Only	High Medical + Mental
Good Mental Health	*Row%*	27.0	37.1	3.5	28.1	4.4
	Col %	86.4	85.7	47.9	79.8	47.2
	Num	939	1,174	95	906	121
Transient	*Row%*	20.8	29.8	11.3	27.1	11.1
	Col %	8.6	8.9	20.0	9.9	15.3
	Num	115	128	44	117	47
Persistent, Moderate	*Row%*	11.8	22.5	15.4	30.3	19.9
	Col %	2.5	3.5	14.3	5.8	14.4
	Num	39	64	29	70	36
Persistent, Severe	*Row%*	11.7	12.6	19.4	23.9	32.3
	Col %	2.5	1.9	17.8	4.5	23.1
	Num	33	38	53	51	72

Several conclusions from these tables are noted. First, the latent class models indicate that about 70 percent of young adults with any mental health problems do not use any mental health services. The rate of low-use of mental health care varies by severity, from 48 percent in the class with severe problems to 78 percent in the class with transient problems. Second, the mean number of ambulatory visits and prescriptions for mental health were low, even for the class described as high use. The high use class had 6.6 visits for therapy and 5.5 prescriptions over the two years. Lastly, about 46 percent of

young adults with persistent problems (severe or with persistent with good SRMH) seek only medical care, suggesting variation in the barriers to mental health care is different from entry into other medical care.

Correlates of Use

The next aim of the analysis was to characterize these patterns of health care use by socio-demographic, physical and mental health characteristics. I first examined descriptive characteristics of each class and then used a multinomial regression of the latent use classes on the selected characteristics (the same covariates as in the first research question) to understand the independent effect of each characteristic on class membership. I used the group with low-health care use as the reference group to understand characteristics that distinguished each type of use relative to low-use. For characteristics that were significantly associated with health care use, I examined whether pair-wise comparisons for each class type (e.g., whether the characteristic was associated with moderate compared to high mental health care use).

As shown in Table 4.15, 57.6 percent of the class with moderate mental health care use were young adult women, and women accounted for 83.5 percent of class with high mental health care use. Utilization varies significantly by race, with the largest proportion of Black and Hispanic young adults in the low-use class. Single young adults were also most concentrated in the low use class. Young adults in poverty (<125 percent FPL) and those covered by public coverage were most concentrated in the class with moderate mental health care use, while uninsured and less educated young adults made up a larger percent of the low-use class relative to the other classes. Employed young

adults were more likely to use medical care only compared to unemployed persons. The classes with moderate and high mental health care and high other medical care only had about twice the proportion of young adults with poor health, conditions and limitations compared to the low use group.

Table 4-15: Demographic and Health Characteristics of Latent Health Care Use Classes

	Low use (N=1,126)		**Moderate Medical Only** (N=1,404)		**Moderate Medical + Mental** (N=221)		**High Medical Only** (N=1,144)		**High Medical + Mental** (N=282)		**F-test Adj. Wald** †
	%	SE	%	SE	%	SE	%	SE	%	SE	
Age (mean yrs)	23.4	0.1	23.3	0.1	23.0	0.2	23.5	0.1	23.7	0.2	0.112
Female	33.7	1.7	57.1	1.7	57.6	4.4	86.2	1.3	83.5	2.6	0.000
Race											0.000
White	56.8	2.0	69.5	1.6	76.8	3.5	75.4	1.5	85.3	2.1	
Black	19.3	1.4	14.8	1.2	7.1	2.0	11.4	1.1	5.9	1.3	
Hispanic	23.9	1.8	15.7	1.2	16.2	2.9	13.2	1.2	8.8	1.9	
Single	86.4	1.1	83.6	1.2	82.0	3.0	70.6	1.8	84.3	2.1	0.000
Poverty (% of FPL)											0.003
<125%	29.4	1.7	25.4	1.4	38.8	3.8	25.6	1.6	29.3	3.3	
125% to 200%	21.9	1.6	17.8	1.3	14.9	3.0	18.7	1.5	20.8	2.9	
200% +	48.7	1.8	56.8	1.7	46.3	3.8	55.7	1.9	49.9	3.8	
Insurance											0.000
Unins. full year	40.3	1.8	19.2	1.4	23.7	3.7	10.6	1.2	9.4	2.0	
Unins. part year	19.1	1.5	23.0	1.4	20.6	3.4	26.6	1.5	26.0	2.9	
Public full-year	4.3	0.6	6.8	0.7	11.1	2.2	10.3	1.1	15.0	2.2	
Private full-year	36.4	1.8	51.1	1.8	44.6	4.5	52.5	1.9	49.6	3.4	
Education											0.000
< High school	17.3	1.4	10.0	0.9	14.0	2.5	9.8	0.9	8.9	1.6	
HS grad	34.1	1.9	25.8	1.7	27.5	3.6	26.3	1.7	26.5	2.9	
Any college	48.6	2.0	64.3	1.8	58.5	4.1	63.9	1.9	64.7	3.2	
Student^	18.6	1.5	23.3	1.5	26.0	3.7	18.9	1.6	20.2	2.9	0.066
Employed	79.5	1.4	80.5	1.2	71.1	3.6	79.2	1.4	75.3	3.0	0.043
Lost Job^	14.8	1.3	14.3	1.3	16.8	3.0	13.8	1.2	14.2	2.7	0.900
Poor SRH	5.8	0.8	6.4	0.8	10.8	2.5	9.6	1.0	13.7	2.1	0.000
Chronic cond. †	24.9	1.6	33.4	1.6	44.4	4.4	44.2	1.8	53.6	3.5	0.000
Any limitation^	9.2	1.0	13.6	1.3	21.4	3.2	16.9	1.4	30.3	3.1	0.000

*Design-based F-test or adjusted Wald test. FPL = percent of federal poverty line; Unins. = uninsured SRH = self-rated health; ^ =any time during year 1; Chronic medical cond. = chronic medical condition. † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, and heart disease.

To test for differences across classes on these characteristics, I used multinomial regression (Table 4.16). Women were much more likely to be in any of the classes of health care use compared to men. Indeed, women had 12.3 times the odds of using high levels of mental & other medical care compared to men. Single young adults compared to married young adults were less likely to be high users of medical care only compared to low-users of health care.

Compared to White young adults, Black and Hispanic young adults had lower odds of using any type of moderate or high level of health care relative to low-use. Black young adults were more likely to use moderate levels of other medical care only compared to high levels of other medical care only, and moderate or high mental health care use. Hispanics were also more likely to use moderate levels of other health care only, rather than use only high other medical care, and more likely to use only high other medical care relative to high mental health care use.

In contrast to race/ethnicity, poverty status was only associated with mental health care use for those with severe problems. Insurance, however, was strongly associated with using services. Young adults without insurance for the first full year of the study were much less likely to use any type of health services compared to young adults who were only uninsured part of the year or who had public or private insurance coverage for the full year. Coverage for part of the year conferred significant advantages to health care use: young adults with part-year insurance were more likely to be in the classes with *high* levels of other medical care only and the class with high mental and other medical care only compared to the moderate use classes. A similar pattern was found for young adults with public and private coverage: young adults with either public

or private coverage were more likely to have high use of other medical care only or high mental health care use, compared to moderate other medical care only, *and* compared to moderate mental care. The effect of type of insurance coverage was not significantly different within each health care group.

Young adults with any college level education were more likely to be in each of the health care groups rather than in the low-use group. Having any college education increased the odds for using high mental health care and other medical care, relative to using other medical care only (OR=1.5, p =049).

Poor self-rated health (SRH) was only associated with an increased odds for using high other medical care (OR = 1.7, p=.017). In contrast, both chronic physical conditions and limitations were associated with mental health care seeking: young adults with chronic conditions and limitations were more likely to use each type of health service outcome, rather than a low-use of services, and those with chronic conditions were more likely to use high levels of mental and other medical services and high levels of other medical services only, relative to moderate other medical services only.

Finally, but perhaps most importantly, young adults with persistent, severe mental health problems were more likely than young adults with good mental health and transient problems to use moderate and high levels of mental and medical care, in contrast to low-use of services, or moderate use of other medical care. Young adults with persistent severe problems were also more likely to use high levels of other medical care compared to young adults in good mental health.

Table 4-16: Multinomial Regression of Health Care Use Class on Selected Characteristics

Reference = Low-Use	Medical Only		Moderate medical + mental		High medical only		High medical + mental	
	OR	**p**	**OR**	**P**	**OR**	**p**	**OR**	**p**
Age	1.0	0.511	1.0	0.423	1.0	0.182	1.1	0.081
Female	3.1	**0.000**	2.5	**0.000**	15.3	**0.000**	12.3	**0.000**
Race (ref = White)								
Black	0.6	**0.000**	0.2	**0.000**	0.3	**0.000**	0.1	**0.000**
Hispanic	0.7	**0.002**	0.5	**0.019**	0.5	**0.000**	0.3	**0.000**
Single	1.0	0.899	0.7	0.212	0.6	**0.008**	1.5	0.127
Poverty (ref = <125% FPL)								
125% to 200%	1.2	0.260	0.7	0.334	1.2	0.319	1.3	0.324
200% +	1.3	0.116	0.9	0.569	1.3	0.178	1.3	0.368
Insurance (ref = full year uninsured)								
Part year uninsured	2.2	**0.000**	1.7	0.100	4.6	**0.000**	5.6	**0.000**
Public full-year	2.8	**0.000**	3.7	**0.000**	6.7	**0.000**	10.8	**0.000**
Private full-year	2.3	**0.000**	2.5	**0.003**	4.7	**0.000**	6.5	**0.000**
Education (ref = < HS)								
High school grad	1.1	0.574	1.2	0.627	1.2	0.257	1.5	0.155
Some college	1.9	**0.000**	2.4	**0.002**	2.4	**0.000**	3.6	**0.000**
Student^	1.1	0.561	1.4	0.275	0.9	0.432	1.2	0.474
Employed	0.9	0.372	0.6	0.080	0.9	0.502	0.7	0.114
Lost a job^	1.3	0.205	1.5	0.201	1.2	0.261	1.4	0.244
Poor SRH	1.4	0.085	1.4	0.311	1.7	**0.017**	1.4	0.252
Chronic condition^†	1.6	**0.000**	2.0	**0.003**	2.8	**0.000**	2.9	**0.000**
Limitation^	1.5	**0.014**	1.4	0.144	1.7	**0.004**	2.4	**0.001**
Mental Health Class (ref = persistent severe)								
Good MH	1.6	0.208	0.1	**0.000**	0.7	0.308	0.1	**0.000**
Transient	1.5	0.278	0.4	**0.013**	0.6	0.270	0.2	**0.000**
Persistent, moderate	1.9	0.133	0.9	0.887	1.4	0.493	0.6	0.292

MH = mental health; SRH = self-rate health. FPL =family income as % of Federal poverty line; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, heart disease.

Young adults with persistent, moderate problems were more likely to use moderate or high other medical care only than to use high mental health care, compared to young adults with persistent, severe problems. But the persistent severe group did not have higher odds for high mental health care use, relative to moderate mental health care use, compared to those with persistent moderate problems.

To better understand if the effects of the socio-demographic and SES characteristics were different *within* each mental health class, subgroup analyses were performed. Because of small sample sizes, poverty was combined into a dichotomous variable (<200 percent FPL versus >=200 percent FPL), insurance was regrouped into 3 categories (any uninsurance, full year public, full year private), education was dichotomized (any college vs. no college) and persons classified as other race/ethnicity were excluded from the analysis. I used regression models to examine two outcomes: a multinomial regression for a three-category outcome of low-use, medical care only and any mental health care (Table 4.17), and a logit regression for a dichotomous outcome of any mental health care (Table 4.18). For the model with the three-category outcome, the two persistent classes were combined into one class. This allowed for sufficient sample size to examine if persistent mental health problems were predictive of any health care use or any mental health care relative to low-use.

These subgroup analyses were largely consistent with the overall findings, with some exceptions. The discussion here is confined mainly to notable results for three groups of young adults with any mental health problems (transient, persistent with good SRMH, and persistent severe). Within each mental health subgroup, women were more likely to seek mental health care. As with the main findings, marital status had no influence on mental health care use within each mental health subgroup. Black or Hispanic young adults with persistent problems but good SRMH had much lower odds of seeking mental health care relative to low-use, compared to Whites (OR= 0.4, p =.017). Poverty (being above 200 percent FPL) had was not related on health care seeking for both mental health groups.

Insurance was substantially and positively related to medical care and to a larger extent, mental health care. Among young adults with transient problems, those covered by were substantially more likely to use mental health care compared to their peers who experienced any uninsurance (OR =3.5, p=.038 for public coverage and OR =7.7, p=0.000 for private coverage). There was no statistical difference in the size of the odds ratios by insurance type (i.e., the odds ratios of 3.5 and 7.7 are not statistically different). For young adults with persistent problems, public insurance was associated with 2.9 and 7.9 times the odds for medical care and mental health care respectively. Young adults with private coverage had 4.4 and 5.4 times the odds of medical and mental health care respectively. There was also no statistical difference in the odds ratios by insurance type, and no statistical difference in the odds ratios for medical and mental health care within each insurance type.

Among young adults with persistent problems, those with higher education (any college) or who were students during the first year were much more likely to use any mental health care compared to their peers without any college (OR =2.2, p=0.046 and 11.0, p= 0.012, respectively). Among young adults with transient problems, those with chronic physical conditions were twice as likely to use mental health care (OR =2.2, p =0.027).

Table 4.18 further simplifies the subgroup analysis into predictors of any mental health care use compared to low-use or other medical care only. As with the previous table, women are more likely to use any mental health care, but only for the class with good mental health. Black and Hispanic youth were less likely to have any mental health care for both persistent classes. In contrast to the previous analyses which combined the

persistent classes, being above the poverty line was associated with mental health care use for those with persistent severe problems, which was not revealed when the two groups with persistent problems were combined. Also different from Table 4.17, for young adults with persistent problems, public insurance was related to mental health care use but not private coverage. Health conditions were mostly not related to mental health care use, within each mental health sub-group.

To summarize the findings for young adults with persistent severe problems, Figure 3 shows the predicted probability of seeking care among those with persistent severe problems by race, insurance and poverty (factors significantly associated with mental health care in the subgroup analysis).

Figure 3: Predicted Probability of Receiving Any Mental Health Care Among Young Adults with Persistent, Severe Mental Health Problems

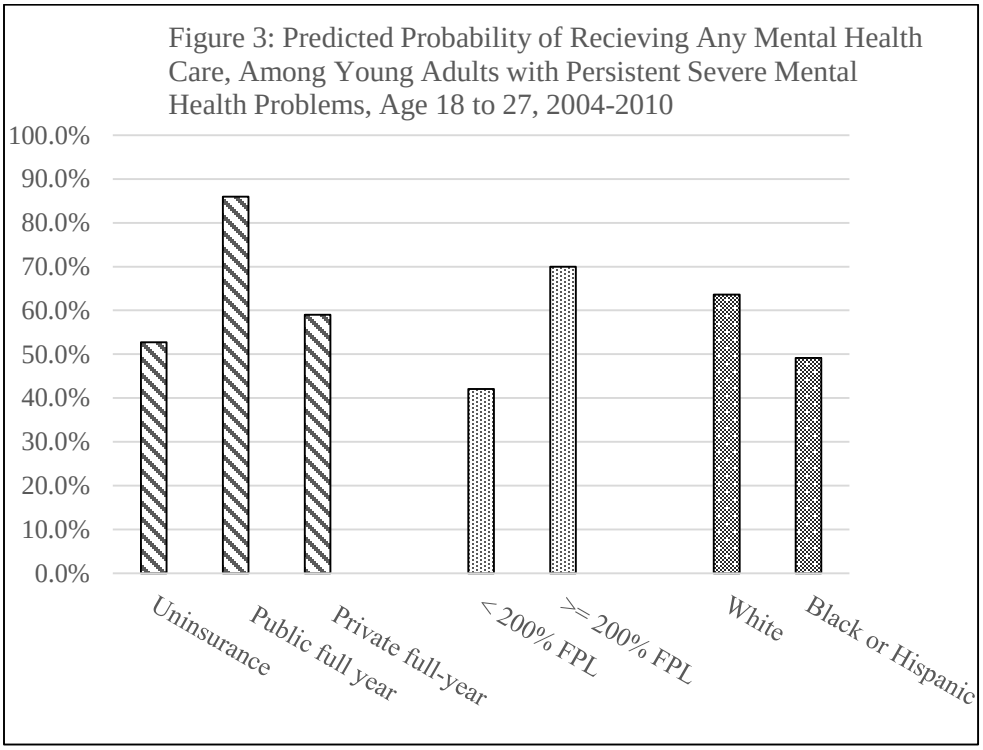


Table 4-17: Multinomial Regression of Health Care Use on Demographic and Health Characteristics by Mental Health Subgroup

	Good Mental Health				Transient				Persistent			
	Medical Care Only		Any Mental Health Care		Medical Care Only		Any Mental Health Care		Medical Care Only		Any Mental Health Care	
	OR	p	OR	p	OR	p	OR	p	OR	p	OR	p
Age	1.0	0.064	1.0	0.630	1.0	0.580	1.0	0.831	1.0	0.863	1.1	0.176
Female	5.6	**0.000**	6.3	**0.000**	6.4	**0.000**	3.4	**0.020**	3.6	**0.001**	3.4	**0.006**
Race (ref = non-White)	0.5	**0.000**	0.2	**0.000**	0.6	0.094	0.5	0.141	1.0	0.990	0.4	**0.017**
Single (ref = married)	0.8	0.146	1.3	0.309	0.7	0.348	0.7	0.523	1.0	0.998	1.0	0.944
Poverty (ref = <200% FPL)	1.2	0.063	1.0	0.904	1.0	0.984	1.0	0.990	0.8	0.574	1.0	0.973
Insurance (ref = any uninsurance)												
Public full year	2.6	**0.000**	1.7	0.099	1.1	0.849	3.5	**0.038**	2.9	**0.052**	7.9	**0.000**
Private full-year	1.6	**0.001**	1.6	**0.045**	4.4	**0.000**	7.7	**0.000**	4.4	**0.010**	5.4	**0.005**
Any college	2.1	**0.000**	2.7	**0.000**	2.1	**0.052**	2.0	0.104	1.8	0.135	2.2	**0.046**
Student^	1.0	0.805	1.0	**0.994**	1.3	0.516	1.5	0.512	4.5	0.102	11.0	**0.012**
Employed	0.9	0.505	0.5	**0.013**	1.4	0.428	1.3	0.630	0.8	0.558	0.7	0.501
Lost a job^	1.3	0.118	1.5	0.211	1.3	0.583	1.5	0.412	1.4	0.422	1.7	0.268
Poor SRH	1.5	0.094	1.3	0.516	2.2	0.145	2.0	0.282	1.4	0.445	1.5	0.414
Chronic cond.^†	1.9	**0.000**	2.1	**0.000**	2.3	**0.011**	4.2	**0.000**	1.4	0.397	1.5	0.307
Limitation^	1.9	**0.001**	2.2	**0.002**	1.9	0.224	1.7	0.359	0.7	0.283	1.1	0.758

FPL =poor/near poor, family income as of Federal poverty line; SRH = self-rated health; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, and heart disease.

Table 4-18: Logistic Regression for Any Mental Health Care by Mental Health Subgroup

	Good Mental Health		Transient		Persistent, moderate		Persistent, severe	
	OR	**p**	**OR**	**p**	**OR**	**p**	**OR**	**p**
Age	1.0	0.720	1.0	0.823	1.2	**0.038**	1.0	0.715
Female	1.7	**0.014**	0.8	0.625	1.1	0.834	1.6	0.296
Race (ref= non-White)	0.3	**0.000**	0.8	0.488	0.2	**0.004**	0.4	**0.046**
Single (ref = married)	1.6	0.058	1.0	0.974	0.7	0.454	1.2	0.659
Poverty (ref = <200% FPL)	0.8	0.318	1.0	0.971	0.5	0.119	4.2	**0.003**
Insurance (ref = any uninsurance)								
Public full year	0.8	0.457	3.3	**0.005**	0.7	0.606	7.7	**0.000**
Private full-year	1.1	0.607	2.4	**0.044**	1.2	0.775	1.5	0.405
Any college	1.6	**0.032**	1.1	0.771	1.2	0.666	1.5	0.329
Student^	1.0	0.889	1.2	0.738	4.9	**0.011**	1.7	0.386
Employed	0.6	**0.015**	1.0	0.970	1.9	0.178	0.6	0.298
Lost a job^	1.2	0.468	1.2	0.583	0.8	0.733	1.4	0.446
Poor SRH	0.9	0.872	1.1	0.839	0.6	0.262	1.3	0.501
Chronic med. Cond.^†	1.3	0.182	2.2	**0.027**	1.5	0.292	0.5	0.076
Limitation^	1.3	0.204	1.0	0.918	1.3	0.538	1.3	0.558

MH = mental health; SRH = self-rate health. FPL =family income as % of Federal poverty line; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, heart disease.

Chapter 5 Discussion

This study contributes to our understanding of the persistence of mental health problems among young adults living in the community, and to what extent young adults access to mental health and other medical health care. Identifying young people who are likely to remain in poor mental health is important because of the critical timing of the problem in their lives: young adulthood is a critical time for decision making regarding role and lifestyle choices and for role transitions in employment and social relationships. By using young adults living in the community, rather than a care-seeking or patient population, I was able to study the mental health and health care of young adults who have not been diagnosed with a problem and are not currently in treatment. By using multiple dimensions of mental health, my findings provide a different, perhaps complimentary, analysis to research that examines change in one disorder over time. Examining use of mental and other medical care among youth with mental health problems provides a better glimpse as to care-seeking patterns for this demographic compared to examining only mental health care use.

For both research questions, I used a model-based (latent class) approach, rather than pre-supposed (hypothetical) classifications. A benefit of the model-based approach compared to a hypothetical construction is that the latent class approach is a data-driven classification which relies less on assumptions (which may vary from researcher to researcher) about how to categorize individuals, and the model-based approach may also identify new groups that are subjectively unforeseen. For research question one, this method revealed a group of young adults with persistent distress or impairment but good SRMH (labeled persistent, moderate in this study). This group of young adults had fewer

physical conditions and limitations, and lower use of both mental and physical health care, compared to young adults with persistent distress and poor SRMH. There may be no one right way to classify youth, but the latent transition analysis was useful for understanding change over time in mental health, and provided results that engender further study as to how individuals perceive and seek help for mental health problems. For research question two, the latent class approach distinguished groups with meaningful levels of moderate and high health and mental health care use.

The goal of research question one was to identify young adults who were at risk for persistently poor mental health. Over the two years, 29.9 percent of young people experience at least one dimension of poor mental health; 11.7 percent had persistent symptoms. And about half of these young adults with persistent problems rated their own mental health as good or better. The second focus of this dissertation was on use of health services. Principal among these findings was that some young adults with persistently poor mental health lacked mental health care but received high levels of medical care. There were also sharp differences in mental and medical care for young adults with persistent problems but good SRMH and those poor SRMH.

In addition to classifying youth into types of mental health and health care groups, a key question was which socio-economic and health factors were associated with persistently poor mental health and low use of mental and other medical services. I used regression analyses to examine the socio-economic and health status correlates of classes to understand how these factors influenced mental health problems and barriers to use. Previous empirical research has shown that social status and socio-economic disadvantage adversely affects mental health and access to health care.[242–244] Other

research indicates that poor health and disability are related to poor mental health and barriers to health care.[113,144,245] Some of my findings depart from this body of work, but I also find some consistencies. In my analyses, several socio-economic characteristics, including race, education, and insurance coverage were not predictive of persistent, severe mental health problems (compared to remaining in good mental health or transient problems), but in contrast, these factors were highly correlated the mental health care use. Other factors, such as poverty, employment and poor physical health were positively associated with poor mental health, but unrelated to health care use when controlling for other socio-economic characteristics.

Despite some difficulty in comparing the results of this study with previous work due to differences in measurement, my findings are similar to other national data. In the National Comorbidity Survey-Replication (NCS-R), around 32 percent of young adults age 18 to 26 met the criteria for having a mental disorder, including substance abuse (GAO, 2008). As another example, Broman (2012), using data from the National Longitudinal Survey of Adolescent Health (Add Health) 2001-2003, found about 11 percent of young adults age 18 to 24 reported depressive symptoms (CES-D) in the past year, which is slightly higher than my cross-sectional estimate of about 8.4 percent who had any distress or depression (Broman, 2012).

Some differences with previous studies in health care use reflect differences in the types of utilization examined and the period under examination. This study focused on transition age young adults, with specific measures of health care utilization, over a two-year period. Most studies on health care utilization examine adults in general, or specific patient populations (e.g. those with a diagnosis or any treatment), and examine treatment

over a year or shorter time frame. The two-year period in this study aids in understanding the receipt or lack of receipt of health care. For example, in this analysis, 16.4 percent of young adults received no health care over the two years, which is lower than an *annual* estimate from national data of 25.2 percent of young adults (age 18 to 24) (HUS, 2013).

Key Findings

Young adults with persistent problems received the majority of all visits for psychotherapy and prescriptions, in both the general and specialty sector, but more than half (51.6 percent) of these young adults did not receive any mental care. And few young adults with persistent problems likely received adequate care. Using a liberal definition based on the literature (Wang, 2005),[*] only 15.9 percent of young adults received adequate psychotherapy, and 19.2 percent received adequate treatment with medication. While young adults with persistent problems received the highest number of visits for mental health care (56.8 percent of all visits), young adults with good mental health received more visits for mental health than those with transient problems (28.9 of all visits percent compared to 14.3 percent). However, about 85.7 percent of young adults who did receive mental health care received medical care. Together these findings suggest that health care systems need better identification of youth in need of care in non-mental health care settings. The fact that a substantial amount of mental health care is received by young adults in good mental health suggests more research is needed to identify what influences young adults to seek care, and the benefits derived from mental health care use among those in comparatively good mental health.

[*] as receiving either medication (2 prescriptions plus 4 visits to any type of physician) or at least 8 psychotherapy visits. Liberal, since the time period for health care use reflects two years.

Young adults with persistent problems and good SRMH have different physical health characteristics and levels of health care use compared to those with persistent problems and poor SRMH.

Significantly fewer young adults with moderate problems received any mental health care compared to those with severe persistent problems--38.9 percent compared to 57.7 percent. Although the persistent severe class received more mental health care, 70.0 percent remained in poor mental health over the two years, while 36.4 percent of those with moderate problems did so. There were also differences between these groups in the intensity of health care sought in the mental and other medical sector: among those with severe problems, 48.7 percent of all health care visits were for mental health care, compared to 20.6 percent for those with moderate symptoms. While the intensity of mental health care use differed between young adults with persistent moderate problems and those with persistent severe problems, the use of medical care was not significantly different. The more severe group had 4.4 times as many mental health care visits but only 1.2 times as many medical care visits compared to those with moderate symptoms.

Young adult men with mental health problems were much less likely than women to receive mental health care.

Women were more likely than men to have persistent severe problems than good mental health: between 72.7 percent and 76.0 percent of the young adults in each of the three classes with mental health problems were women. However, my analysis also excludes some forms of mental illness more common among men, such as social phobias, attention deficit and hyperactivity disorder (ADHD), and substance abuse.[107,237] These types of mental health problems may be more persistent among men than women.

Women also used much more mental health care—around 70.0 percent of all mental health care visits were by women. Women had 12 times the odds of using high levels of mental health care, controlling for mental health status. However, in the stratified analysis, men with persistent severe problems were not less likely to receive any mental health care relative to other care or no care, but men with moderate persistent problems were less likely. It is possible my measures do not fully capture severity of illness, and if women have more severe illnesses, they may also be more likely to seek care.* However, it may also be that men who have the same levels of need seek much less care, may face prolonged distress or impairment, or use other coping mechanisms.

Why there are gender differences in care-seeking behaviors for individuals with the same level of psychological symptoms is not clear, despite this long-standing situation in U.S. society, and despite the potential for worse outcomes in adulthood for men compared to women.[48,246] Some have suggested that women are more likely to recognize problems as psychological,[247] or have a higher degree of "psychological openness."[248 ,p.575] Gender differences in help-seeking propensities, recognition of problems and willingness to disclose may explain why men are less likely to perceive a need for care.[249] There mixed evidence as to whether men and women have significantly different attitudes in the efficacy of mental healthcare,[174,250] or towards mental illness itself. [251] Men may be more likely to avoid mental health care due to stigma, compared to women, rather than other attitudinal barriers, such as mistrust or negative attitudes towards treatment.[161,252,253]

* Specifically noted by D. McAlpine.

Black and Hispanic young adults were not more likely to have persistent severe problems than White young adults, but had much lower rates of mental health care.

I find race/ethnicity was not related to mental health in young adulthood, consistent with findings from other studies (albeit with varying age demographics).[56,69,254] The lack of association with race may be partly explained by the lack of clinical specificity of symptoms: others have found that non-Whites are less likely to report poor SRMH when they have functional impairment.[164] Other research points to the role of particular positive influences that buffer the effects of adversities or disadvantages faced by Black and Hispanic youth, such as cultural identity, self-esteem,[255,256] and relationships with peers and family members.[257]

While risk of persistent, severe mental health problems did not differ by race or ethnicity, White young adults were more likely to have any mental health care use as well as other medical care compared to Black and Hispanic young adults. Black and Hispanic young adults constituted 22 percent and 25 percent of all young adults with persistent problems respectively, but had 13 percent and 14 percent of all visits, respectively. However, race/ethnicity was not related to using moderate compared to high levels of mental health care among young adults with persistent problems, which suggests that race and culture may be more influential on the entry into care, rather than the amount of services used. In contrast to mental health care, race/ethnicity was not related to using any non-psychiatric medical care compared to low use of health care among young adults with persistent problems, suggesting that the barriers to mental health care experienced by Black and Hispanic youth are different from the barriers to medical care.

Racial/ethnic differences in mental health care use are likely unrelated to differences in perceived need or in attitudes towards care or stigma,[161,174,258,259] with some exceptions.[260] For example, Scott and colleagues (2009) found that African Americans age 18 to 24 had significantly *higher* odds of having a positive attitude towards mental health care as compared to their White peers. Blacks and Hispanics also do not differ from Whites on willingness to seek mental health treatment or perceived need, though this finding is not specifically for young adults.[261]

Black and Hispanic young adults may use less mental health care due to low quality of care,[181,262,263] or low availability of formal and informal mental health care. For example, African Americans with mental illness are more likely to seek care in the public sector compared to the private sector than Whites, independent of income and education.[264] This may be due to barriers such as a lack of culturally appropriate providers or a scarcity of African American providers in the private sector near African American communities.[264] Blacks and Hispanics are less likely to use formal mental health care, independent of income and insurance coverage, indicating other structural barriers related to SES that vary by race/ethnicity.[160,265–267] It may also be due to preferences for care outside the medical sector.

Young adults with any college education did not have worse mental health but used more mental health services than their peers with less education.

I found no relationship between education and mental health among these young adults (consistent with Frye and Liem, 2011), but young adults with any college education were more likely to use mental health care. The lack of variation in education among the mental health subgroups differs from literature and theory which points to the

role of education in conferring resources for buffering stress, such as social networks and self-esteem.[268] Yet education may confer fewer advantages for good mental health during young adulthood compared to later in life, as young adults may find other ways to establish social networks. At the same time, college can bring about many stressors that adversely affect mental health.[129]

Other research (on adults over age 18) suggests that education may be more related to the *stability* of mental health symptoms, rather than the absence of symptoms.[269] However, education may reduce persistent mental health problems by improving access to mental health care. College educated young adults were more likely to seek mental health care than their peers with less education. Others have suggested that a potential benefit of education is a more favorable view towards mental health treatment.[251] Education may also improve the capacity to understand symptoms and navigate health care systems. Caution should be noted in the interpretation of the role of education in mental health care seeking in this study, as others have observed a wide variation in mental health care use among college students.[252,259]

Poverty and employment were related to poor mental health, but young adults with persistent probelms in poverty used fewer mental health services. In contrast, insurance was unrelated to mental health status among young adults but highly related to mental health care and health care.

Young adults in poverty (<125 percent FPL) had 60 percent lower odds of being in good mental health and 50 percent lower odds of having transient symptoms, relative to persistent severe problems, compared to young adults at or above 200 percent the FPL (young adults between 125 percent and 200 percent FPL also had lower odds for good

mental health and transient symptoms compared to young adults with high income). The stratified analysis indicated among young adults with persistent severe problems, those in the upper two quintiles of income were more likely to use any mental health care compared to those below 125 percent FPL. And among young adults with persistent severe problems in poverty, mental health care use is concentrated in 60 percent of this group. About 13 percent of mental health care provided to those with severe problems went to young adults between 125 and 200 percent FPL, who constituted 20 percent of the group with persistent severe problems.[*] That poverty was related to lower use of mental health care use predominantly for young adults with severe problems might reflect financial concerns over copays, as well as other barriers to care that economic disadvantage has, such as lower availability of local providers and less flexible work schedules that allow for health care visits.

While poverty was mostly related to care among those with severe problems, findings from this study highlight the role for insurance as an important means to accessing health care for all young adults. Among all subgroups of young adults with mental health problems, young adults with private insurance had higher odds of medical care and mental health care, and young adults with public insurance had higher odds of mental health care. Substantial disparities were found: among young adults with persistent problems (moderate or severe), 56 percent of young adults had any period of uninsurance, and received just 37 percent of visits, whereas the 44 percent of young

[*] Some cell sizes for covariates (married, >200%FPL, full year insurance, college education, being a student, losing a job, and poor SRH) in the low-use class for the persistent severe mental health group were less than 30 and statistical differences could not be determined.

adults with persistent mental health problems who had insurance received 63 percent of all care, with the majority of these visits going to those with public coverage.

Yet there was also a substantial lack of any mental health care among the insured young adults with persistent (moderate or severe) problems: 33 percent of young adults with public coverage and 46 percent of those with private coverage received no mental health care. In contrast, nearly all of these young adults received medical care: 3 percent and 6 percent received no medical care. This indicates considerable obstacles to mental health care, such as recognizing the need or finding appropriate services, which exist beyond the role of cost.

Employed young adults were more likely to have good mental health or experience transient symptoms compared to their unemployed peers. Employment can confer advantages of social support and income, and provide a person with a social role that is salient of achievement in life. Moreover, young adults with mental health problems may have difficulty getting or keeping a job. But in contrast, and despite the greater burden of mental distress, unemployed young adults did use more mental health care use.[*] This may be due to financial barriers or due to a lack of recognition of need.

Young adults in with chronic (physical) conditions and limitation were much more likely to have persistent severe mental health problems. Compared to young adults with persistent moderate mental health problems (high SRMH), those with severe problems had 1.7 times more chronic physical conditions and limitations than young adults with severe symptoms. Chronic conditions and limitations were related to high

[*] But caution should be noted: this study used a broad measure of employment, which may obscure how occupational class is related to mental health. Lower class jobs may adversely affect mental health over the long-term (Marmot et al., 1997) while good mental health may be required for higher paying, more demanding jobs relative to other occupational classes.

mental health care use, as well as high medical use only, relative to low-use. In contrast, poor self-rated health was not related to use mental health care. Chronic conditions and limitations are more common among less educated and more socio-economically disadvantaged populations,[244,270] and although some aspects of SES were controlled for in the analysis, young adults with poor health face other unmeasured challenges that result in persistent distress.

The direction of the relationship between poor physical health and mental health cannot be ascertained from this analysis—physical health may adversely affect mental well-being, while poor mental health can lead to a decline in health habits, greater risk-taking behaviors and adverse coping mechanisms. Chronic conditions and limitations bring about challenges to mental well-being, while adverse mental health can exacerbate the impact of chronic conditions through poor health habits and social impairment.[144] Nonetheless, Wickrama and colleagues suggest that among young adults, poor mental health likely brings about poor physical health.[50]

Chapter 6 Implications and Conclusion

The transition age can be a pivotal time for reducing the burden of mental health problems. Untreated mental health problems among young adults have serious consequences on human capital formation. For young adults with persistent problems who do not seek care, symptoms may remit without treatment, but they may also worsen over time [61,271] and interfere with care-seeking.[272,273] A concerning possibility is that delayed care-seeking among those with persistent problems can lead to worse outcomes.[274,275] Mental health problems can also lead to substance abuse problems, and the two comorbidities can have cyclical effects on each other.[276]

The significant lack of mental health care use but high rate of medical care use among young adults with persistent mental health problems indicates that young adults face different barriers to mental health care compared to medical care, such as perceived need or the availability of mental health care providers. The use of medical care may be due to higher rates of poor health among those with persistent severe mental health problems. Nonetheless, the lack of mental health care use and continued use of medical care suggests that integrated care could improve health care delivery. It is possible (but speculative) that better mental health care would also improve the treatment of physical health problems and lower the use of medical care.

This study has also shown that despite having elevated rates of psychological distress or impairment, a subgroup of young adults view their own mental health as good or excellent. Compared to their peers with persistent problems who view their mental

health as poor, those with good SRMH were marginally less likely to be in poverty, had significantly fewer any chronic conditions and limitations, and were also less likely to be uninsured.* While good SRMH may be due to better physical health or less poverty, other research has suggested that maintaining a perception of mental well-being confers social advantages.[277,278] SRMH may also reflect the ability to cope with or adapt to distress; an individual may recognize the stress and actively manage or adjust to the burden.[279] Given the differences in health care use, further research should examine what shapes SRMH, and examine the long term mental health and wellbeing of persons with persistent distress but good SRMH.

Poor health was a key predictor of poor mental health and high medical and mental health care use. Public health programs could improve efforts to educate young adults on the link between physical and mental health. For example, in 2004, the CDC outlined a strategy for improving the integration of mental health into chronic disease prevention and primary care, with emphasis on increasing public awareness of the impact of mental health on physical health.[280] In the private sector, work-place wellness programs aimed at reducing chronic diseases could also promote mental health care and awareness of resources for mental health counseling.

The findings also point to the critical role for insurance in the use of mental health care. Recent legislative acts, specifically the Mental Health Parity and Addiction Equity Act of 2008 (MHPAEA) and the Patient Protection and Affordable Care Act of 2010 (ACA), could improve mental health treatment for young adults through the provisions which expand insurance coverage and improve integrated care. The legislation enables

* As indicated by logit regression of being in the severe versus the moderate group on background and health characteristics.

young adults to stay on their parent's insurance coverage until age 26. And young adults in poverty (<133 percent of FPL) may gain access to insurance coverage through Medicaid, while other low-income adults may be provided subsidies, reduced cost-sharing or may be able to purchase more affordable coverage through the state-based health insurance markets (i.e., Exchanges). And although care integration has been a prominent theme in mental health care for more than a decade (notably since the President's *New Freedom Commission on Mental Health* in 2003), new initiatives in the Affordable Care Act have ushered forth funding for expansion and evaluation of accountable care organizations (ACOs) and the co-location of health and social services. ACOs and other policies which facilitate the integration of behavioral health care with other medical care may help young adults with persistent problems who only seek medical care gain entry into mental health care. The ACA also ensures that health plans participating in the Exchanges must provide mental health care as well as substance abuse treatment.[281]

However, the integration of care is not easily accomplished, and there is not a strong evidence base for the benefits (e.g., which patients benefit and how much better do they fare).[282] A principal challenge among the barriers to integration is the lack of capacity for adequate and timely financial reimbursement for mental health services delivered in primary care. Alongside barriers in financial systems, cultural changes are needed, such as adjustments in work style that encourage mental health professionals to practice in primary care settings.[283] Nonetheless, health care organizations are developing and testing models, encouraged by funding initiatives in the ACA.[284,285] Other aspects of health care reform, such as support for the collaboration of community-based providers to

work with general medical organizations and the use of electronic medical records in care delivery, may also improve coordination of care between providers.[286]

There is also a need for better identification of mental illness among those seeking medical care. Because 85.7 percent young adults with persistent mental health problems who didn't receive any mental health received some medical care, screening for disorders outside the mental health services sector may seem to be a sensible approach to detecting young adults who are in need of mental health services. However, currently screening is not a promising direction for improving the delivery of care. Screening is currently recommended by the U.S. Task for depression only in managed care systems that have the capacity for the management of patient follow-up.[287] And there no evidence that screening provides benefits that outweigh the costs. The benefits are the number of patients identified and treated with improved outcomes compared to usual care. Costs include added resources in primary care, high rates of false positives, referrals for non-severe problems (which reduces resources for patients with severe problems), and the adverse effects of labeling patients with mental health problems when this may not be so. Nonetheless, with the expansion of collaborative care models, effective screening programs can be implemented. More research that is specifically targeted at young adults is needed to evaluate how to effectively screen and treat young adults.[288]

Besides screening, other public health approaches that prompt young adults to seek care can be developed. For example, aside from screening scales, asking young adults as to their perceived need has shown to be useful, valid indication a mental illness,[132] and is an approach that may tap into unperceived mental health issues. It is important to understand what motivates and sustains care seeking among this age group,

and how interventions can address factors that discourage seeking, such as perceived need, stigma, reliance on self-recovery, the acceptability of health care professionals and other barriers to care among young adult[s.289,*] Public health programs can also do more to engage young adults in interventions that shape attitudes toward mental health care, and here too, there is a need for an evidence base for what targets of interventions work best among young adults.[290]

Treatment alone does not always reduce mental disorder or symptoms. Other factors, particularly substance use, violence, and community disorganization, influence recovery.[291,292] Alongside health care delivery systems, social policies have significant roles in providing other supports to young adults, such as affordable housing, vocational training, and substance abuse treatment.[293] For example, holistic approaches for mental health care, such as those that include vocational programs and housing supports, have demonstrated better outcomes to those which provide treatment alone.[294]

Treatment is also one approach to reducing mental health problems; the public health care system can also address ways to prevent the onset of problems. Protective factors can improve the capacity to respond to mental distress. For example, coping skills (cognitive and behavioral strategies) can help an individual manage stressors.[295–297] Strategies to promote mental health could help prevent some young adults with less moderate or transient problems from developing more severe problems.[298] To this end, public health interventions can incorporate concepts from the life-course perspective on the unique aspects of young adulthood that bring about challenges to mental health. For example, support from other adults and mentors can help young adults navigate the many

[*] However, this study included data from other countries with different financing arrangements for mental health care, which may partly explain why cost was not a prominent reason.

role transitions during this period which may be sources of distress. More research is needed to understand the coping mechanisms that are salient for the transition age and which engender sustained mental health.[299]

Conclusion

Many young adults encounter a temporary loss of mental well-being, which they may experience as a decline in happiness, a loss of optimism, or anxiety. Schulenberg et al., describe that depression during the transition age may occur in response to *"difficulties in the active engagement with the new contexts of early adulthood in a continuation of identity formation, perhaps serving as a mechanism for self-examination and self-change."* [10(p803)] In this sense, a transient absence of a sense of mental health may have a developmental function, if it is contextual and temporary. But some young adults experience persistent hopelessness or social impairment.

Young adults who experience mental health problems should have access to mental health services that are effective. And since many young adults with persistent mental health problems will only access general medical care, mental health care should be integrated across health care settings. Severity, rather than demographic or other socially structured factors, should be the determining factor for mental health care. Findings here point to the role of gender, poverty and physical health in shaping mental health, while race/ethnicity, employment and insurance affect the receipt of care. For many young adults who experience mental health problems, recovery is possible, while foregone care can have individual and collective consequences. The health care system should continue to improve entry into treatment among young adults so they can achieve their optimal selves.

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Appendices

Appendix A: Supplemental Analysis on Self-Respondents

Table A3.3 Predictors of Non-Household Respondent Status
Bivariate logit regression

	OR	p
Baseline or Year 1 Demographic and Health Characteristics		
Age	0.9	0.000
Female	0.5	0.000
Race (ref = White non-Hispanic)		
Black non-Hispanic	1.1	0.153
Hispanic	1.5	0.000
Other	1.0	0.646
Single	1.1	0.426
Poverty Status (ref = <125% FPL)^		
125 to 200%	1.1	0.285
200 +	1.7	0.000
Insurance (ref = full year uninsured)		
Part year uninsured	0.7	0.000
Public full year	0.7	0.000
Private full-year	0.7	0.000
Education (ref =< HS)		
High school grad	0.6	0.000
Some college	0.3	0.000
Employed	0.5	0.000
Lost a job^	0.9	0.036
Student^	2.4	0.000
Poor self-rated health	0.6	0.000
Chronic condition^†	0.7	0.000
Limitation^	0.6	0.000
Year 1 Mental Health Status		
Poor SRMH 1	0.9	0.252
Serious Psychological Distress	0.8	0.082
Depression	0.8	0.005
Impairment	0.7	0.000
Poor SRMH2	1.0	0.945
Poor SRMH 3	0.8	0.176

MH = mental health; SRH = self-rate health. FPL =family income as % of Federal poverty line; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, heart disease

Table A3.2 shows the count and percent of respondents in this analysis that have missing values for variables not imputed by MEPS administrators.

Table A3.2: Number and Percent of Household Respondents with Missing Data

Round 1	N	Percent
Education attainment	54	0.44%
Employment status	71	0.58%
Student status	16	0.13%
Self-rated health	9	0.07%
Self-rated mental health	11	0.09%
Round 2		
Employment status	35	0.29%
Student status	2	0.02%
Self-rated health	1	0.01%
Self-rated mental health	4	0.03%
SPD	231	1.88%
Depression	145	1.18%
Round 3		
Employment status	61	0.50%
Student status	4	0.03%
Self-rated health	1	0.01%
Self-rated mental health	2	0.02%
Year 1		
Any limitations	220	1.79%
Any chronic physical conditions	33	0.27%
Round 4		
Employment status	30	0.24%
Student status	8	0.07%
Self-rated health	0	0.00%
Self-rated mental health	0	0.00%
SPD	200	1.63%
Depression	145	1.18%
Round 5		
Employment status	31	0.25%
Student status	8	0.07%
Self-rated health	2	0.02%
Self-rated mental health	2	0.02%
Year 2		
Any limitations	182	1.48%
Any chronic physical conditions	38	0.31%

SPD= serious psychological distress; Chronic conditions include asthma, arthritis, hypertension, diabetes, joint pain, stroke, emphysema, and heart disease. Limitations include any functional or activity limitation.

Table A3.3: Descriptive Baseline Characteristics of Respondents in Study and Respondents Excluded from Study Due to Missing Data (N= 4,518)

	Not In Sample (N = 341)		In sample (N= 4,177)		F or Wald* Test
	%	SE	%	SE	
Age (years)	23.7	0.2	23.8	0.1	0.697
Female	61.3	4.4	61.4	1.0	0.976
Race/Ethnicity					0.002
White	46.2	4.6	65.0	1.1	
Black non-Hispanic	20.0	3.0	12.9	0.7	
Hispanic	26.7	3.9	15.3	0.8	
Other	7.2	2.3	6.9	0.5	
Single	83.8	3.0	80.6	0.8	0.305
Poverty					0.005
< 125% FPL	40.1	4.8	27.5	0.9	
125 to 200%	19.4	3.7	19.1	0.7	
200 +	40.6	4.9	53.4	1.1	
Insurance					0.083
Full year uninsured	26.5	3.8	21.5	0.9	
Part year uninsured	21.6	3.7	21.1	0.8	
Public full year	13.3	2.8	8.5	0.6	
Private full-year	38.6	4.7	49.0	1.1	
Variables with Missing Data					
Education					0.018
< High school	21.1	3.1	11.9	0.6	
High school grad	26.0	3.7	28.1	0.9	
Some college	52.8	4.6	60.0	1.1	
Employed	72.6	5.3	79.0	0.7	0.010
Lost a job^	7.5	2.9	14.4	0.7	0.164
Student^	18.1	5.4	20.8	0.8	
Poor SRH	12.5	4.2	7.9	0.5	
Chronic condition^†	19.3	4.3	20.9	0.8	0.959
Limitation^	21.0	5.2	15.1	0.8	0.580
SPD	5.0	2.5	4.7	0.3	0.275
Impairment	11.8	3.7	16.4	0.7	0.183
Depression	9.1	3.0	8.4	0.5	0.265
Poor SRMH	7.0	2.0	4.6	0.4	0.258

*Design-based F-test or adjusted Wald test. FPL =poor/near poor, family income as % of Federal poverty line; SRH = self-rated health ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, and heart disease.

Table A3.4 reports the fit statistics and factor structure for an EFA with three latent constructs of mental health (SPD, depression, impairment) for the first year. Fit statistics are based on recommendations from the literature.[300] The chi-square ($\chi 2$) is a goodness-of-fit measure to determine overall model fit. A $\chi 2$ above 0.05 means that the model does not fit the data well. Since the $\chi 2$ test is sensitive to sample size (such that large samples often have statistically significant chi-square values), other fit indices were examined. The Comparative fit index (CFI) and the Tucker-Lewis index (TLI) are comparative fit indices, and range from 0 to 1, with scores above .95 indicating good model fit. The Bayesian Information Criterion (Schwartz, 1978) is a measure of model "parsimony"; a smaller BIC is preferred to a larger one. The Root Mean Square Error of Approximation (RMSEA) is a measure of absolute fit, with values close to or less than .06 indicating good fit.[300] Oblique rotations (which allow for correlations among the factors); results were consistent using orthogonal (varimax) rotations as well. The chi-square test is statistically significant, which means that the null hypothesis that a single factor fits the data is rejected. The RMSEA and CFI/TLI are .057, and .982/.967, indicating that the model fits moderately well.

Table A3.4: Exploratory Factor Analysis Fit Statistics

BIC	110147
Chi-Square Test (df=42)	616
P-Value	0.00
RMSEA and 90 % C.I.	0.057 (.053, .061)
Probability RMSEA <.05	0.000
CFI/ TLI	.982 / .967

Three of the items from SPD load with the PHQ-2, while two measures of impairment also load with depression. Two of impairment measures (feeling less accomplished and less functional at work or other activities) load on one factor, while the remaining impairment measure (feeling little calm) loads with the SPD measures of nervousness and restlessness.

`Table A3.5: Exploratory Factor Analysis (no SRMH)

(Oblique Rotated Loadings)	Factor 1	Factor 2	Factor 3
PHQ-2: Little interest	0.616	0.021	0.104
PHQ-2: down/depress/hopeless	0.874	-0.099	0.064
K-6: hopeless	0.780	0.075	-0.005
K-6: everything an effort	0.367	0.243	0.055
K-6: nervous	-0.005	0.717	0.05
K-6: restless	0.085	0.691	-0.021
K-6: sad	0.925	-0.095	-0.014
K-6: worthless	0.906	-0.108	-0.018
SF-12 MCS: little calm or peaceful	0.172	0.292	0.153
SF-12 MCS: social impairment	0.441	0.016	0.356
SF-12 MCS: down or depressed	0.575	0.032	0.237
SF-12 MCS: accomplished less	0.028	-0.019	0.889
SF-12 MCS: interferes w/ work	-0.017	-0.002	0.777

Table A3.6: Exploratory Factor Analysis (with SRMH)

(Oblique Rotated Loadings)	Factor 1	Factor 2	Factor 3	Factor 4
Mental health round 1	0.693	0.319	0.318	0.323
Mental health round 2	0.773	0.426	0.376	0.428
Mental health round 3	0.722	0.376	0.342	0.383
PHQ-2: Little interest	0.378	0.705	0.562	0.551
PHQ-2: down/depress/hopeless	0.431	0.847	0.612	0.616
K-6: hopeless	0.42	0.83	0.672	0.592
K-6: everything an effort	0.34	0.581	0.56	0.468
K-6: sad	0.402	0.845	0.607	0.576
K-6: worthless	0.404	0.814	0.577	0.551
K-6: nervous	0.34	0.549	0.75	0.504
K-6: restless	0.357	0.57	0.739	0.48
SF-12 MCS: little calm or peaceful	0.364	0.492	0.522	0.46
SF-12 MCS: social impairment	0.427	0.704	0.588	0.676
SF-12 MCS: down or depressed	0.449	0.766	0.627	0.662
SF-12 MCS: accomplished less	0.468	0.645	0.585	0.897
SF-12 MCS: interferes w/ work	0.378	0.533	0.496	0.764

Table A3.7 Self-Administered Questionnaire Questions Used to Assess Mental Health Status

1. In general, would you say your health is:
_____ Excellent
_____ Very Good
_____ Good
_____ Fair
_____ Poor

The following two questions are about activities you might do during a typical day. Does YOUR HEALTH NOW LIMIT YOU in these activities? If so, how much?
2. MODERATE ACTIVITIES, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf:
_____ Yes, Limited a Lot
_____ Yes, Limited a Little
_____ No, Not Limited At All

3. Climbing SEVERAL flights of stairs:
_____ Yes, Limited a Lot
_____ Yes, Limited a Little
_____ No, Not Limited at All

During the PAST 4 WEEKS have you had any of the following problems with your work or other regular activities AS A RESULT OF YOUR PHYSICAL HEALTH?

4. ACCOMPLISHED LESS than you would like:
_____ Yes
_____ No
5. Were limited in the KIND of work or other activities:
_____ Yes
_____ No

During the PAST 4 WEEKS, were you limited in the kind of work you do or other regular activities AS A RESULT OF ANY EMOTIONAL PROBLEMS such as feeling depressed or anxious?
6. ACCOMPLISHED LESS than you would like:
_____ Yes
_____ No 2
7. Didn't do work or other activities as CAREFULLY as usual:
_____ Yes
_____ No 2

8. During the PAST 4 WEEKS, how much did PAIN interfere with your normal work including both work outside the home and housework?
_____ Not at All
_____ a Little Bit
_____ Moderately
_____ Quite a Bit
_____ Extremely

The next three questions are about how you feel and how things have been DURING THE PAST 4 WEEKS. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the PAST 4 WEEKS –
9. Have you felt calm and peaceful?
_____ All of the Time
_____ Most of the Time
_____ a Good Bit of the Time

_____ Some of the Time
_____ a Little of the Time
_____ None of the Time

10. Did you have a lot of energy?
_____ All of the Time
_____ Most of the Time
_____ a Good Bit of the Time
_____ Some of the Time
_____ a Little of the Time
_____ None of the Time

11. Have you felt downhearted and blue?
_____ All of the Time
_____ Most of the Time
_____ a Good Bit of the Time
_____ Some of the Time
_____ a Little of the Time
_____ None of the Time

12. During the PAST 4 WEEKS, how much of the time has your PHYSICAL HEALTH OR EMOTIONAL PROBLEMS interfered with your social activities like visiting with friends, relatives, etc.?
_____ All of the Time
_____ Most of the Time 2
_____ a Good Bit of the Time
_____ Some of the Time
_____ a Little of the Time
_____ None of the Time

Appendix B: Results of analysis including non-household respondents (N=11,266)

Table B4.1: Descriptive Characteristics of Sample at Baseline (N=11,266)

	Percent	SE
Demographics		
Age (mean years)	22.4	0.04
Female	50.9%	0.6%
Race/Ethnicity	61.8%	0.9%
White non-Hispanic	12.9%	0.6%
Black non-Hispanic	18.6%	0.9%
Hispanic	6.7%	0.4%
Other		
Single/divorced/separated	81.1%	0.6%
Poverty Status (% of FPL)^		
< 125%	23.0%	0.6%
125% to 200%	16.6%	0.5%
200% +	60.3%	0.8%
Health Insurance^		
Uninsured full year	24.7%	0.7%
Uninsured part-year	21.8%	0.5%
Public full year	7.7%	0.4%
Private full year	45.8%	0.8%
Education		
No high school		
HS graduate	19.7%	0.6%
Some college	31.7%	0.6%
Employed	48.7%	0.8%
Loss of job^	31.1%	0.7%
Any time a student^	70.4%	0.6%
Health Status	13.4%	0.4%
Poor self-rated health (fair or poor)	6.1%	0.3%
Any chronic physical condition^	29.6%	0.6%
Any limitation^	11.6%	0.4%

Notes: ^ =data collected during the first year; otherwise collected at round 1. Low-self rated health is fair or poor compared to good, very good, and excellent. Chronic conditions include asthma, arthritis, hypertension, diabetes, joint pain, stroke, emphysema, and heart disease. Limitations include any functional or activity limitation. SE = standard error.

Table B4.2: Descriptive Measures of Mental Health Status of Sample (N=11,266)		
	Percent	**SE**
Year 1		
Round 1		
Poor SRMH	4.3%	0.2%
Round 2		
SPD	4.2%	0.2%
Depression	7.5%	0.3%
Impairment	14.1%	0.4%
Poor SRMH	4.6%	0.3%
Round 3		
Poor SRMH	4.4%	0.2%
Any mental health problem, Year 1	20.6%	0.2%
Year 2		
Round 4		
SPD	4.1%	0.2%
Depression	7.0%	0.3%
Impairment	12.9%	0.4%
Poor SRMH	4.3%	0.2%
Round 5		
Poor SRMH	4.3%	0.3%
Any mental health problem, Year 2	17.5%	0.2%
Any time during Y1 or Y2		
SPD	6.8%	0.3%
Depression	11.8%	0.4%
Impairment	21.2%	0.5%
Poor SRMH	12.3%	0.4%
Any mental health problem, Year 1 or 2	28.2%	0.6%
SPD= serious psychological distress; Poor SRMH= fair or poor self-rated mental health. SE = standard error.		

Table B4.3: Model Fit Statistics, Year 1 and 2							
Model	**# FP**	**LogL**	**BIC**	**SSABIC**	**Bivariate χ^2**	**Entropy**	**LMRT p-val**
Year 1							
LCM, 3C	20	-12665	25516	25452	154.8	0.892	0.000
LCM, 4C	27	-12506	25264	25178	11.6	0.887	0.000
LCM, 5C	34	-12484	25285	25177	2.3	0.826	0.000
FMM, 3C	28	-12491	25242	25153	3.9	0.589	0.000
FMM, 4C	36	-12465	25265	25151	110.3	0.858	0.240
Year 2							
LCM, 3C	17	-10256	20671	20617	60.5	0.932	0.000
LCM, 4C	23	-10165	20545	20472	1.4	0.910	0.000
LCM, 5C	29	-10165	20600	20508	0.8	0.793	0.000

FP = free parameters; LCM = latent class model; FMM = factor mixture model; LogL = Loglikelihood; SSABIC= Sample Size adjusted Bayesian Information Criterion; BIC = Bayesian Information Criterion; ABIC 5 Adjusted BIC; LMRT = Lo-Mendell Rubin Likelihood Test.

Table B4.4: Latent Class Analysis Results: Year 1 and 2 Mental Health Status

Probability of endorsing item, given latent class membership

	Class 1 Good Mental Health		**Class 2 Poor SRMH & Impairment**		**Class 3 Severe distress, good SRMH**		**Class 4 Severe Distress**	
Year 1	%	SE	%	SE	%		%	SE
SRMH 1	1.4%	0.2%	41.0%	3.0%	7.3%	1.6%	53.3%	3.9%
SPD	0.2%	0.1%	3.5%	1.1%	51.8%	2.6%	80.7%	2.9%
Depression	1.5%	0.1%	8.4%	1.3%	89.1%	1.6%	92.2%	2.0%
Impairment	6.9%	0.3%	43.0%	3.3%	95.1%	1.2%	96.6%	1.4%
SRMH 2	0.0%	0.0%	65.9%	3.2%	4.0%	1.0%	90.8%	2.3%
SRMH 3	1.2%	0.2%	41.6%	3.1%	8.2%	1.5%	68.3%	3.7%
Year 2								
SPD	0.2%	0.1%	0.9%	0.5%	52.5%	2.8%	79.9%	2.7%
SRMH 4	0.0%	0.0%	84.5%	2.7%	0.0%	0.0%	75.3%	3.3%
Depression	1.2%	0.1%	8.7%	2.2%	89.0%	1.8%	93.0%	1.6%
Impairment	6.3%	0.3%	41.3%	3.7%	95.5%	1.1%	95.1%	1.5%
SRMH 5	1.4%	0.1%	49.3%	3.5%	0.0%	0.0%	64.8%	3.2%
Class Counts and Proportion*								
Year 1 No.	10,022		463		571		210	
Year 1 %	89.5%		4.1%		4.5%		1.9%	
Year 2 No.	10206		330		445		285	
Year 2 %	90.8%		3.0%		3.9%		2.4%	

*Based on estimated posterior probabilities. SRMH = self-rated mental health. SPD = serious psychological distress

Table B4.6: Latent Transition Results: Probability of endorsing item, given latent transition class membership													
	P	**T**	**T**	**T**	**T**	**P**	**P**	**P**	**P**	**P**	**P**	**P**	**P**
Class Description	**Good Mental health**	**Imp-air.**	**Distr. Good SRMH**	**Distr., Good SRMH**	**Severe**	**Poor SRMH + Impair.**	**Distr. Good SRMH**	**Distress, Good SRMH**	**Poor SRMH to Distr.**	**Distr. + Good SRMH to Severe**	**Severe to Distr. + Good SRMH**	**Distr., Good SRMH to Poor SRMH**	**Severe**
	%	%	%	%	%	%	%	%	%	%	%	%	%
Year 1													
SRMH	1.2	49.7	0.0	4.2	62.5	31.5	0.0	7.0	48.3	23.5	57.9	0.0	69.7
SPD	0.2	5.2	0.0	51.5	87.5	2.1	45.0	44.1	0.0	0.0	68.4	34.4	71.7
Depression	1.5	15.7	0.0	91.2	87.5	5.6	90.0	71.6	0.0	4.7	91.2	93.8	84.1
Impairment	6.3	47.1	0.0	88.9	95.8	30.3	85.0	85.7	6.9	38.8	94.7	100.0	91.7
SRMH	0.6	56.2	0.0	7.7	87.5	35.3	0.0	10.5	34.5	22.4	71.9	18.8	77.9
SRMH	0.6	42.5	0.0	3.1	66.7	44.8	0.0	5.1	37.9	48.2	73.7	0.0	76.6
Year 2													
SPD	0.0	0.0	62.0	0.0	0.0	0.3	100.0	38.1	51.7	77.7	0.0	0.0	77.9
SRMH	0.5	0.0	2.8	0.0	0.0	54.3	10.0	1.4	0.0	87.1	54.4	62.5	80.7
Depression	1.4	0.0	84.5	0.0	0.0	7.7	95.0	67.8	86.2	89.4	7.0	6.3	92.4
Impairment	5.6	0.0	86.9	0.0	0.0	49.3	95.0	85.1	86.2	92.9	50.9	34.4	95.9
SRMH	0.9	0.0	7.0	0.0	0.0	51.0	10.0	6.0	0.0	55.3	61.4	56.3	67.6
No.*	9,541	153	213	260	24	337	20	370	29	85	57	**32**	145
Percent	84.7	1.4	1.9	2.3	0.2	3.0	0.2	3.3	0.3	0.8	0.5	0.3	1.3

P = persistent; T= transient; SRMH = self-rated mental health. Impair. = Impaired. Distr. = Distressed. *Based On Estimated Posterior Probabilities.

Table B4.7: Correlates of Mental Health Transition Groups						
Ref = Persistent MH problem (N=685, 6.1%)						
	Good MH N=9541		**Transient N=650**		**Persistent, Good SRMH N=390**	
	OR	**P-val**	**OR**	**P-val**	**OR**	**P-val**
Age	1.0	0.296	1.0	0.241	1.0	0.762
Female	0.8	0.060	1.1	0.422	1.6	**0.013**
Race (ref = White)						
Black non-Hispanic	1.5	**0.016**	1.2	0.307	1.4	0.177
Hispanic	1.8	**0.000**	1.8	**0.008**	1.4	0.153
Single	0.6	**0.001**	0.8	0.231	0.8	0.473
Poverty (ref = <125% FPL)						
125 to 200%	0.9	0.470	0.8	0.184	0.8	0.277
>=200%	1.5	**0.006**	1.1	0.543	1.1	0.730
Insurance (ref = full year uninsured)						
Part year uninsured	1.1	0.729	1.0	0.815	1.0	0.852
Public full year	0.6	**0.003**	0.7	0.087	0.4	**0.001**
Private full-year	0.9	0.608	0.7	0.150	0.7	0.106
Education (ref =< high school)						
High school grad	1.2	0.147	0.8	0.281	1.0	0.948
Some college	1.5	**0.012**	0.9	0.422	0.9	0.571
Student^	0.9	0.597	0.7	0.077	0.8	0.364
Employed	2.1	**0.000**	2.0	**0.000**	1.5	**0.034**
Lost a job^	0.7	**0.054**	0.9	0.727	1.1	0.631
Poor self-rated health	0.2	**0.000**	0.5	**0.001**	0.5	**0.003**
Chronic condition^†	0.6	**0.000**	1.0	0.908	0.9	0.509
Limitation^	0.2	**0.000**	0.5	**0.000**	0.7	**0.042**
Percent	84.7%		5.8%		3.5%	

MH = mental health; SRH = self-rate health. FPL =family income as % of Federal poverty line; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, heart disease

Table B4.9 Summary Measures of Mental and Medical Care (N=11,266)				
	Mean events	**SD**	**Range**	**% 1+ events**
Mental Health Care				
Mental Health RX				
Specialty	0.3	0.4	0 to 63	2.9%
General	0.3	0.6	0 to 94	5.3%
Only RX (visit or RX file)	0.6	0.7	0 to 140	8.5%
Any RX	0.8	0.9	0 to 140	8.9%
Mental Health Therapy				
Specialty	0.7	1.1	0 to 240	5.4%
General	0.2	0.6	0 to 112	1.9%
Only Therapy	0.7	1.1	0 to 233	5.8%
Any Therapy	0.8	1.3	0 to 240	5.8%
Therapy and RX	1.3	1.9	0 to 290	6.2%
Any specialty care	1.0	1.4	0 to 247	7.0%
Any general care	0.6	1.0	0 to 146	8.9%
Any mental health care	2.3	2.2	0 to 290	14.8%
General Medical Visit				
Ambulatory visit, no RX	5.6	1.8	0 to 230	76.4%
Ambulatory + RX	6.6	2.4	0 to 234	54.5%
RX Only	3.8	1.6	0 to 119	46.0%
Any Medical Visit	12.2	3.4	0 to 285	82.8%
Any Health Care	14.5	4.3	0 to 325	83.6%

Table B4.10 Mean, Standard Deviation and Percent with Any Use, by Mental Health Class										
		Mental health care						Medical care		
		Any Ther	Any RX	Any Visit and any RX	Any Spec.	Any General	Any mental health	Any RX	Any medical	Any health care
Good Mental Health	*Mean*	0.2	0.3	0.3	0.3	0.2	0.8	4.7	8.7	9.5
	SD	0.8	0.9	1.1	0.9	0.7	1.5	3.2	4.5	5.0
	1 + visits	2.4%	4.4%	1.5%	2.8%	3.9%	7.4%	42.6%	70.4%	70.8%
Transient Problems	*Mean*	0.8	1.0	1.7	1.2	0.7	2.8	5.4	10.2	13.0
	SD	1.3	1.4	2.9	2.1	1.4	3.2	3.0	5.2	6.6
	1 + visits	8.3%	14.1%	6.0%	9.5%	12.5%	22.3%	52.2%	74.8%	77.1%
Persistent, Good SRMH	*Mean*	1.6	1.4	2.2	2.1	1.0	4.2	*6.8*	12.7	17.0
	SD	2.1	1.6	2.5	2.5	1.2	3.4	*5.1*	7.4	8.4
	1 + visits	13.8%	21.2%	11.9%	17.8%	18.9%	32.3%	52.9%	79.7%	82.8%
Persistent Severe Problems	*Mean*	5.9	5.5	11.1	8.2	3.6	15.5	*9.6*	16.1	31.6
	SD	5.8	4.4	9.8	7.0	4.2	10.3	*5.4*	7.4	13.6
	1 + visits	27.9%	41.3%	23.7%	33.4%	30.2%	53.9%	57.6%	78.6%	86.9%

Table B4.11 Mental Health Treatment Modality by Latent Mental Health Class

	Therapy Only	RX Only	Therapy + RX	Any Mental Health care
Good Mental Health	1.5%	3.6%	1.5%	7.4%
Transient	4.0%	8.8%	6.0%	22.3%
Persistent, Good SRMH	7.3%	14.1%	11.9%	32.3%
Persistent Severe	7.6%	19.4%	23.7%	53.9%

SRMH =self-rated mental health

Table B4.12 Model Fit Statistics, Latent Class and Mixture Model for Health Care Use

	BIC	SSABIC	Entropy	LMRT p-val
Negative binomial 5C	118701	118593	0.76	0.000
Negative binomial 4C	119050	118961	0.762	0.000
Negative binomial 3C	119270	119200	0.719	0.000
Negative binomial 2C	121372	121321	0.953	
Zero-inflated Poisson 2C	142570	142503	0.915	0.000
Two-part negative binomial model (mixture model)	123566	123312	NA	NA

C = number of classes; BIC= Bayesian Information Criteria; SSABIC = Sample-Size Adjusted BIC; LMRT= Lo-Mendel-Rubin likelihood ratio test.

Table B4.13 Mean and Range of Utilization Measures by Latent Care Health Class						
		Low use	**Moderate Medical Only**	**Moderate Medical + Mental**	**High Medical Only**	**High Medical + Mental**
Mental health care						
Any Therapy	*Mean*	0.0	0.0	5.1	0.0	6.1
	SD	0.0	0.0	3.6	0.0	4.7
	1 + visits	0.1%	0.7%	38.5%	0.3%	41.4%
Any RX	*Mean*	0.0	0.0	6.6	0.0	6.0
	SD	0.0	0.0	3.3	0.0	3.5
	1 + visits	0.0%	0.0%	71.2%	1.8%	63.7%
Any Specialty Care	*Mean*	0.0	0.0	6.5	0.0	8.7
	SD	0.0	0.0	4.6	0.0	5.4
	1 + visits	0.0%	0.8%	47.6%	0.0%	48.9%
Any General Care	*Mean*	0.0	0.0	3.2	0.0	5.3
	SD	0.0	0.0	2.5	0.0	3.7
	1 + visits	0.6%	0.0%	49.1%	1.9%	60.7%
Medical Care						
Any RX	*Mean*	0.6	3.8	4.4	12.0	17.8
	SD	1.2	2.0	2.4	4.2	6.2
	1 + visits	0.0%	65.5%	39.7%	80.8%	88.6%
Any Medical	*Mean*	0.8	6.0	20.8	24.4	50.9
	SD	1.2	2.1	6.9	5.2	11.8
	1 + visits	26.1%	99.8%	93.8%	100.0%	100.0%

Table B4.14 Mental Health Status by Latent Health Care Use						
		Low use	**Moderate Medical Only**	**High Medical Only**	**Moderate Medical + Mental**	**High Medical + Mental**
Good Mental Health	*Row*	39.1%	33.6%	3.3%	20.7%	3.4%
	Col	87.2%	85.2%	45.7%	80.7%	48.9%
	Num	4,033	2,810	237	1,660	230
Transient	*Row*	29.1%	28.7%	10.7%	21.4%	10.1%
	Col	7.6%	8.5%	17.6%	9.7%	17.2%
	Num	405	316	97	237	92
Persistent, Good SRMH	*Row*	21.2%	24.7%	16.9%	23.5%	13.7%
	Col	2.7%	3.6%	13.7%	5.3%	11.6%
	Num	154	141	69	119	55
Persistent, Severe	*Row*	17.3%	16.0%	25.7%	17.3%	23.8%
	Col	2.5%	2.6%	23.1%	4.3%	22.3%
	Num	129	101	148	105	128

Table B4.15 Descriptive Characteristics of Health Care Use Classes											
	Low use (N = 4,721)		**Moderate Medical Only (N=3,368)**		**Moderate Medical + Mental (N=551)**		**High Medical Only (N=2,121)**		**High Medical + Mental (N=505)**		**F-test or Adj. Wald test†**
N= 11,266	%	SE	%	SE	%	SE	%	SE	%	SE	
Age (mean years)	22.2	0.1	22.3	0.1	22.1	0.2	22.8	0.1	23.0	0.1	0.000
Female	30.0	0.8	51.9	1.1	47.3	2.7	79.0	1.1	80.4	1.9	0.000
Race											0.000
White	52.4	1.4	69.7	1.2	80.7	2.0	75.2	1.2	85.7	1.7	
Black	18.5	1.0	13.8	0.9	5.7	1.0	10.7	0.9	5.4	0.9	
Hispanic	29.1	1.5	16.5	0.9	13.6	1.7	14.2	1.0	8.9	1.5	
Marital	85.2	0.7	82.5	0.9	85.1	1.8	70.4	1.4	81.1	1.9	0.000
Poverty (%FPL)											0.000
<125%	24.5	0.9	20.7	0.9	28.4	2.3	21.9	1.1	25.7	2.3	
125 to 200%	18.2	0.8	15.8	0.8	13.6	1.7	16.0	1.1	17.0	2.0	
200% +	57.3	1.1	63.6	1.2	58.1	2.6	62.1	1.4	57.4	2.7	
Insurance											0.000
Unins. full yr.	40.2	1.1	19.1	0.9	21.7	2.2	11.3	0.9	9.5	1.6	
Unins. part yr.	19.8	0.8	21.6	0.9	22.9	2.3	24.4	1.1	25.2	2.3	
Public full yr.	5.0	0.4	7.2	0.5	12.5	1.6	9.9	0.8	14.5	1.7	
Private full yr.	35.0	1.1	52.2	1.2	42.9	2.8	54.4	1.4	50.8	2.6	
Education											0.000
< high school	24.1	0.9	17.8	0.9	21.9	2.1	15.3	1.0	15.4	1.8	
High school	36.9	0.9	29.7	1.0	31.1	2.3	27.3	1.2	25.1	2.2	
Any College	39.0	1.1	52.5	1.3	47.0	2.8	57.4	1.5	59.5	2.7	
Student	30.9	0.9	33.8	1.1	35.6	2.5	26.9	1.3	27.2	2.3	
Employed											
Lost Job^	12.9	0.6	12.9	0.8	15.3	1.7	14.3	1.0	14.4	1.8	0.470
Poor SRH	4.3	0.4	4.9	0.4	9.6	1.4	8.3	0.7	13.1	1.8	0.000
Chronic medical cond. †^	18.8	0.8	29.1	1.0	38.2	2.6	41.5	1.4	51.0	2.8	0.000
Any limitation^	6.3	0.5	10.2	0.7	22.5	2.0	15.4	1.0	29.3	2.3	0.000

*Design-based F-test or adjusted Wald test. FPL =poor/near poor, family income as of Federal poverty line; Unins = uninsured; SRH = self-rated health ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, and heart disease.

Table B4.16 Multinomial Regression of Health Care Use Class on Selected Characteristics

Ref = low use (N= 4,721, 41%)	**Medical Only**		**Moderate Medical + Mental**		**High Medical Only**		**High Medical + Mental**	
	OR	p	OR	p	OR	p	OR	p
Age	1.0	0.415	1.0	0.839	1.0	0.994	1.1	**0.000**
Female	2.7	**0.000**	2.0	**0.000**	9.9	**0.000**	10.8	**0.000**
Race (ref = White)								
Black non-Hispanic	0.6	**0.000**	0.1	**0.000**	0.3	**0.000**	0.1	**0.000**
Hispanic	0.6	**0.000**	0.3	**0.000**	0.4	**0.000**	0.2	**0.000**
Single	0.9	0.473	0.9	0.651	0.6	**0.000**	1.2	0.343
Poverty (ref = <125% FPL)								
125 to 200%	1.1	0.203	0.9	0.511	1.1	0.600	1.2	0.399
>=200%	1.1	0.477	1.0	0.950	1.0	0.982	1.0	0.915
Insurance (ref = full year uninsured)								
Part year uninsured	1.9	**0.000**	1.9	**0.001**	3.3	**0.000**	4.4	**0.000**
Public full year	2.7	**0.000**	3.6	**0.000**	5.6	**0.000**	9.0	**0.000**
Private full-year	2.4	**0.000**	2.3	**0.000**	4.4	**0.000**	6.2	**0.000**
Education (ref =< HS)								
High school grad	0.9	0.439	1.1	0.704	0.9	0.456	0.9	0.480
Some college	1.4	**0.000**	1.8	**0.001**	1.5	**0.000**	2.0	**0.001**
Student^	1.0	0.744	1.2	0.430	0.9	0.254	1.1	0.541
Employed	1.1	0.391	0.6	**0.000**	1.1	0.275	0.9	0.323
Lost a job^	1.1	0.303	1.5	**0.027**	1.3	**0.031**	1.5	**0.041**
Poor self-rated health	1.2	0.157	1.2	0.446	1.7	**0.002**	1.6	0.062
Chronic condition^†	1.7	**0.000**	2.1	**0.000**	3.1	**0.000**	3.3	**0.000**
Limitation^	1.6	**0.000**	2.0	**0.000**	2.2	**0.000**	3.0	**0.000**
Mental Health Class (ref = persistent severe)								
Good MH	1.0	0.835	0.1	**0.000**	0.7	0.133	0.1	**0.000**
Transient	1.2	0.422	0.3	**0.000**	0.9	0.479	0.3	**0.000**
Persistent, Good SRMH	1.3	0.246	0.7	0.249	1.3	0.399	0.6	**0.047**

Table B4.17 Multinomial Regression of Health Care, by Mental Health Subgroup

	Good MH				Transient				Persistent			
	Medical Care Only		Any Mental Health Care		Medical Care Only		Any Mental Health Care		Medical Care Only		Any Mental Health Care	
	OR	**p**	**OR**	**p**	**OR**	**p**	**OR**	**p**	**OR**	**p**	**OR**	**p**
Age	1.0	0.218	1.0	0.473	1.0	0.580	1.1	0.175	1.0	0.487	1.1	0.170
Female	**4.1**	**0.000**	**4.5**	**0.000**	**4.9**	**0.000**	**3.3**	**0.000**	**3.8**	**0.000**	**3.0**	**0.000**
Race (ref = non-White)	**0.5**	**0.000**	**0.2**	**0.000**	**0.4**	**0.000**	**0.2**	**0.000**	**0.7**	**0.047**	**0.3**	**0.000**
Single (ref = married)	0.7	**0.001**	1.1	0.545	0.8	0.463	1.2	0.663	0.9	0.773	0.9	0.665
Poverty (ref = <200% FPL)	1.0	0.929	1.0	0.759	1.0	0.847	0.9	0.798	0.8	0.256	1.0	0.881
Insurance (ref = any uninsurance												
Public full year	**2.3**	**0.000**	**2.2**	**0.001**	1.8	0.079	**2.7**	**0.018**	3.1	**0.001**	**6.2**	**0.000**
Private full year	**1.8**	**0.000**	1.5	**0.010**	**2.8**	**0.000**	**4.6**	**0.000**	4.2	**0.000**	**4.9**	**0.000**
Any college	**1.6**	**0.000**	2.0	**0.000**	1.2	0.484	1.3	0.354	1.8	0.037	**2.4**	**0.001**
Student^	0.9	0.576	1.1	0.745	1.3	0.386	1.6	0.183	0.9	0.859	1.3	0.401
Employed	1.1	0.456	**0.7**	**0.020**	1.4	0.190	0.7	0.248	1.2	0.505	0.7	0.206
Lost a job^	1.2	0.118	**1.6**	**0.013**	1.5	0.183	1.6	0.177	1.4	0.234	1.5	0.185
Poor SRH	1.3	0.135	1.2	0.499	**2.0**	**0.031**	1.3	0.595	1.2	0.472	1.6	0.125
Chronic med. cond.^†	2.1	**0.000**	2.5	**0.000**	**2.4**	**0.000**	**3.7**	**0.000**	**1.6**	**0.032**	1.4	0.130
Limitation^	1.8	**0.000**	2.3	**0.000**	1.8	0.075	**2.4**	**0.022**	**1.8**	**0.028**	**2.6**	**0.000**

FPL =poor/near poor, family income as of Federal poverty line; SRH = self-rated health ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, and heart disease.

Table B4.18 Multinomial Regression for Any Mental Health Care, by Mental Health Subgroup

	Good MH		Transient Problems		Persistent Problems, Good SRMH		Persistent Problems	
	OR	**p**	**OR**	**p**	**OR**	**p**	**OR**	**p**
Age	1.0	0.208	1.1	0.238	**1.2**	**0.027**	1.0	0.437
Female	**1.8**	**0.000**	1.1	0.695	1.3	0.383	1.3	0.235
Race (ref = non-White)	**0.3**	**0.000**	**0.4**	**0.000**	**0.3**	**0.000**	**0.4**	**0.000**
Single (ref = married)	**1.4**	**0.038**	1.4	0.267	0.8	0.586	1.0	0.865
Poverty (ref = <200% FPL)	1.0	0.705	0.9	0.686	0.9	0.820	1.4	0.234
Insurance (ref = any uninsurance)								
Public full year	1.2	0.333	1.8	0.057	1.0	0.930	**3.6**	**0.000**
Private full year	1.0	0.944	**2.2**	**0.005**	1.2	0.503	**2.1**	**0.016**
Any college	**1.5**	**0.006**	1.2	0.558	1.4	0.205	**2.1**	**0.017**
Student^	1.1	0.518	1.4	0.344	2.1	0.075	0.9	0.699
Employed	**0.7**	**0.006**	**0.6**	**0.029**	0.8	0.380	0.7	0.192
Lost a job^	**1.4**	**0.045**	1.2	0.509	1.1	0.745	1.1	0.819
Poor SRH	1.0	0.970	0.8	0.468	1.5	0.264	1.1	0.702
Chronic med. cond.^†	**1.5**	**0.001**	**1.9**	**0.004**	1.2	0.541	0.9	0.590
Limitation^	**1.5**	**0.024**	1.5	0.102	0.9	0.652	**2.3**	**0.001**

MH = mental health; SRH = self-rate health. FPL =family income as % of Federal poverty line; ^ =any time during year 1; † =asthma, arthritis, diabetes, high blood pressure, joint pain, stroke, emphysema, heart disease.

Appendix C

The following codes identify the clinical classification category (CCC) codes (in bold) and corresponding ICD-9-CM condition used in the study.

CCC code in bold
corresponding ICD-9 code

650 Adjustment disorder

3090 3091 30922 30923 30924 30928 30929 3093 3094 30982 30983 30989
3099

651 Anxiety disorder

29384 30000 30001 30002 30009 30010 30020 30021 30022 30023 30029 3003
3005 30089 3009 3080 3081 3082 3083 3084 3089 30981 3130 3131
31321 31322 3133 31382 31383

652 Attention-deficit, conduct, and disruptive behavior disorder

Conduct disorder

31200 31201 31202 31203 31210 31211 31212 31213 31220 31221 31222 31223
3124 3128 31281 31282 31289 3129

Oppositional defiant disorder

31381

Attention deficit disorder / Attention deficit hyperactivity disorder

31400 31401 3141 3142 3148 3149

655 Disorders usually diagnosed in infancy, childhood, or adolescence

Elimination disorders

3076 3077

Other disorders of infancy, childhood or adolescence

3073 30921 31323 31389 3139

Pervasive developmental disorders

29900 29901 29910 29911 29980 29981 29990 29991

Tic disorders

30720 30721 30722 30723

656 Impulse control disorders, NEC

31230 31231 31232 31233 31234 31235 31239

657 Mood disorders

Bipolar disorders

29600 29601 29602 29603 29604 29605 29606 29610 29611 29612 29613 29614
29615 29616 29640 29641 29642 29643 29644 29645 29646 29650 29651 29652
29653 29654 29655 29656 29660 29661 29662 29663 29664 29665 29666 2967
29680 29681 29682 29689 29690 29699

Depressive disorders

29383 29620 29621 29622 29623 29624 29625 29626 29630 29631 29632 29633
29634 29635 29636 3004 311

658 Personality disorders

3010 30110 30111 30112 30113 30120 30121 30122 3013 3014 30150 30151
30159 3016 3017 30181 30182 30183 30184 30189 3019

659 Schizophrenia and other psychotic disorders

29381 29382 29500 29501 29502 29503 29504 29505 29510 29511 29512 29513
29514 29515 29520 29521 29522 29523 29524 29525 29530 29531 29532 29533
29534 29535 29540 29541 29542 29543 29544 29545 29550 29551 29552 29553
29554 29555 29560 29561 29562 29563 29564 29565 29570 29571 29572 29573
29574 29575 29580 29581 29582 29583 29584 29585 29590 29591 29592 29593
29594 29595 2970 2971 2972 2973 2978 2979 2980 2981 2982 2983
2984 2988 2989

660 Alcohol-related disorders

2910 2911 2912 2913 2914 2915 2918 29181 29182 29189 2919
30300 30301 30302 30303 30390 30391 30392 30393 30500 30501 30502
30503 76071 9800

661 Substance-related disorders

2920 29211 29212 2922 29281 29282 29283 29284 29285 29289 2929 30400
30401 30402 30403 30410 30411 30412 30413 30420 30421 30422 30423 30430
30431 30432 30433 30440 30441 30442 30443 30450 30451 30452 30453 30460
30461 30462 30463 30470 30471 30472 30473 30480 30481 30482 30483 30490
30491 30492 30493 30520 30521 30522 30523 30530 30531 30532 30533 30540
30541 30542 30543 30550 30551 30552 30553 30560 30561 30562 30563 30570
30571 30572 30573 30580 30581 30582 30583 30590 30591 30592 30593 64830
64831 64832 64833 64834 65550 65551 65553 76072 76073 76075 7795 96500
96501 96502 96509 V6542

662 Suicide and intentional self-inflicted injury

V6284 E9500 E9501 E9502 E9503 E9504 E9505 E9506 E9507 E9508 E9509 E9510
E9511 E9518 E9520 E9521 E9528 E9529 E9530 E9531 E9538 E9539 E954 E9550
E9551 E9552 E9553 E9554 E9555 E9556 E9557 E9559 E956 E9570 E9571 E9572
E9579 E9580 E9581 E9582 E9583 E9584 E9585 E9586 E9587 E9588 E9589 E959

663 Screening and history of mental health and substance abuse codes

Mental health disorder related codes

33392 V110 V111 V112 V114 V118 V119 V154 V1541 V1542 V1549 V1582
V6285 V663 V701 V702 V7101 V7102 V7109 V790 V792 V793 V798 V799

Substance-related disorder codes

3051 30510 30511 30512 30513 3575 4255 5353 53530 53531 5710 5711
5712 5713 7903 V113 V791

670 Miscellaneous disorders

Dissociative disorders
30012 30013 30014 30015 3006
Eating disorders
3071 30750 30751 30752 30753 30754 30759
Factitious disorders
30016 30019
Mental disorders due to general medical condition not elsewhere classified
29389 2939 3101
Other miscellaneous mental conditions
316 64840 64841 64842 64843 64844 V402 V403 V409 V673
Psychogenic disorders
3060 3061 3062 3063 3064 30650 30652 30653 30659 3066 3067 3068
3069
Sexual and gender identify disorders
3021 3022 3023 3024 30250 30251 30252 30253 3026 30270 30271 30272
30273 30274 30275 30276 30279 30281 30282 30283 30284 30285 30289 3029
30651
Sleep disorders
30740 30741 30742 30743 30744 30745 30746 30747 30748 30749
Somatoform disorders
30011 3007 30081 30082 30780 30781 30789