

Team Processes in Mental Health Care

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A dissertation  
submitted in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy  
University of Washington

2012

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Program Authorized to Offer Degree:  
Sociology

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**Abstract**

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The “managed care” model of health care refers to organizational techniques intended to reduce health care provision costs while improving quality of care. One technique this model necessitates is “team care” as opposed to single-clinician care for patients. Status characteristics theory suggests that relative differences in social status among mental health care providers can affect team building and decision making processes, and that these interrelated social processes may, in turn, affect team outcomes including patient health. Implications of status characteristics, team building, and decision making processes for patient health outcomes have not been examined empirically. In three interrelated studies, this dissertation explores contexts, processes, and consequences that are associated with status characteristics in “collaborative care,” an innovative, evidence-based form of team care for mental health developed and tested at the University of Washington Department Of Psychiatry and Behavioral Sciences. Collaborative care teams vary in size and composition in accordance with the expectation that resources (e.g. referrals to psychiatrists) are allocated according to patient need (i.e. patients’ clinical characteristics do drive resource allocation). However, findings also suggest that team processes (such as amount of deliberation in teams), care outcomes (such as screening for posttraumatic stress disorder), and even patient health (improvement in symptoms of mental health disorder) are influenced by status characteristics. Across the three studies, provider gender was consistently associated with differences in health and care outcomes for patients, and these effects were magnified for tasks that are plausibly associated traditional gender roles. Effects of team-level factors such as gender balance, gender heterogeneity, tenure diversity, and diversity in expertise varied according to tasks and outcomes. Of the team-level factors examined in these studies, amount of deliberation among care providers appeared most consistently as both an effect of status characteristics and as a potentially helpful mediator of patients’ health and care outcomes.

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## Introduction

The “managed care” model of health care refers to organizational techniques intended to reduce health care provision costs while improving quality of care. One technique this model necessitates is "team care" as opposed to single-clinician care for patients. Cohesive teams of providers who have complementary knowledge, skills and roles can achieve higher quality care for patients, such as more consistent prescribing of medication (e.g. Rodriguez et al 2008). However, team care can also result in lower levels of patient satisfaction and quality of care (Cabana and Jee, 2004; Saultz and Albedaiwi, 2004; Saultz and Lochner, 2005).

“Collaborative care” is an innovative and especially successful team care model, developed and tested at the University of Washington Department of Psychiatry and Behavioral Sciences.<sup>1</sup> Collaborative mental health care for older adults is an improvement over standard (single-clinician) care; it is shown to improve rates of depression treatment, increase patient satisfaction, and reduce depression symptoms at all follow-up points up to one year (Unützer et al 2002).

Even though collaborative care is an improvement over standard care, significant variation in patient outcomes persists. Some patients who receive collaborative care do not experience significant reduction in depression symptoms, and most patients still do not experience full remission (Unützer et al 2002). Taken together with sociological theory, these findings pose interesting and important questions about whether team characteristics play a role in determining outcomes, over and above roles played by individual patients, providers, and prescriptions. While Health Services and Risk Management research each explore differences in care quality and costs associated with team care, these agendas have only begun to investigate how variation between teams might possibly affect care quality, treatment decisions, and (most importantly) patient health outcomes. To what extent might variation in collaborative care team

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<sup>1</sup> Collaborative care performed at research sites analyzed for this dissertation reflects the IMPACT model developed and tested at the University of Washington Department of Psychiatry and Behavioral Sciences. For more information, see Unützer, J., Katon, W., Callahan, C.M., Williams, J.W., Hunkeler, E., et. al. (2002). Collaborative care management of late-life depression in the primary care setting. A randomized controlled trial. *Journal of the American Medical Association*, 288 (22), 2836-2845.

structures and processes explain differences in patient outcomes? Promising explanations for differences in treatment and outcomes for patients in collaborative care focus on care processes and how these might vary by social context.

Collaborative care teams can be composed of a variety of mental health care providers who work interdependently toward holistic care tailored to individual patients. Instead of being assigned onto specific teams (which are then designated for particular patients), care is “patient-centered.” Patient-centered care means that different arrays of providers are generated around each patient, based upon the individual needs of the patient (i.e. in theory, each patient could have a unique set of providers from whom they receive care). Providers who do share patients in common must engage in interactive decision making with one another, while also engaging the patient in interactive decisions about care and treatment; collaborative care providers and patients are “teams” in that each member of the group shares responsibility for the care process, as well as accountability for the patient’s outcomes.

As each team is generated, interactive decision making processes automatically involve decisions about how many providers a patient should see (i.e. how large or small teams become), and what kinds of therapists (providers) a patient should see (i.e. what kinds of expertise the team is composed of). Because these decisions are based on individual patient need, the collaborative care model provides the researchable expectation that team size and composition will vary almost exclusively according to patients’ clinical characteristics.

In the field of sociology, status characteristics theory posits that the same characteristics that differentiate power and prestige orders within broader social contexts are imported into work groups. Imported status hierarchies associated with characteristics like gender, age, race, and ethnicity can affect interpersonal interactions and processes within organizations, even when such characteristics are unrelated to the purpose of work groups (Berger, Cohen, and Zelditch 1972; Cohen and Zhou 1991; Wagner and Berger 1993; Tajfel 1982; Tajfel and Turner 1979; Alderfer 1987; Ridgeway 1997, 2006, 2007, 2009).

Socially disadvantaged groups are at particular risk of receiving less-than-adequate care (Miller 2009; Murray and Lopez 1997; Patel et al. 1999; Jenkins et al. 1997; Araya et al. 2001). Research suggests that treatment decisions are sometimes influenced by unintentional provider bias beliefs about patients' sociodemographic characteristics (such as gender, race and ethnicity), and that these biases and beliefs are linked to disparities in health care (Burgess et al 2006; van Ryn 2002). Collaborative care holds potential for reducing these disparities while providing a unique solution to what has, for at least three decades, been described as “epidemic” anxiety and depression in Western societies (Centre for Economic Performance 2006; James 2007; Lawson 2007). Even from within the powerful “do more with less” ethos of managed care, collaborative care emerged to address problems of resource allocation, to provide integrated patient-centered care, and to help alleviate the growing burden of disease *at the population level* (Davison 2000; Newman 2000; Katon 2012).

By the year 2000, many treatments had proven effective for specific psychiatric disorders (Kendall and Chambless 1998; Davison 2000). For example, psychotherapy was found to be especially effective for treating depression (de Mello et al. 2005; Dobson 1989; Gloaguen et al. 1998; Wampold et al. 2002). But in spite of knowledge gains about effective treatment for mental illnesses, diagnosing and treating mental illness became increasingly complicated.

In the first place, high demand for psychiatric services and limited supply of specialists made access to mental health services in the United States and Britain notoriously limited (DoD 2007; Bower and Gilbody 2005). As Haaga (2000) observes, “the supply of practitioners adequately trained in effective protocols is unlikely to catch up to the need for services in the near future. Accordingly, we need to be concerned with how to manage our scarce resources efficiently so as to deliver beneficial interventions to as many people who need them as possible.” (2000:547).

Research soon revealed that patients suffering from the same mental disorders did not require the same levels of care and treatment, and practitioners found that patient treatment preferences varied significantly across sociodemographic groups (Cooper et al 2003; Hazlett-Stevens 2002; Dwight-Johnson et al 2000). Furthermore, patients who did receive the same treatments sometimes had different clinical

responses to them, due to biological factors (Daly et al. 1996), cultural factors (Lin, Smith and Ortiz 2001), lifestyle-based factors (Mackenzie et al 2003), and/or factors based in diet and diet changes (Oosterheld and Kallepalli 1997; e.g. diet changes due to immigration: Allen, Rack and Vaddadi 1977). Finally, patients would or would not engage in their treatment plans for myriad reasons based on culture and personal background, and treatment dropout became a concern (Janz, Champion and Strecher 2002; Montano and Kasprzyk 2002; Prochaska, Redding and Evers 2002; Rimer 2002).

As specialty care utilization increased, mental health professionals worked to foster “holistic care” that considers specialty care needs in context of each patient’s broader spectrum of medical needs and well-being. Increasingly, patients were “shared” between practitioners and specialty settings (this is now called “integrated care”).

Integrated, patient-centered care models were designed to engage patients in collaborative decisions about their treatment and referral options given their unique circumstances (such as access to transportation) and considerations regarding treatment preference (such as social stigma associated with seeing a therapist, and fears about taking prescription pharmaceuticals). Accounting for broader inventories of patient’s needs encouraged treatment engagement and reduce likelihood of patient dropout from treatment (Wilcock and Headrick 2000; Mitchell 2006; Institute of Medicine 2001).

Prior to integrated care, specialist providers had little experience treating patients in concert with others. Throughout most of medicine, authority within medical specialties was infamously hierarchical, and prestige between fields was highly stratified (Abbott 1988). In spite of the highly stratified nature of medicine, and perhaps due to challenges such as those explained above, psychiatric care emerged as a vanguard of integrated occupational expertise and teamwork.

According to Litchenstein et al (2004), teamwork is a documented “mainstay” in psychiatric care (e.g. Brown 1982; Shaw 1990). In order to coordinate care and to facilitate assimilation of various clinical perspectives and expertise, psychiatric teams involved a less severe (“flat”) authority structure (Shaw 1990). In order to provide better access for patients, foster coordination between diverse sets of providers,

and achieve helpful combinations of treatment in integrated care, specialty mental health services were sometimes “co-located” with primary care practices.

Collaborative care begins by placing “care coordinators” into primary care clinics. When a primary care provider believes their patient may benefit from patient-centered mental health care, he or she refers the patient to a care coordinator. From within the primary care clinic, the care coordinator facilitates and troubleshoots the patient’s mental health and overall health care by working interdependently with the patient, the patient’s primary care provider, and an array of additional providers as determined by the interactive decision making process. Care coordinators can also incorporate consulting psychiatrists and additional team members (therapists, substance abuse counselors, additional primary care providers, etc.) into a patient’s care team.

In addition to providing integrated, co-located patient-centered care, collaborative care enhances communication between providers and tracking of patient progress through technological infrastructure. for connecting and communicating with other providers, making referrals, and tracking patient progress. Information technology called a Mental Health Integrated Tracking System (MHITS) helps alleviate the problem of differential patient response to treatment by systematically tracking patient progress across multiple care settings. MHITS also assists with communication among providers by centralizing patient records and referral information. Using MHITS, providers (such as care coordinators and consulting psychiatrists, who are not co-located) can view patient information, deliberate and re-evaluate treatment plans together.

Multiple levels of treatment exist for patients in collaborative care. MHITS allows for “targeting,” or prompt re-evaluation and alteration of treatment plans for patients whose treatment is falling short of goals, and more intensive (potentially more restrictive, invasive and certainly more expensive) “stepped up” care can be given to patients who are not responding to current treatment. Care can also be “stepped down” for patients who no longer require intensive treatment.

While some treatment decisions (such as whether a patient should try cognitive behavioral theory) might be considered between care coordinators and patients, other decisions must also include

additional providers. For example, decisions about medication must also include a prescribing physician such as a psychiatrist and/or a primary care provider. Results of clinical tests for symptoms of mental illness and other information from patient encounters are recorded in MHITS, and help guide decision making among multiple providers who share a patient and who, therefore, must work as a team.

Based on severity and complexity of the patient's symptoms as measured by clinical diagnostic tools, core team members (the primary care provider, the care coordinator, and the patient) decide what "team dose" (i.e. how many providers and what types of expertise should be present on a team) is best for each patient. Studies of collaborative care have not yet explored "team dose" in terms of how it varies, how it is generated, and the extent to which variation in team size, composition, and processes can explain patient outcomes.

This dissertation asks three questions: (1) How do collaborative care teams vary, and what explains how many and what types of providers are included on teams? (2) Do team size and team status composition explain differences in health care processes? (3) Do team size and composition play a role in patient health outcomes over and above roles played by individual patients and providers?

The extent to which decision making/team building processes have implications for patient health and disparities in mental health care is unknown, and the ways that teams are generated have not been examined empirically. Research findings on sociodemographic disparities in health care suggest that clinical decision making differs by patient sociodemographic characteristics for a variety of complex reasons. Status characteristics theory suggests that relative status differences between patients and providers, and among providers on the same team, affect team-building and decision making processes, and that these interrelated social processes impact team outcomes.

## Setting and Subjects

Data come from an electronic patient record and tracking system, called “MHITS” or Mental Health Integrated Tracking System, in use by the Mental Health Integration Program (MHIP). This system tracks the innovative form of collaborative care developed and tested at the University of Washington Department Of Psychiatry and Behavioral Sciences.<sup>2</sup> The Mental Health Integration Program brings mental health services into 148 safety net primary care clinics that serve medically vulnerable populations, operated by 78 different agencies across the state of Washington. MHIP’s electronic patient record and tracking system, captures approximately 1,700 MHIP care providers working in collaborative care “teams” across the state of Washington, and includes over 16,000 patient records during the study period, from January 1, 2007 through December 31, 2010.

In MHIP, providers share responsibility for patient health care needs and outcomes. Providers are required to meet quality aims, or formal, organization-wide care quality benchmarks. Providers’ abilities to meet these aims depends in part on their patients’ health outcomes as recorded in the program’s Mental Health Integrated Tracking System. Therefore, MHITS not only includes patient health and sociodemographic information, but also documentation of the unique skill sets that providers have (e.g. area of expertise), providers’ experience (e.g. tenure in the organization), and quality aims achievements. For this dissertation, administrative data on gender was added to MHITS user information. This system archives initial patient condition and characteristics, patient progress, the providers who are on any given patient’s team, provider information, and team communication patterns over the study period beginning January 1, 2007 and ending December 31, 2010. MHITS documents collaboration among providers by tracking communication within teams (messages, information and invitations for other providers to join the team are archived as they are contributed by individual team members).

Patients are initially referred into MHIP by their primary care providers at any one of the 148 primary care settings across the state. Upon referral to the program by their primary care provider,

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<sup>2</sup> Unützer, J., Katon, W., Callahan, C.M., Williams, J.W., Hunkeler, E., et. al. (2002). Collaborative care management of late-life depression in the primary care setting. A randomized controlled trial. *Journal of the American Medical Association*, 288 (22), 2836-2845.

patients are enrolled in MHIP by a Care coordinator. The Care coordinator is responsible for inputting patients' sociodemographic and social background information into MHITS, including information about which providers are involved in the patient's care, and for helping tailor care throughout the patient's time in the program.

Care coordinators assess patients for potential mental health conditions upon intake, and can request that other providers share in a patient's care, or join their patient's care team, by making a referral recorded in MHITS. Thus MHIP care providers who are not care coordinators are captured in MHITS, even though it is care coordinators primarily responsible for entering MHITS information. For example, a care coordinator can request that a psychiatrist, a domestic violence counselor, or veterans' services provider consult about their patient's case, and/or the care coordinator may directly refer the patient to them for a face-to-face assessment or interaction (each of which is specified in MHITS).

Care coordinators discuss their caseloads (e.g. new cases and cases needing treatment plan adjustment) with consulting psychiatrists on a weekly basis. Care coordinators then include information from these consults in patients' MHITS records. This way, all patients have access to consulting psychiatrists. Realistically, every patient has a primary care provider, a care coordinator, and a consulting psychiatrist on their team, regardless of whether a care coordinator and a consulting psychiatrist ever discuss a patient specifically during weekly discussions of caseloads.

Input from consulting psychiatrists that is specific to a given patient may result from direct psychiatric evaluations of the patient, or through consultations between care coordinators, consulting psychiatrists (and potentially through psychiatrist consults with primary care providers and other providers) are documented in MHITS patient records as psychiatric evaluations, or as psychiatrist notes. For the purposes of this study, teams "include" a consulting psychiatrist if the psychiatrist has evaluated the patient personally or if a psychiatrist note is included in a patient's MHITS record. In practice, it is likely that many more patients receive some amount of input from a psychiatrist via weekly check-ins between care coordinators and psychiatrists than what is documented in MHITS. However, because MHIP incentivizes care coordinators and others to document information in MHITS as part of meeting

organization-wide benchmarks (quality aims which are tracked with MHITS), much of the input from consulting psychiatrists will have been documented in patient records, especially where it is specific to a particular patient.

Care coordinators may refer patients to a number of other providers, including care managers who act in analogous roles as care coordinators, but who are located in “stepped up” acute care settings in community-based mental health centers. Referral for this kind of care is called “Level II care,” and it occurs when care coordinator determines that resources available at the primary care location are not sufficient for meeting the patient’s care needs. When patients are referred for Level II care, their progress is tracked in MHITS, and they may eventually “graduate” to receiving mental health care in the primary care location (this constitutes one example of “stepped down” care). As with other care decisions (such as seeking psychiatrist input), referral for Level II care may be based on many factors, some of which are considered in this dissertation.

Care coordinators may also refer patients to other providers outside of the Mental Health Integrations Program. These providers range widely, and may include members of the clergy, state-run assistance programs and agencies, homeless shelters, transportation services, relocations services, veteran services, religious and spiritual counseling. In these data, there were more than 260 types of providers outside of MHIP. Information about attributes relevant to these analyses (such as provider gender and tenure) was not readily accessible in MHITS. While resource limitations dictated exclusion of inter-organization referrals for the present analyses, inclusion of referrals to providers outside of MHIP may be fruitful in future analysis.

The primary function of MHITS is for tracking of patients by care coordinators. Other team members (such as consulting psychiatrists) are able to view information entered by their patients’ care coordinators. Viewing of patient MHITS records by or other providers (such as primary care providers) is probably very rare, limited to situations in which care coordinators and primary care physicians (who are co-located in primary care clinics) view care coordinators’ accounts together in-person.

Because of extensive documentation of care processes available in MHITS, the Mental Health Integration Program is an ideal setting in which to conduct an observational study of how and to what effects multiple providers' unique skill sets and expertise are applied to holistic, multidisciplinary, patient-centered care. Documentation occurs over a period of three years, so it is possible to see how teams are built, how patients progress in the program, and it becomes possible to examine consequences of team characteristics for outcomes such as patient health, provider quality aims achievements and organizational outcomes (such as provider turnover and agency-wide quality aims achievements) .

A collaborative care team is defined as the array of providers reported in MHITS who are affiliated with a patient's care during the patient's time in the Program. Clinics are defined as the location in which care is given to patients by providers. Agencies are defined as the larger health care organizations which oversee multiple clinics. While agencies operate in collaboration with one another under the umbrella organization (MHIP), these agencies may have their own unique formal and informal patient care and human resource procedures. In addition to the team characteristics examined in Chapters 2 and 3, clinics and agencies are approached as contextual units of analysis in Chapters 4, as these loci are also meaningful for mental health service procedure and policy intervention.

In much the same manner as Facebook users invite other users to attend an event, MHITS users can invite other MHITS users to attend to a patient. Also analogous to a social event held via Facebook, MHIP providers' decisions to attending the patient may depend on the characteristics of the patient, the Care coordinator who requests their involvement, and upon the other providers who are already attending to the patient.<sup>3</sup>

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<sup>3</sup> Likewise, a patient's decision to engage in care that has been requested by their care coordinator may depend much on that patient's characteristics, the relationship between themselves and the care coordinator, the care coordinator's attributes, and the attributes and relationships already available to the patient on his/her current care team, and patients' propensity to engage in care (by remaining in the treatment program for 30 to 90 days) based on these characteristics is examined in Chapter 4.

## Sample

The sample for all three studies (Chapters 2-4) was limited with regard to individual-level MHITS data on patients based on several considerations: Children were excluded from the analysis because mental health symptoms, diagnoses, and treatment outcomes for children are measured differently than for adults and are in many ways not comparable to measures used for adults. This makes it difficult to test general links between team structures and outcomes for patients, and because guardians (whose information would not be captured in the MHITS record) may contribute to decisions and care processes.

Because of the focus on effects of team processes on outcomes it was necessary to limit the sample to patients whose teams had completed the team-building and treatment process entirely. Of the 15,925 adults participating in MHIP during the study period, 11,614 were documented as having disenrolled from MHIP by the study period's end. Any patients who may have disenrolled from the program to return at a later date (and complete the process again within the study period) were unidentifiable from others in the data, and would be counted as separate patients. While the removal of ongoing care patients (patients who had not disenrolled from the program by study's end) and possibility of return patients prohibits conclusions from being generalized to a range of patient outcomes, but lends some precision to the discussion of team processes and their effects on a limited number of clearly defined and documented outcomes. Descriptive statistics of sample variables (measures) appear in Table 2.

## Chapter 2: Explaining Collaborative Care Team Size and Composition

The present chapter introduces the collaborative care model and how it is designed to rely on patients' clinical characteristics to drive collaborative decisions about team size and composition. The chapter then reviews empirical links between patient characteristics and sociodemographic disparities in health care, and presents status characteristics theory. Status characteristics theory suggests how individual patient health outcomes (and perhaps disparities in care) might be affected by social processes linked to team-level characteristics such as collaborative care team size and composition. This study focuses on how clinical and sociodemographic characteristics of patients are associated with team size and composition, and asks two main questions: (1) How does size and composition vary between teams in the collaborative care organization as a whole? (2) How do baseline patient characteristics relate to team size and composition over the course of care?

The current chapter is the first of three studies focusing on patient characteristics and team variation. Chapter 3 (study 2) explores the extent to which patients' and providers' status characteristics are associated with team composition and care processes (such as amounts of deliberation among team members). Chapter 4 (study 3) focuses on whether team-level differences are associated with patient health and care outcomes over and above what could be expected given patient and provider characteristics alone.

### Background

“Stepped” psychiatric care rests on the premise that patient needs are unique. On one hand, some patients suffer from co-occurring mental illnesses. For example, a patient could suffer from Major Depressive Disorder (MDD, which I will call depression) as well as from Post-Traumatic Stress Disorder (PTSD), while another patient could suffer from depression and no other disorder. In this study, “complexity” will refer to the count of mental health disorders from which a patient is diagnosed as suffering, as classified by the DSM. A patient diagnosed as suffering from depression as well as from Generalized Anxiety Disorder (or GAD, which I will call anxiety) will be termed as having higher

complexity than a patient diagnosed as suffering solely from GAD (see *Measures*, below).<sup>4</sup> Complexity is my first measure of patient need.<sup>5</sup>

On the other hand, patient needs can be unique in that symptoms and experiences associated with the same diagnosis/disorder may vary from patient to patient. For example, a patient suffering from anxiety may experience a symptom of the disorder (such as the overwhelming sense that something terrible is about to happen) seven days out of a given week, and these symptoms may interfere with the patient's daily activities. However, a different patient suffering from anxiety may not experience this particular symptom at all, or may experience this symptom four days in a given week without interference with activities. "Severity" will refer to the extent to which symptoms of mental health disorders present themselves as measured by scores on clinical screeners and diagnostic tools. Severity is my second measure of patient need.

Building upon the premise that patient needs are unique, collaborative care as a general resource allocation model rests upon three basic assumptions about overall distributions of need and care (Bower and Gilbody 2005). When interpreted in light of stepped and cost-offset models of mental health care delivery (e.g. Newman 2000 and Davison 2000) and applied to collaborative care (Unützer et al 2003), these three assumptions provide researchable expectations for the distributions of need and care, as well as a helpful backdrop ("null hypotheses") against which to compare hypotheses derived from social theories. As they relate to the present study, Bower and Gilbody (2005:13)'s three assumptions can be defined as follows: (1) the "equivalence assumption" states that, for the majority of patients in psychiatric care, minimal interventions can provide 'significant health gain' equivalent to that of more intensive

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<sup>4</sup> This chapter defines patients presenting fewer mental illnesses as less complex cases than those presenting greater numbers of mental illness diagnoses, and analyzes complexity as a count variable (i.e. the study makes no assumption that patients suffering from two disorders are twice as complex as those suffering from one disorder. Also, this study does not differentiate between types of mental illness. However, complexity, defined here, is not the same as "diagnostic challenge." UW AIMS Center hypotheses included that patients with some diagnoses (such as PTSD) have greater likelihood of larger, more specialized teams because of the greater diagnostic challenge presented by those diagnoses. Chapter 3 explores variation in team size, composition, and decision making across mental illness diagnoses.

<sup>5</sup> The current study does not account for co-existing medical conditions (such as diabetes); for discussion see Chapter 5 "Next steps."

traditional psychological therapies; (2) the “efficiency assumption” states that using minimal interventions will therefore allow current healthcare resources to be used more efficiently, in that more intensive (and expensive) therapies can be applied to the smaller proportion of patients who do not achieve significant health benefit from minimal interventions; (3) the “acceptability assumption” states that minimal interventions and the multi-level “stepped care” approach are acceptable to patients and professionals in terms of equity in process and equality in patient outcomes.

Broadly interpreted, the equivalence assumption posits that most collaborative care teams in the organization will be small and composed of “core” team members (i.e. team membership will be limited to primary care providers, care coordinators, and patients). Secondly, distributions of patient care needs (severity and complexity) will be positively skewed.<sup>6</sup>

The efficiency assumption posits positive association between severity and complexity on one hand, and team size and composition on the other. Larger team size and more diversity of expertise within teams is expected to be associated with greater severity and greater complexity<sup>7</sup>.

Third and finally, the acceptability assumption posits that unequal resource allocation (i.e. human resource allocation with respect to the numbers and types of providers on teams) via provision of minimal interventions for the majority of patients and more intensive interventions for the minority of patients (i.e. the stepped care approach) can be ethically acceptable to patients and providers. This assumption reflects stepped care’s goal of a uniform distribution of mental health outcomes (severity and

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<sup>6</sup> This expectation, based on Bower and Gilbody’s equivalence assumption, was developed with input from an advisory body that included academic researchers and leaders in integrated mental health care practice. Researchers and practitioners at the University of Washington Center for Advancing Integrated Mental Health Solutions hypothesized that patient severity and complexity in the present sample will follow a distribution strongly skewed to the right, and this is consistent with Bower and Gilbody’s argument.

<sup>7</sup> This expectation, based on Bower and Gilbody’s efficiency assumption, was also developed with input from an advisory body that included academic researchers and leaders in integrated mental health care practice, and as a starting point is judged to be consistent with the general intent and design of collaborative care. Researchers and practitioners at the University of Washington Center for Advancing Integrated Mental Health Solutions hypothesized that team size and composition (increased diversity and specialization) in the present sample would be strongly positively skewed, and that both of these factors would be positively associated with patient’s severity and complexity measures. This is consistent with Bower and Gilbody’s argument.

complexity upon program exit) regardless of severity and complexity at intake. In other words, stepped psychiatric care aims for equality of outcomes as opposed to equality in care and treatment, while variation in treatment adherence, completion, and symptom improvement results from individual-level patient variation. The intent of collaborative care is to provide improved care (compared to usual care) for the population by targeting and adjusting care for patients whose illness does not respond to baseline care. In order to achieve equitable mental health outcomes regardless of patients' initial conditions, allocation of resources in collaborative care is explicitly unequal.

## Research Questions

### *(1) How do collaborative care teams vary in size and composition?*

The collaborative care model assumes that demand (patient need) and resources (how many and which kinds of providers) are distributed in certain ways. I test these assumptions by describing overall variation in patient need in my sample, and by describing how care varies in terms of how many and which kinds of providers compose care team. These descriptions illustrate the extent to which expectations about distribution of resources hold up, and they suggest the extent to which sociological theories might be applied for a more nuanced and accurate understanding of how mental health resources are distributed in the population.

### *(2) How does team size and composition over the course of care relate to clinical and sociodemographic characteristics of patients?*

After describing variation in patient need and care, I illustrate how team size and composition are associated with baseline patient characteristics. By design, the collaborative care model posits that team size and composition are driven by clinical characteristics of patients. However, empirical research suggests that non-clinical patient characteristics are also significant predictors of the type of care patients receive (van Ryn and Burke 2000; van Ryn 2002; Burgess et al 2004; in mental health see: Skaer et al 2000; Lin et al 1997; Potts, Burnam and Wells 1991; for review see Schraufnagel et al 2006). Empirical research and status characteristics theories each suggest alternative hypotheses about how patient

sociodemographic characteristics are associated with care distribution. In this section, I analyze how care team size and composition are distributed across patient sociodemographic characteristics, and how patient sociodemographic characteristics vary with clinical need.

The chapter concludes with an analysis of which patient characteristics appear as main drivers of team dose, and whether differences in receipt of collaborative care are consistent with previous research on treatment disparities in mental health.

### Theory and Hypotheses *Expectations for Stepped Care*

Expectations drawn from Bower and Gilbody's assumptions, and interpreted in light of research and leading integrated mental health practice, propose no systematic variation in "team dosage" other than what is generated by patients' clinical need, as determined by complexity and severity measures<sup>8</sup>. Bower and Gilbody's three assumptions describe collaborative care as a powerful resource allocation and speak to the intent and design of collaborative care not only toward improved care for individual patients, but toward equity across the patient population. Collaborative care intends for variation in observed processes is a direct reflection of variation in patient clinical needs. In other words, the "dose" of team care a patient receives (the number and type of providers on a patient's team) is based on complexity and severity. The acceptability assumption is explored in Chapters 3 and 4, while

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<sup>8</sup> By design, allocation of resources (team size, diversity in expertise) in collaborative care is expected to vary by severity and complexity. With regard to effects of care resources on patient outcomes (approached in Chapter 4), confounding by severity and complexity presents a problem: the four measures of severity analyzed in the present set of studies (scores on clinical screeners and diagnostic tools depression, anxiety, PTSD; and count of diagnoses of disorder) captures only a few ways in which patient needs can differ. Because collaborative care is designed to allocate greater resources to more severe cases, conclusions about direct relationships between particular types of resources (e.g. evaluation of the patient by a consulting psychiatrist) and better or worse patient outcomes are subject to confounding between severity/complexity and health outcomes. Rather than focusing on causality between resources and outcomes, exploration of whether care processes can be included as valuable causal mechanisms in the relationship between patients' needs of at baseline and their ultimate health outcomes constitutes the main contribution of this set of studies.

equivalence and efficiency assumptions are taken up in the present chapter. The set of expectations explored in the present chapter are as follows:

*As severity increases, team size increases.*

*As severity increases, team composition becomes more diverse: greater likelihood of inclusion of additional providers, such as care managers and consulting psychiatrists (see Measures, below).*

*As complexity increases, team size increases.*

*As complexity increases, team composition becomes more diverse: greater likelihood of inclusion of additional providers, such as care managers and consulting psychiatrists (see Measures, below).*

Collaborative care expectations are a helpful backdrop for disparities research and insight into how care is associated with patient characteristics. They also create “null hypotheses” against those drawn from status characteristics theory, which suggests that this resource allocation or “team dose” (i.e. team size and composition) is also based in part on team-level characteristics within collaborative care.<sup>9</sup>

#### *Sociodemographic Disparities in Mental Health Care*

Among patients who do obtain mental health treatment, predictors of receiving high quality (guideline-concordant) care consistently include being Caucasian, female, severely ill, and having mental health insurance coverage (Wang et al 2000, Young et al 2001; see Schraufnagel et al 2006). Even though prevalence rates of mental health disorders such as depression appear to be comparable across US demographic groups (Skaer et al 2000), sociodemographic disparities in mental health care and treatment remain widely documented and persistent (Institute of Medicine 2001, 2002; U.S. Department Health and Human Services 2000, 2001, 2003; Takeuchi et al 1995; Unützer et al 2006; Snowden 2001; Boscarino et al 2005; Schulman et al 1999; Tobin 1987; for reviews see Smedley et al 2003, Atdjian and Vega 2005; and Schraufnagel et al 2006).

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<sup>9</sup> In addition to suggesting that team-level characteristics affect resource allocation (team size and composition, present study), status characteristics theory also suggests that these team-level characteristics may also impact care processes (Chapter 3) and patient health outcomes (Chapter 4).

Gender, age, race and ethnic differences in treatment may be due to divergent rates of treatment initiation once patients are referred, and/or with adequacy of treatment once initiated. Patients who are provided the treatments they prefer are more likely to initiate treatment (Eisenthal et al 1979), more likely to effectively engage in treatment (Roy-Byrne et al 2003; Chilvers et al 2001; Schulberg et al., 1996; Dwight-Johnson et al.2001; van Schaik et al. 2004) and more likely to overcome avoidance of mental health services (especially where patients may be at risk for or suffering from PTSD [Roy-Byrne et al 2003: 164-165]). Patient-centered care, which explicitly incorporates patient preferences toward the goals of reduced dropout and better adherence, is largely based on these findings.

Patient characteristics such as gender, employment status and socioeconomic status tend to impact treatment preferences to a large extent (Roy-Byrne et al 2003; Feeny et al 2009; Dwight-Johnson et al., 2000; Hazlett-Stevens et al., 2002), as do characteristics of the proximal cause of the disorder for which help is sought also affects treatment choice. For post-traumatic stress disorder, patients have been shown, generally, to prefer counseling to medication. However, the proximal cause of trauma affects treatment choice vis-à-vis patient gender: in a ten-week open-choice treatment trial for patients exposed to trauma (i.e. who had been victims of assault), medication was more likely to be preferred by women than by men. Female victims of assault tended to have experienced sexual assault, and male victims tended to have experienced physical assault (Roy-Byrne et al 2003:163); the nature of these two different experiences of assault could be associated with increased levels of avoidance (i.e. patients are less likely to engage in therapy over medication; 2003). In another study, women with chronic PTSD (as opposed to having recently experienced trauma) tended to prefer prolonged exposure therapy (PE) over medication (Feeny et al 2009). This study also found that preference for medication was also associated with less-than full-time employment, and not having a college degree (Feeny et al 2009: 726). Treatment adherence for mental illness such as depression and anxiety has been shown to be significantly better for non-Hispanic patients (Sleath et al 2003:202 *Table 2*), while elderly patients are less likely than younger patients to receive adequate care (e.g. Harmon et al 2003).

Providers' perceptions about patients (including perceptions about different patients' orientations to various kinds of treatment, potential to benefit from certain treatments, and potential to recover from various health problems) are often based in part on patient race, ethnicity, socioeconomic status, and sex (van Ryn and Burke 2000; van Ryn 2002; Burgess et al 2004; Schulman et al. 1999; in mental health see: Skaer et al 2000; Schraufnagel et al 2006; Potts, Burnam and Wells 1991). In depression care, provider-level interventions to combat biases (interventions such as giving providers supplemental education, informational support and better access to screening tools and treatment guidelines) has sometimes lead to improved rates of depression *diagnosis* between patient sociodemographic groups (e.g. Lin et al 2001). However, these individual-level interventions have not lead to significant improvement in depression outcomes disparities (Lin et al 2001; Calahan 1994; Katon and Gonzales 1994; Callahan et al 1996; Brown and Schulberg 1994; Unützer et al. 2002; Unützer et al. 2006:39; Calahan 2001).

While Roy-Byrne et al (2003) conclude that individual-level interventions (education, informational support, access to screening tools) have been insufficient for achieving uniformity in treatment outcomes, but the effectiveness of these more recent interventions is as yet unknown. More recent efforts to reduce provider biases include strategy and skill development for medical trainees and practicing physicians. These strategies are designed to enhance personal motivation for providers to reduce bias and to improve their ability to build partnerships with patients (Burgess et al 2007).

Thus far, research suggests that patient and provider attributes and attitudes can foster disparities in some situations and settings, but this body of research only begins to specify which situations and settings are most likely to result in disparate outcomes for patients. Prior research on disparities yields some expectations for relationships between patient attributes and treatment behavior in the current sample (measured by patients' team size and composition), and these expectations are listed in Table 1. Next, sociological theory will provide possible explanations as to where such relationships exist most strongly.

Table 1: Disparities research: hypothesized effects of patient attributes and collaborative care team “dose.”

| Patient Factors                  | Team size<br>(number of<br>providers on a<br>team) | Team dose<br>(odds ratios for psychiatric<br>evaluation, psychiatrist input<br>and Level II referral) |
|----------------------------------|----------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Female (vs. Male)                | +                                                  | +                                                                                                     |
| Caucasian (vs. all other groups) | +                                                  | +                                                                                                     |
| Hispanic (vs. non-Hispanic)      | -                                                  | -                                                                                                     |
| + Age                            | -                                                  | -                                                                                                     |
| + Socioeconomic Status           | +                                                  | +                                                                                                     |
| Immigrant (vs. non-immigrant)    | -                                                  | -                                                                                                     |

Patients’ demographic characteristics are systematically associated with treatment and outcomes, and innovative interventions for dealing with provider bias are underway. However, findings are mixed regarding when and where certain characteristics will result in different treatment decisions and lower quality care. Ways that patient clinical and demographic characteristics interact to affect decisions and outcomes for different types of providers is unknown. Group process theories argue that demographic characteristics alone cannot explain decisions and other outcomes for individuals or dyads, let alone within more complex groups, such as those necessitated by the patient-centered, integrated, collaborative care model. Rather than arguing the importance of demographic characteristics alone, this family of theories focuses on conditions and processes in which various combinations of demographic and other personal characteristics are turned into “status characteristics” powerful enough to impact outcomes (Pfeffer 1985, Lawrence 1997).<sup>10</sup>

Several theories and models on compositional effects of demographic characteristics within groups have been established and applied to explain a variety of organizational processes, and even

<sup>10</sup> Lawrence (1997) referred to this as the black box of organizational demography: “Demographers frequently invoke untested subjective concepts to explain the relationship between demographic predictors and organizational outcomes . . . as a result, untested subjective concepts remain poorly defined and their relationships, timing, and context consistently underspecified. Available data substantiate this problem. The literature does not show reliable, strong relationships between demographic predictors and the subjective concepts commonly used to explain organizational outcomes . . . it creates a black box where contents remain unknown.” (1997: 20), noted and applied to task groups by Horwitz and Horwitz 2005, p. 223. See Pfeffer 1985 for discussion of demographic concepts and organizational outcomes such as innovation, performance, and management succession.

decisions within health care<sup>11</sup>. While these theories have not been used to explain patient health outcomes, some empirical research on the effects of blending various individual characteristics on team process, efficiency, and behavioral outcomes<sup>12</sup> within teams exists (e.g. Horwitz and Horwitz 2005, 2007; in mental health care: Litchenstein et al 2004) and is reviewed below.

### *Status Characteristics in Collaborative Care*

A status characteristic is any characteristic around which an individual's evaluations of and beliefs about a person can come to be organized (Berger, RosenHoltz and Zelditch 1980: 479). Status characteristics typically include gender, race, ethnicity, age, and socioeconomic status. Through interpersonal interactions, these characteristics become the bases of observable inequalities in task-oriented groups. Rather than focusing on demographic differences as descriptors of individuals (e.g. patient traits) and predictors of behavior (e.g. provider's treatment decisions), this theory focuses on how demographic descriptors "activate" under certain conditions to become status characteristics that organize beliefs and create relative differences in power and prestige within groups. When this happens, status characteristics can become significant drivers of individual behavior, and ultimately the bases for inequality. From this standpoint, demographic differences do "affect" outcomes, but only in ways that are situationally specific and alterable (Wagner and Berger 1997; Berger, RosenHoltz and Zelditch 1980; Correll 2007; Webster and Hysom 1998)<sup>13, 14</sup>.

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<sup>11</sup> Compositional effects of status characteristics have been linked to team process outcomes in healthcare which concern top management teams rather than patient care (for example, outcomes studied include: cohesion, Janis 1972; promoting debates and dissents, Willians and O'Reilly 1998, Peterson et al 1998; quality and process of strategic decision making in hospitals Dooley and Fryxwell 1999).

<sup>12</sup> At least one study links team composition to prescribing behavior, Rodriguez et al 2008.

<sup>13</sup> According to Wagner and Berger (1997): Two types of status characteristics typically exist: specific and diffuse. Expectations are specific if they refer to actors' expectations for performance in a specific, clearly defined situation. Expectations are general if they are not limited to a specified situation. For example, "mathematical ability" is generally understood to carry specific expectations, "intelligence" to carry general expectations. *Specific characteristics* then involve two or more states that are differentially valued, with each state associated with a distinct specific expectation state. For example, reading ability may function as a specific status characteristic. We differentially evaluate levels of reading ability, and we associate specific levels of performance at specific tasks with each level of reading ability. *Diffuse characteristics* also involve two or more differentially valued states. However, in this case there are distinct sets of specific expectations and a general expectation associated with each state of the characteristic. These specific and general expectations carry the same evaluation as the state of the

Status characteristics theory claims that each individual possesses multiple status characteristics (gender, race, and so on)<sup>15</sup>. Each individual also possesses conscious or unconscious associations between each of these characteristics and positive expectations for a given task (success), or negative expectations for a given task (failure). When individuals evaluate an actor (whether the actor is the self or others), they take mental stock of the positive and negative implications associated with the set of status characteristics they perceive, weighing most heavily the expectations that are associated with the status

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characteristic itself. Gender, race, ethnicity, educational attainment, and physical attractiveness all sometimes serve as diffuse status characteristics. For example, when we differentially evaluate males and females, associate specific levels of ability at a variety of different tasks with each gender, and expect members of one gender to be generally more capable than those of the other, then gender operates as a diffuse characteristic. There is extensive evidence that gender serves as a diffuse status characteristic for many people (See Berger et al. 1980 for a detailed discussion of some of this evidence.)

<sup>14</sup> Expectation-states theory was originally developed to explain Bales' finding that problem-solving groups of status equals evolved stable, "intercorrelated inequalities." According to the theory, "expectations" about future performance arise out of the task-related interaction of members of the group. Once expectations emerge, they determine the different types of subsequent task-related interactions, both in terms of what action occurs and how action is interpreted, in such a way that the expectation states are confirmed (and are so maintained) by the very interaction that depends on them (Berger 1958; Berger & Snell 1961; Berger, Conner & McKeown 1969; Berger & Conner 1969, 1974; Fisek 1968, 1974). External status differences can instantaneously create stable inequalities, assuming that expectation states not only arise out of interaction but also by prior beliefs about and evaluations of the characteristics possessed by members of a group (who are strangers but who may differ in observable external status) (see above and Berger et al 1966).

<sup>15</sup> Arguably, ascribed characteristics are analogous to diffuse status characteristics; achieved characteristics can arguably be analogous to specific status characteristics, because the characteristic is based on performance, choice, practice, individual effort, competition [i.e. behavior], and these two concepts applied to characteristics here may operate in the same way in that they are associated with success or failure and used to explain decision making behavior. However, while it is acceptable to consider that various levels of mental health are "achievable," the author finds it unclear and inappropriate, given the current state of the field, to term mental health scores and diagnoses (especially at baseline) either as "ascribed" (consider the possibility of being born with a disorder) or "achieved" (consider the possibility of being diagnosed with a disorder or as recovered from a disorder), nor as "specific status characteristics" as established in the literature by Berger (esp. 1977) and as applied by Correll and Ridgeway. Therefore, where scholars of stratification and social mobility may be tempted to apply the terms "ascribed" and "achieved" characteristics, and where scholars of social psychology may be tempted to apply the term "specific status characteristics" to refer to expectations for the specific task of recovery, the author argues presently that mental health screeners do not measure *aptitude* for recovery – they measure current condition. On one hand, clinical characteristics closely resemble the function of "individuating information" in economics and behavioral economics literature; however actual use of clinical information for *individuation* regarding performance expectations vs. *generalizing* about expected benefit from medical treatment options, given foundational assumptions collaborative care model, is empirically unknown and conceptually shaky. Therefore, the terms "diffuse status characteristics" and "status characteristics" are used interchangeably, and the term "clinical characteristics" is used to distinguish scores on mental health screeners and prior diagnoses, symptoms and treatment.

characteristics that they perceive as most relevant (Berger, RosenHoltz and Zelditch 1980).<sup>16</sup> The strength of associations between status characteristics and expectations varies according to the relative salience of the characteristic, and the task at hand.

When a status characteristic is consciously or unconsciously assumed to be relevant to a task, it becomes salient. However, in the presence of other status information that is (a) also relevant to the task and (b) disproves the relevance of the characteristic for the task inconsistent with the expectation associated with the status characteristic at hand, a status characteristic is no longer salient. In this case, the characteristic is no longer a primary means of expectation formation, and it is not likely to become the basis for behavior.

Individual behavior is based on expectation formation in the following way: an individual forms an overall expectation for an actor based upon the actor's set of status characteristics, and the performance expectations that the individual associates with each characteristic the actor possesses. The individual then assigns "high" or "low" status to the actor for a given task, and affords the actor opportunities to participate in the task based upon the actor's high or low status (high status receives more opportunity to participate in the task, low status receive fewer opportunities to participate in the task).

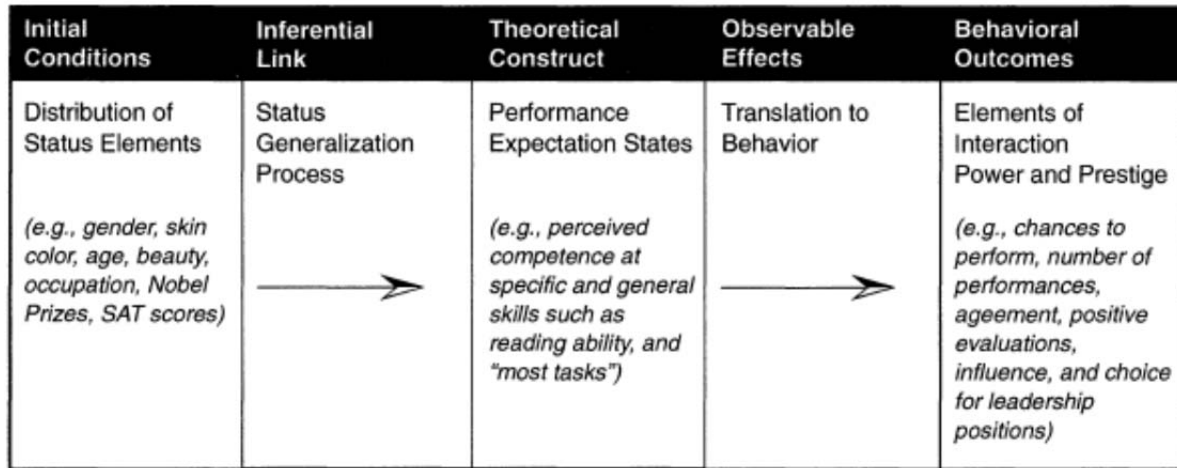
The present chapter asks how patient clinical and sociodemographic characteristics may interact with provider expectations to affect the composition teams. Study 2 focuses on whether patient and provider status characteristics may affect processes within the team. Study 3 focuses on the extent to which status characteristics (of patients and providers) may drive health and care outcomes, in addition to

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<sup>16</sup> Scope conditions applying to Berger, RosenHoltz and Zelditch (1980) are similar in the present study. Berger et al (1980: 483-484) write: First, we deal only with groups engaged in tasks-i.e. actions in which there is (a) a goal, (b) some idea of the difference between success and failure in achieving the goal, and (c) some idea that the contributions of group members affect success and failure in achieving it. Second, we deal only with groups-i.e. sets of two or more individuals who think of themselves as jointly responsible for the outcome and who are therefore oriented toward a collective decision. Third, we study primarily the power-prestige order of the group, an order that includes only the task-related activities of the members: (a) the opportunities given to members to perform (e.g. by being asked questions, or simply by being looked at); (b) the performance outputs of the members (such as opinions, suggestions, or information relevant to the task); (c) the evaluations of these performance outputs communicated by the members; and (d) influence, i.e. resolution of disagreements in the favor of one rather than another member's views.

what we would expect given clinical characteristics. The figure below illustrates Webster and Hysom's (1998:354, *Figure 1*) generalized model of the status organizing process<sup>17</sup>:

Figure 1: Status Organizing Processes



Starting at the left, the distribution of status characteristics possessed by actors is an observable set of initial conditions. Unless those status characteristics are known to be irrelevant, they create aggregated performance expectation states, depicted in the shaded, unobserved, portion of [the figure]. Performance expectations are unobservable theoretical constructs; they translate to observable components of a group's power and prestige structure, shown at the right-hand side of the figure. Thus the theory explains interaction advantages and disadvantages associated with status characteristics as consequences of the ability inferences, or performance expectation states, created by status generalization (Webster and Hysom 1998: 353).

In their research on information processing in teams, Van de Ven and Ferry (1980) find that structural aspects of tasks are likely to condition ways that individual characteristics alter outcomes. Because tasks dictate which characteristics are perceived during initial conditions, tasks are especially important in the creation of status characteristics and performance expectations. Wagner and Berger (1997) provide examples of tasks widely perceived as male (e.g., automotive repair), female (e.g., pattern

<sup>17</sup> The authors Webster and Hysom abstract and generalize from Berger et al (1997), Webster and Foschi (1988), Wagner and Berger (1993), who originally abstracted from Ridgeway (1991), to theorize a "status generalizing process" in which the emergence of new status characteristics (i.e. other than gender and skin color) could be explained. I retain Wagner and Berger's (1997) term "status organizing process," and its link to Weber's notion of multiple bases of stratification (i.e. Wagner and Berger (1997) do apply their "status organizing process" to new status characteristics, only just prior to the introduction of Webster and Hysom's "status generalizing process."

sewing), or neutral (e.g., vegetable gardening). When tasks (e.g. auto repair) are associated with a particular state of a characteristic (e.g. the task is a male or female task), that characteristic (e.g. gender) is likely to be perceived as highly relevant to an individual actor's success at the task. In this case, individuals who possess the positively associated state of the characteristic (e.g. maleness) are likely to elicit higher expectations for success at the task (auto repair). Then, based on higher expectations, individuals assign higher status to those in possession of the preferred state of the characteristic (e.g. males) with regard to the task (auto repair), and *behave accordingly* by affording those actors (males) greater opportunity to participate in the task (agreement or lack of resistance to auto repair, requests for instruction on how to complete repairs, etc).

In research by Lichtenstein et al (2004), females (female nurses in particular) were less likely than males to participate in psychiatric team decision making. These authors conclude that status hierarchies in broader social context affect status, roles, and functions within teams, via opportunities for participation.

In the collaborative care context, provider expectations about patient treatment preferences, adherence, and potential to benefit from care may be based on gender, age, race and ethnicity. Opportunities for aspects of care may be afforded based on “high” or “low” status, as determined by sociodemographic characteristics and structural aspects of the task. Female gender may be associated with decreased opportunities for providers (above, Lichtenstein et al 2004), however it may be associated with *increased* opportunities for patients to participate in care decisions, because of differences in gender associations between patient- vs provider-roles<sup>18</sup>. Female patients may more fully engage in care decisions because providers may associate the task (receiving care) with female gender, may assign higher status to female patients with regard to treatment adherence and benefit, and may afford more opportunities for female patients to participate in various aspects of treatment.

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<sup>18</sup> This assumes that patients want more treatment, and that differences in team composition are not due to male patients refusing to participate in treatment; next steps can look at “closed referrals vs. refused...”

Some tasks in collaborative care are associated with greater uncertainty and may “activate” status characteristics more so than others. As explained above, when task-relevant information is missing or vague, individuals are likely to rely on characteristics such as gender, age and race in their formulations of performance expectations<sup>19</sup>. In the research setting, clinical characteristics associated with greater uncertainty are understood to generate greater likelihood of referring a patient to a consulting psychiatrist (as opposed to discussing the patient during weekly check-ins between care coordinators and consulting psychiatrists)<sup>20</sup>. According to status characteristics theory, in-person psychiatric evaluation should be associated with greater differences between male and female patients, racial and ethnic minorities as opposed to Caucasians. The present study is limited to three measures of severity (for depression, anxiety and PTSD) and one measure of complexity (count of mental health diagnoses), however associations between gender, race, and ethnicity, and more intensive care tasks associated with greater uncertainty (such as psychiatric evaluation), and more routine care tasks associated with lesser degrees of uncertainty (such as input from a psychiatrist without an in-person evaluation).

For “team dose” as it relates to patient characteristics, status characteristics theory provides similar expectations as disparities research tested in this chapter (summarized in Table 2) and adds the following expectation:

*Differences in team dose associated with patient sociodemographic characteristics should vary in magnitude according to uncertainty associated with the care task: tasks associated with more uncertain conditions (in this case, the more intensive “stepped up” task of in-person psychiatric evaluation) will be associated with relatively greater differences by gender, age, race and ethnicity; less intensive tasks will be least associated with relatively smaller differences by gender, age, race and ethnicity.*

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<sup>19</sup> See also Reskin and McBrier 2000 for an overview of various group processes affecting employment decisions within organizations.

<sup>20</sup> Dr. Wayne Bentham, personal communication, April 13, 2011.

## Measures

### *Care Team Attributes (Team Composition)*

*Level II*: a binary variable indicating whether a patient was ever referred outside of the primary care setting, to Level II care as described in “Setting.” Level II care occurs at a community-based mental health center for mental health care and involves care management by a different type of provider (a care manager). *Level II* indicates that patient need is greater than what can be met by MHIP resources available at the primary care location. Referral to *Level II* is made by MHIP care coordinators and may be considered referral to an MHIP care manager.

*Psychiatrist input*: a binary variable indicating whether a patient was referred for psychiatric evaluation by a consulting psychiatrist (CP) or whether a psychiatrist note appeared anywhere in the patient’s MHITS record. At a minimum, this variable indicates discussion between care coordinators and psychiatrists about specific patients, and may indicate direct psychiatric evaluation of the patient by a psychiatrist (i.e. the consulting psychiatrist conducts an in-person evaluation of the patient his or herself). Summary statistics for psychiatric evaluation (*Evaluation*) appear in Table 2 for reference only.

*Team size*: all MHIP providers have unique MHITS user identification numbers, which were assigned unique study identification numbers. Team size is the count of unique provider study identification numbers that appear in a patient’s record. Providers’ study identification numbers could appear in a patient’s MHITS record as a result of one or more of the procedures: initial assessment; follow up assessments; psychiatrist notes; treatment planning; internal referrals<sup>21</sup> (including Level II referrals, psychiatric evaluations, psychiatrist notes, referrals to primary care, and more); and discharge notes. Using documentation of each of these procedures for each patient, I gathered study identification numbers of providers who personally assessed the patient, providers who physically entered information, and

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<sup>21</sup> In the present study, “teams” are comprised only of MHIP providers in the Mental Health Integrated Tracking System, as opposed to non-MHITS providers included as part of an extended team. (In practice, Care coordinators may also refer to professionals who work at other organizations such as churches, 12-step programs, and homeless shelters. While these professionals are integrated into MHIP patients’ mental health care via referral from an MHIP provider – typically a Care coordinator, these professionals may not be formally involved in the Mental Health Integration Program). An untitled manuscript related to this dissertation will examine the impact of inter-organizational referrals, or extended team size and composition, on patient health and care outcomes.

providers who modified this information, as applicable. Not all patients at MHIP went through all of these processes, nor did patients always encounter the same provider each time they received care (e.g. a follow up assessment). Teams can include a variety of providers (see *Note Team composition*, below). However, at minimum teams include the patient, a patient's primary care provider, and a care coordinator, making "three" the smallest possible team size.

*Note Team composition:* To measure team composition, I first created fifteen binary variables indicating whether MHITS users were one of the following types of providers: Administrator, Level 1 Site Manager, Care coordinator, Care manager, Primary care provider, Consulting psychiatrist – Unrestricted, Data Manager, Consultant - No PHI, Site Manager L2, Consultant L1, Consultant L2, Community Service Office, Reviewer, Consulting psychiatrist, and Disability Outreach Worker.

#### *Patient factors*

*Case complexity* is operationalized as the number of diagnosed mental disorders a patient is suffering (upon program intake). Complexity will refer to the total count of the following array of diagnosed mental health disorders, as classified by the DSM and as documented in patients' MHITS health records: Depression, Anxiety, Bipolar Disorder, Psychotic Disorder, Chronic Pain, Cognitive Disorder, Post-traumatic Stress Disorder, a pending mental health diagnosis, Substance Abuse Disorder.

*Depression severity:* a count variable indicating a patient's score on a screening and diagnostic tool for depression (a nine-item Patient Health Questionnaire, PHQ-9) where scores range from 0 to 27, and higher scores indicate greater depressive symptom severity.

*Anxiety severity:* a count variable indicating a patient's score on an anxiety screening and diagnostic tool GAD-7 (where scores range from 0 to 21, and higher scores indicate greater anxiety symptom severity).

*PTSD severity:* a count variable indicating a patient's score on a screening tool for posttraumatic stress disorder (the PCL-C) where scores range from 17 to 85, and higher scores indicate greater severity.

*PTSD screened:* a binary variable indicating whether a patient was screened for PTSD symptoms (using the PCL-C) at their initial (first) assessment.

*Patient sociodemographic factors*

*Age:* a continuous variable indicating years of age as of the patient's date of enrollment in MHIP.

*Gender:* patient's sex as male or female, as two binary variables (male = 1 or 0, female = 1 or 0).

*Race:* four categorical variables indicating whether race information was listed in a patient's MHITS records, as one of the following: African American (1 or 0), Caucasian (1 or 0), Asian (1 or 0) and all else (1 or 0). "All else" included patients whose MHITS record included designation of race as American Indian/Alaska Native, Hawaiian Native/Other Pacific Islander, Multi-racial, Unreported/refused to report, or which did not include race information. Because race information was unavailable for most of the sample (about 73% of patients in the sample are in the "all else" category, see Table 2), analyses can only be interpreted as suggestions of potential race effects, and may more directly measure factors such as care coordinator caseload (e.g. care coordinators who have lower caseloads may take time to gather race information from patients, while other may not).

*Hispanic:* a binary variable indicating whether Hispanic ethnicity was indicated in the patient's MHITS record, where 1 = Hispanic, 0 = non-Hispanic. Patients for whom no information was listed were coded as non-Hispanic.

*Immigrant:* a binary variable indicating whether the patient was recorded as having immigrated to the United States, where 1 = immigrant, 0 = non-immigrant. Patients for whom no information was listed were coded as non-immigrants.

*Transportation:* a binary variable indicating whether the patient reported having access to dependable transportation, where 1 = yes and 0 = no or no report.

*Employed:* a binary variable indicating whether the patient reported being employed (either full or part time), where 1 = yes and 0 = no or no report. Although information about transportation and employment status was most likely gathered upon patient's initial assessment, it is possible that they were gathered and/or updated at any point during a patient's treatment at MHIP. These measures are assumed to be baseline measure, but are interpreted with much caution.

*For reference: population:* binary variables indicating patient's source of eligibility for MHIP are included for reference in Table 2. Further analyses might approach such variables as a source of information about patients' social background and status in MHIP, as this status determined by the funding/insurance mechanism under which the patient receives mental health benefit. *Population* was operationalized as dummy variables for each of the following categories: *general assistance unemployable (GAU), veteran, family of veteran, mother, older adult, and chronically mentally ill.*

#### Summary

Table 2 provides descriptive statistics for patient clinical and sociodemographic factors, and care team attributes (key outcomes: team size, Level II referral, psychiatrist input, and psychiatrist evaluation).

Table 2: Variable names, descriptions, and descriptive statistics. N = 11,614

| Variable                                           | Variable Description                                                    | <i>n</i> | Mean<br>or <i>p</i> | SD    | min<br>/ N | max<br>/ Y |
|----------------------------------------------------|-------------------------------------------------------------------------|----------|---------------------|-------|------------|------------|
| Care team attributes (key outcomes)                |                                                                         |          |                     |       |            |            |
| Team Size                                          | Count of providers on the team                                          | 11614    | 4.40                | 0.82  | 3          | 9          |
| Level II Referral                                  | Patient is referred for MH care outside of primary care setting         | 11614    | 0.07                | 0.26  | 0          | 1          |
| Psych Evaluation                                   | Consulting psychiatrist evaluated the patient.                          | 11614    | 0.03                | 0.16  | 0          | 1          |
| Psychiatrist Input                                 | Psychiatrist gives patient-specific input to the PCP or CC              | 11614    | 0.32                | 0.47  | 0          | 1          |
| Patient factors (at baseline)                      |                                                                         |          |                     |       |            |            |
| Complexity                                         | Count of mental health diagnoses at intake                              | 11614    | 1.89                | 1.41  | 0          | 9          |
| Depression Severity                                | Score on PHQ-9 depression screener                                      | 11614    | 11.66               | 9.00  | 0          | 27         |
| Anxiety Severity                                   | Score on GAD-7 anxiety checklist                                        | 11614    | 7.55                | 7.99  | 0          | 21         |
| PTSD Severity                                      | Score on PCL-C posttraumatic stress screener                            | 11614    | 8.45                | 21.47 | 17         | 85         |
| PTSD Screened                                      | Patient was screened for PTSD                                           | 11614    | 0.14                | 0.35  | 0          | 1          |
| Social and demographic characteristics of patients |                                                                         |          |                     |       |            |            |
| Age                                                | Age at program intake (in years)                                        | 11614    | 40.51               | 12.00 | 18         | 99         |
| Gender                                             | Male                                                                    | 6144     | 0.52                | 0.50  | 0          | 1          |
|                                                    | Female                                                                  | 5470     | 0.47                | 0.50  | 0          | 1          |
| Race                                               | Caucasian                                                               | 2216     | 0.19                | 0.39  | 0          | 1          |
|                                                    | African American                                                        | 543      | 0.05                | 0.21  | 0          | 1          |
|                                                    | Asian                                                                   | 276      | 0.02                | 0.15  | 0          | 1          |
|                                                    | American Indian/Alaska Native                                           | 116      | 0.01                | 0.10  | 0          | 1          |
|                                                    | Pacific Islander                                                        | 29       | 0.00                | 0.05  | 0          | 1          |
|                                                    | Multiracial                                                             | 159      | 0.01                | 0.12  | 0          | 1          |
|                                                    | Refused to report                                                       | 227      | 0.02                | 0.14  | 0          | 1          |
|                                                    | Unknown                                                                 | 8048     | 0.31                | 0.46  | 0          | 1          |
| Other Race                                         | All Other Race (includes all except Caucasian, African American, Asian) | 8579     | 0.73                | 0.43  | 0          | 1          |
| Ethnicity                                          | Hispanic                                                                | 577      | 0.05                | 0.22  | 0          | 1          |
|                                                    | Non-Hispanic                                                            | 11037    | 0.95                | 0.22  | 0          | 1          |
| Immigrant                                          | Patient immigrated to the US                                            | 568      | 0.05                | 0.22  | 0          | 1          |
| Population‡                                        | General Assistance                                                      | 9105     | 0.78                | 0.41  | 0          | 1          |
|                                                    | Unemployable                                                            |          |                     |       |            |            |
|                                                    | Veteran                                                                 | 384      | 0.03                | 0.18  | 0          | 1          |
|                                                    | Family of veteran                                                       | 161      | 0.01                | 0.12  | 0          | 1          |
|                                                    | Mother                                                                  | 971      | 0.08                | 0.28  | 0          | 1          |
|                                                    | Older adult                                                             | 739      | 0.06                | 0.24  | 0          | 1          |
| Transportation                                     | Has access to reliable transport                                        | 3642     | 0.31                | 0.46  | 0          | 1          |
| Employment                                         | Employed part or full time                                              | 335      | .028                | .167  | 0          | 1          |

‡Patient eligibility for MHIP through General Assistance-Unemployable (GAU) of Washington State is available across Washington State; all other populations are eligible only in King County.

## Analysis

I use descriptive statistics to illustrate variation in team size and composition, and regression methods to describe association between team size, composition and baseline patient (clinical and sociodemographic) characteristics.

Table 2 provides descriptive statistics for severity, complexity, and sociodemographic characteristics of patients, as well as for care team attributes (key outcomes) team size, referral to care outside the primary care setting (“Level II care”), referral for direct evaluation by a consulting psychiatrist (Psych Evaluation), and input from a consulting psychiatrist (Psychiatrist Input).

I compare predictors of team size in Table 3. Model 1 analyzes effects of baseline clinical characteristics depression, anxiety, and PTSD severity, as well as number of mental health diagnoses at baseline (complexity) on team size. Model 2 investigates effects of patient sociodemographic characteristics on team size. Model 3 looks at effects of clinical and sociodemographic variables combined, and illustrates how effects in Models 1 and 2 are altered when both clinical and sociodemographic characteristics are included in analyses of team size.

Tables 2.3 presents logistic regression analyses estimating magnitudes of association between patient clinical and sociodemographic characteristics and direct psychiatric evaluation. Direct psychiatric evaluation of patients is rare compared to overall involvement by consulting psychiatrists (Table 5 will present analyses of psychiatrist input.) Model 4 results display the relationship between a one-point increase in depression, anxiety and PTSD severity scores, and an additional mental health diagnosis (complexity) at baseline on likelihood of referral for direct psychiatric evaluation. Model 5 results display the relationship between patient sociodemographic characteristics and referral for direct psychiatric evaluation. Model 6 results illustrate how associations in Models 4 and 5 are altered when both sets of patient characteristics are used to predict direct psychiatric evaluation.

Tables 2.4 presents logistic regression analyses estimating magnitudes of association between patient clinical and sociodemographic characteristics and patient-specific input from an MHIP consulting psychiatrist. Model 7 results display the relationship between a one-point increase in depression, anxiety

and PTSD severity scores, and an additional mental health diagnosis (complexity) at baseline on likelihood of a psychiatrist providing patient-specific input to a care coordinator or primary care physician. Model 8 results display the relationship between patient sociodemographic characteristics and referral for psychiatrist input. Model 9 results illustrate how associations in Models 7 and 8 are altered when both sets of patient characteristics are used to predict psychiatrist input.

Table 6 presents logistic regression analyses that estimate magnitudes of association between patient characteristics and referral outside of the primary care setting (Level II care). Model 10 results display the relationship between depression, anxiety and PTSD severity scores, and number of mental health diagnoses, and referral to Level II care. Model 11 results display the relationship between patient sociodemographic characteristics and referral to Level II. Model 12 results illustrate how associations in Models 10 and 11 are affected when both sets of patient characteristics are used to predict referral out of the primary care setting, into Level II care.

## Results

Model 3 (Table 3) suggests that team size is driven by some clinical characteristics and some sociodemographic factors. Each severity measure has a significant effect on team size, but directions of effects vary: while depression severity significantly increases team size, anxiety and PTSD severity are significantly associated with negative effects on team size ( $b = -.012$  and  $-.005$ , respectively). Of the clinical characteristics, complexity has the greatest effect on team size ( $b = .202$ ). Some sociodemographic factors are significantly associated with team size, as well. The anticipated association between female gender and team size is slightly altered when clinical and sociodemographic variables are modeled together (the coefficient for female gender shifts from  $b = .060$  in Model 2 to  $.054$  in Model 3), however the effect remains significant ( $p < .001$ ).

Table 3 may also suggest potential associations between team size, and race and ethnicity. In Models 2 and 3, African American race (as compared to Caucasian) is associated with an increase in team size. Some of these potential associations change when clinical and sociodemographic factors are taken together: A significant reduction in team size associated with Asian race (compared to Caucasian) is suggested in Model 2 ( $b = -.133$ , significant at  $p < .01$ ), however this effect disappears when clinical factors are controlled for in Model 3 ( $b = .026$  and is not significant).

Like team size, team composition is driven both by some clinical and sociodemographic characteristics. Referral for psychiatric evaluation also appears to be driven both by some clinical and some sociodemographic characteristics of patients. In Model 6 (Table 5), a one-point increase in depression severity appears to have a small, significant association with odds for referral to a consulting psychiatrist (OR = 1.02), while relatively greater severity on anxiety and PTSD screeners are associated with slightly lower odds for referral (OR = .991 and .976, respectively). In these ways, severity behaves similarly with regard to odds for referral for psychiatric evaluation as with regard to team size (Table 3). Complexity was not associated with significant changes in odds of referral. In Model 6, female gender is strongly associated with increased odds of referral for psychiatric evaluation as compared to odds for male gender (OR = 1.39).

In Model 5, the odds of referral given Hispanic ethnicity appear much lower than odds for non-Hispanic (OR = .132), and this association is not greatly affected when clinical factors are included in Model 6 (OR = .135). When clinical factors are included (Model 6), the odds of referral associated with African American race (as opposed to Caucasian) are reduced from .095 (Model 5) to .092 (Model 6).

In Table 5, effects of severity on psychiatrist input are similar to those observed for psychiatric evaluation (Table 5) and team size (Table 3). While increased depression severity appears to positively impact odds for input (OR = 1.04), increased severity for PTSD and anxiety are associated with reduced odds ratios for input (both OR = .991). As with team size, greater complexity is associated with a much

larger odds ratio for referral (OR = 1.48). The directions and significance of these effects remain when patient sociodemographic factors are included in Model 9. Gender is not significantly associated with whether patients receive input from consulting psychiatrists.

Some sociodemographic factors also appear to drive input, in somewhat unexpected ways: Unlike what is observed in associations between Asian race and referral for psychiatric evaluation (no observations; Table 5) and for team size (no difference associated with Asian as opposed to and Caucasian race; Table 3), Model 9 suggests that Asian race is significantly associated with greater odds for input, as compared to odds for Caucasian patients (OR = 1.41). Also in Model 9, odds of input associated with African American race are much greater (compared to Caucasian; OR = 1.65). This ratio is even greater than that observed for African American race in Model 8 (OR = 1.61), before clinical characteristics are included along with sociodemographic factors.

Table 6 illustrates how, as with other key outcomes, referral to Level II care may be driven both by some clinical and some sociodemographic factors. As in previous analyses, female gender is significantly associated with the outcome. Model 12 presents greater odds for referral for female vs. male gender (OR = 1.17). Unlike previous models, Model 12 suggests that depression severity is not a significant predictor of this care outcome. Increased odds for referral are instead associated primarily with greater case complexity (OR = 1.35). Potential associations with regard to race and ethnicity run contrary to expectations, as there is no indication of difference in odds for referral to Level II associated with African American (as opposed to Caucasian) race information. In these models, Asian race and Hispanic ethnicity indicators are both associated with reduced odds compared to Caucasian race and non-Hispanic ethnicity (OR = .389 and .108, respectively).

Table 3: Unstandardized regression coefficients and standard errors: predicting team size by clinical and sociodemographic characteristics of patients

| Variable Name              | Model 1  |                   | Model 2           |                   | Model 3           |                   |
|----------------------------|----------|-------------------|-------------------|-------------------|-------------------|-------------------|
|                            | <i>b</i> | <i>SE</i>         | <i>b</i>          | <i>SE</i>         | <i>b</i>          | <i>SE</i>         |
| Patient factors (baseline) |          |                   |                   |                   |                   |                   |
| Depression                 | .025***  | .001              |                   |                   | .025***           | .001              |
| Severity                   |          |                   |                   |                   |                   |                   |
| PTSD                       | -.004*** | .003 <sup>a</sup> |                   |                   | -.005***          | .003 <sup>a</sup> |
| Severity                   |          |                   |                   |                   |                   |                   |
| Anxiety                    | -.012*** | .001              |                   |                   | -.012***          | .001              |
| Severity                   |          |                   |                   |                   |                   |                   |
| Complexity                 | .207***  | .007              |                   |                   | .202***           | .008              |
| Sociodemographic factors   |          |                   |                   |                   |                   |                   |
| Patient age                |          |                   | .001 <sup>†</sup> | .006 <sup>a</sup> | .005 <sup>a</sup> | .005 <sup>a</sup> |
| Female                     |          |                   | .060***           | .015              | .054***           | .014              |
| Hispanic                   |          |                   | -.043             | .029              | .061*             | .030              |
| Transport                  |          |                   | .254***           | .015              | .082***           | .015              |
| Employed                   |          |                   | -.226             | .035              | -.100**           | .034              |
| Asian                      |          |                   | -.133**           | .041              | .026              | .040              |
| African American           |          |                   | .085*             | .033              | .075*             | .034              |
| All other race             |          |                   | -.064***          | .018              | .013              | .017              |
| F                          | 693.82   |                   | 45.20             |                   | 206.63            |                   |
| Prob > F                   | 0.00     |                   | 0.00              |                   | 0.00              |                   |
| R <sup>2</sup>             | .192     |                   | .026              |                   | .196              |                   |
| N                          | 11614    |                   | 11614             |                   | 11614             |                   |

Caucasian patients are used as the referent group for race.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

<sup>†</sup> p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.

Table 4: Odds ratios for direct psychiatric evaluation by clinical and sociodemographic patient characteristics

| Variable Name              | Model 4<br><i>OR</i> | <i>SE</i> | Model 5<br><i>OR</i> | <i>SE</i> | Model 6<br><i>OR</i> | <i>SE</i> |
|----------------------------|----------------------|-----------|----------------------|-----------|----------------------|-----------|
| Patient factors (baseline) |                      |           |                      |           |                      |           |
| Depression severity        | 1.03***              | .008      |                      |           | 1.02**               | .008      |
| PTSD severity              | .992†                | .004      |                      |           | .991*                | .004      |
| Anxiety severity           | .976*                | .011      |                      |           | .978†                | .011      |
| Complexity                 | 1.06                 | .073      |                      |           | 1.10                 | .076      |
| Sociodemographic factors   |                      |           |                      |           |                      |           |
| Patient age                |                      |           | .999                 | .005      | .998                 | .005      |
| Female                     |                      |           | 1.41**               | .175      | 1.39**               | .175      |
| Hispanic                   |                      |           | .132**               | .096      | .135**               | .098      |
| Transport                  |                      |           | .709*                | .108      | .693*                | .110      |
| Employed                   |                      |           | .778                 | .469      | .804                 | .485      |
| Asian                      |                      |           | NO                   | NE        | NO                   | NE        |
| African American           |                      |           | .095*                | .096      | .092*                | .093      |
| All other race             |                      |           | 1.38†                | .246      | 1.38†                | .255      |
| $X^2$                      | 19.88                |           | 34.62                |           | 60.79                |           |
| Prob > $X^2$               | .005                 |           | 0.00                 |           | 0.00                 |           |
| Pseudo $R^2$               | .007                 |           | .022                 |           | .029                 |           |
| N                          | 11614                |           | 11338 <sup>b</sup>   |           | 11338 <sup>b</sup>   |           |

Caucasian patients are used as the referent racial group.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

<sup>b</sup> Asian patients were dropped, no Asian patients in this sample were referred evaluation (n = 276) †

†p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.

NO = No Observations.

NE = Not Estimatable.

Table 5: Odds ratios for psychiatrist input by clinical and sociodemographic patient characteristics

| Variable Name              | Model 7   |           | Model 8           |           | Model 9            |           |
|----------------------------|-----------|-----------|-------------------|-----------|--------------------|-----------|
|                            | <i>OR</i> | <i>SE</i> | <i>OR</i>         | <i>SE</i> | <i>OR</i>          | <i>SE</i> |
| Patient factors (baseline) |           |           |                   |           |                    |           |
| Depression severity        | 1.04***   | .003      |                   |           | 1.04***            | .003      |
| PTSD severity              | .991***   | .001      |                   |           | .991***            | .001      |
| Anxiety severity           | .991*     | .003      |                   |           | .989**             | .003      |
| Complexity                 | 1.48***   | .035      |                   |           | 1.46***            | .035      |
| Sociodemographic factors   |           |           |                   |           |                    |           |
| Patient age                |           |           | 1.04 <sup>a</sup> | .001      | 1.04 <sup>a*</sup> | .001      |
| Female                     |           |           | 1.05              | .043      | 1.04               | .045      |
| Hispanic                   |           |           | .812*             | .083      | 1.05               | .115      |
| Transport                  |           |           | 2.00***           | .088      | 1.46***            | .069      |
| Employed                   |           |           | .553***           | .077      | .719*              | .101      |
| Asian                      |           |           | .961              | .137      | 1.41*              | .210      |
| African American           |           |           | 1.61***           | .163      | 1.65***            | .175      |
| All other race             |           |           | 1.05              | .056      | 1.24***            | .071      |
| $X^2$                      | 1138.04   |           | 296.10            |           | 1212.15            |           |
| Prob > $X^2$               | 0.00      |           | 0.00              |           | 0.00               |           |
| Pseudo $R^2$               | .083      |           | .021              |           | .090               |           |
| N                          | 11614     |           | 11614             |           | 11614              |           |

Caucasian patients are used as the referent racial group.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

†p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.

NO = No Observations.

NE = Not Estimatable.

Table 6: Odds ratios for Level II referral by clinical and sociodemographic patient characteristics

| Variable Name              | Model 10  |           | Model 11           |           | Model 12           |           |
|----------------------------|-----------|-----------|--------------------|-----------|--------------------|-----------|
|                            | <i>OR</i> | <i>SE</i> | <i>OR</i>          | <i>SE</i> | <i>OR</i>          | <i>SE</i> |
| Patient factors (baseline) |           |           |                    |           |                    |           |
| Depression severity        | .998      | .006      |                    |           | .996               | .006      |
| PTSD severity              | 1.00*     | .001      |                    |           | 1.00               | .001      |
| Anxiety severity           | .986*     | .006      |                    |           | .983*              | .006      |
| Complexity                 | 1.37***   | .045      |                    |           | 1.35***            | .044      |
| Sociodemographic factors   |           |           |                    |           |                    |           |
| Patient age                |           |           | .995               | .002      | .997               | .002      |
| Female                     |           |           | 1.17*              | .086      | 1.17*              | .087      |
| Hispanic                   |           |           | .090***            | .045      | .108***            | .054      |
| Transport                  |           |           | 1.63***            | .125      | 1.31**             | .105      |
| Employed                   |           |           | NO                 | NE        | NO                 | NE        |
| Asian                      |           |           | .316**             | .125      | .389*              | .154      |
| African American           |           |           | .856               | .159      | .913               | .171      |
| All other race             |           |           | .921               | .086      | .103               | .098      |
| $X^2$                      | 197.43    |           | 84.48              |           | 233.59             |           |
| Prob > $X^2$               | 0.00      |           | 0.00               |           | 0.00               |           |
| Pseudo $R^2$               | .028      |           | .018               |           | .038               |           |
| N                          | 11614     |           | 11279 <sup>b</sup> |           | 11279 <sup>b</sup> |           |

Caucasian patients are used as the referent racial group.  
<sup>a</sup> Multiplied by 100 in order to display significant figures.  
<sup>b</sup> Employed patients (n = 335) were dropped from the model, no employed patients were referred to Level II care.  
†p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.  
NO = No Observations.  
NE = Not Estimatable.

## Discussion

Team size and composition each appear to be driven by some clinical characteristics and by some sociodemographic factors.<sup>22</sup> Severity and complexity at baseline each have unique associations with how many care providers a patient has on their team during treatment. Depression severity significantly increases team size, while anxiety and PTSD severity are negatively associated with team size ( $b = -.012$  and  $-.005$ , respectively). Of clinical patient factors, complexity has the greatest effect on team size ( $b = .202$ ). Patient sociodemographic factors associated with team size tend to operate in the same manner

<sup>22</sup> In related analysis, female patient gender does not significantly increase diversity in expertise, a team-level measure of team composition; in additional analyses complexity and access to reliable transport both significantly increase diversity in expertise (results not reported, see Chapter 3 for explanation of diversity in expertise measure).

with and without including severity and complexity in estimations predicting team size. The association between female gender and team size, robust with and without controlling for clinical factors for patients, is in line with hypotheses derived from disparities research and status characteristics theory. Chapter 3 will further explore status (gender) boundaries between patients and providers (care coordinators), and how these boundaries associate with care decisions and treatment processes.

Most collaborative care teams are relatively small and vary from 3 to 5 providers (mean is = 4.4, SD = .82; Table 2). Small proportions of patients receive intensive psychiatric evaluations and few more patients are referred to Level II care (about 3% and 7% of patients, respectively). About one-third of patients (32%) receive specific input from consulting psychiatrists, via weekly deliberations between care coordinators and psychiatrists.

Associations between team size, and race and ethnicity are tentative. Some of these potential associations change when clinical and sociodemographic factors are taken together: A significant reduction in team size associated with Asian race (compared to Caucasian) is suggested in Model 2, however this effect disappears when clinical factors are controlled for in Model 3. Race and ethnicity may be associated with other processes regarding gathering of race information, and may more directly measure factors such as care coordinator caseload (e.g. care coordinators who have lower caseloads may take time to gather race information from patients, while other may not). Paired with largely incomplete information in patient records (about 73% of patients in the sample are in the “all else” category, see Table 2), analyses can only be interpreted as suggestions of potential race effects.

With regard to involvement of care managers and psychiatrists, team composition is also driven both by some clinical and some sociodemographic characteristics of patients. Depression severity appears to have a small, significant associations with odds for referral for both measures of psychiatrist involvement (evaluation and input). Relatively greater severity on anxiety and PTSD screeners are associated with slightly lower odds for referral (OR = .991 and .976, respectively). As with team size,

female gender is strongly associated with increased odds of referral for psychiatric evaluation as compared to odds for male gender (OR = 1.39).

Even though Hispanic ethnicity appears to be associated with much lower odd for referral than those associated with non-Hispanic ethnicity (Model 6, OR = .135) and African American race (Model 6 OR = .092), these associations are tentative due to the relatively small amount of race information across patients in the data. Interpretations of this outcome (direct psychiatric evaluation) vis-à-vis results displayed in Table 5 (psychiatrist input) temper general conclusions about care decisions as these relate to patient race.

Controlling for clinical characteristics, patient gender is consistently associated with outcomes in this study, and magnitudes of gender effects do vary by intensiveness of care tasks (OR = 1.39 for psychiatrist evaluation, OR = 1.17 for Level II referral, and no significant gender difference was found for psychiatrist input).

Overall distributions team size and composition vary in accordance with expectations for stepped care models, as presented by Bower and Gilbody (2005). However, team size and composition also relate to sociodemographic characteristics of patients, and are consistent with expectations derived from status characteristics theory and disparities research. At minimum, these results generate powerful hypotheses about MHIP providers' views of patients as they concern gender and age, which it may be fruitful to test qualitatively. Chapters 3 and 4 further investigate status boundaries and their potential effects on team decisions, processes, and health outcomes for patients.

## Chapter 3: Collaborative Care Team Composition, Decisions, and Processes

Researchers and practitioners often come to different conclusions about how collaboration works, and to what effects. Some research suggests that groups comprised of diverse individuals are more effective at problem solving and high quality decision making compared to work groups composed of similar individuals (Guzzo 1996; Hoffman and Maier 1961; Janis 1982). In health care research, interdisciplinary teams are perceived to promote problem solving and to protect against individual errors in judgment (Kaiser and Woodman 1985). In health care practice, however, teams are often described as “disorganized,” “inefficient,” and “a waste of time” (Hackman 1987; for review see Lemieux-Charles and McGuire 2006).

Well-coordinated “cohesive” teams are likely to achieve the team model’s goals of enhanced quality and efficiency (Cohen and Bailey 1997; Fried, Leatt, Deber, and Wilson 1988; and Shweikhart and Smith-Daniels 1996). Lack of cohesion can lead to efficiency losses and inability to complete tasks to patients’ satisfaction (Shortell et al. 2004; Rodriguez et al. 2008). Researching aspects of collaborative care team composition as potential determinants of process (potentially coordination) may yield helpful explanations of the difference between care that improves patient health, and care that may be “a waste of time” (Keating et al 2007; Lichtenstein et al 2004; Alexander et al 1996).

The present study introduces provider characteristics (such as care coordinator gender and tenure) as potential explanations for team processes (such as deliberation and referrals). Empirical findings on dynamics in team care are reviewed, and a theoretical overview suggesting why provider characteristics may be associated with team deliberation and composition is given.

### Research Questions

*(1) What are the effects of core team member characteristics on processes and decisions within teams?*

This chapter examines patterns related to group dynamics within teams by examining effects of provider characteristics on processes and decisions. Care coordinator gender and tenure, together with

patient gender, age, race, ethnicity, immigrant status, and are examined for effects on referral decisions (referral to care managers at “Level II” stepped up care, and referral to consulting psychiatrists for direct evaluation) on amount of team deliberation (measured by the number of revisions that team members make to a patient’s MHITS record).

Model team and provider attributes on processes and decisions

*(2) Under what conditions might provider characteristics operate as status characteristics?*

Consistent with status characteristics theory (see Chapter 2), information processing research finds that heterogeneous membership within teams is associated with more conflict, less trust, higher turnover, absenteeism, and dissatisfaction (Alder 1991; Tsui, Egan and O’Reilly 1991; Zenger and Lawrence 1989). However, research in this tradition also finds that diverse teams can enjoy more effective problem solving because of widened group scanning abilities and greater consideration of alternatives. This perspective specifies two different team diversity concepts: (1) task-related diversity, and (2) team-member diversity. Task-related diversity, or heterogeneity in team member’s functional expertise and education relevant to the task, has been found to improve team performance (Cohen and Levinthal 1990) and is usually associated with positive outcomes (Horwitz and Horwitz 2005, 2007). On the other hand, team-member diversity has been found to have little effect, or weak negative effects on team outcomes (Horwitz and Horwitz 2007).

After comparing how patient and provider characteristics are related to deliberation and treatment decisions within teams, this study provides a rudimentary test for potential situational effects on these relationships. Magnitudes of effects provider sociodemographic characteristics and decisions (for referral and screening) will be compared across tasks that vary in terms of levels of uncertainty and, plausibly, their association with status characteristics (such as gender).

Background

Nurses’ orientations toward patient education and self-help are sufficiently beneficial to some patients as part of a stepped-care approach (e.g. Lovell et al. 2003). Nurses’ “preventive care orientation” and routine adherence to clinical guidelines can benefit patients directly (Hung et al. 2006). Nurse

practitioners and other non-physician health professionals have been shown to perform health promotion tasks with superior ability and consistency (e.g. Avorn, Everitt, & Baker, 1991; Mundinger, 1994) and some evidence suggests that nurse practitioners more consistently order preventive tests than do physicians (Wilson et al., 2005).

Physician training has historically emphasized autonomy and self-reliance (Mizrahi 1986) and has not emphasized collective decision making (Lichtenstein et al 2004). As a result, physicians often discount the opinion of other professional groups, including specialist nurses (Bucher and Stelling 1997), and may exert greater influence over other team members. By contrast, social workers are often trained to be coordinators of decision making processes and often attempt to coordinate with team members (Kitchen and Brook 2005; Donnelly 1992).

Research generally concludes that collaborative care does have the potential to provide superior care if provided by clinicians who have *complementary* knowledge, skills, and roles (Rodriguez et al. 2008). Rodriguez and colleagues (2008) find that, controlling for team size, patients whose teams included three or more *physicians* were more likely to have an inappropriate emergency room visit than were patients whose teams included both a nurse practitioner and a physician. So, while medical teams (as opposed to single-clinician care) can safely be associated with better technical care in some areas (e.g. better prescribing habits), the results of team care for patient behavioral outcomes (e.g. inappropriate emergency room visits) can depend on team composition measured in terms of providers' occupational characteristics.

Administrative data utilized in the present study includes team member occupation, roles, and tenure. Provider occupation and team composition could therefore affect patient outcomes directly, as well as by contributing to a complementary set of knowledge, skills, and roles on a team.

Craven and Bland (2006) review of 38 studies of collaborative health care. They conclude that the complicated nature of collaborative care interventions employed in most studies make it difficult to single out aspects of collaborative care that do affect clinical outcomes. Furthermore, restrictive research

protocols employed in the studies make it equally difficult to generalize findings about aspects of collaborative care to actual care settings.

The present study incorporates team composition and task as aspects of care that may help explain why some teams are associated with better clinical outcomes than others. These are as follows: team size, team composition, and team task. Theoretical importance of these aspects is highlighted by theories of group solidarity, status characteristics, and information processing, and the intent of the study is to suggest circumstances and situational relationships within collaborative care teams that are potentially relevant to clinical outcomes.

## Theory and Hypotheses

As explained in Chapter 2, task characteristics are defined as ‘objective’ job features that are independent of the person who is doing the job (Parker, Wall, & Cordery, 2001; Wood, 1986) Individuals possess multiple status characteristics (gender, race, and so on), and they also possess conscious or unconscious associations between each of these characteristics and expectations for a given task (success or failure). Individuals take mental stock of the positive and negative implications associated with the set of status characteristics they perceive, giving more attention to expectations that are associated with the status characteristics that they perceive as most relevant to the task (Berger, RosenHoltz and Zelditch 1980).<sup>23</sup> The strength of associations between status characteristics and expectations varies according to the relative salience of the characteristic, and the task at hand.

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<sup>23</sup> Scope conditions applying to Berger, RosenHoltz and Zelditch (1980) are similar in the present study. Berger et al (1980: 483-484) write: First, we deal only with groups engaged in tasks-i.e. actions in which there is (a) a goal, (b) some idea of the difference between success and failure in achieving the goal, and (c) some idea that the contributions of group members affect success and failure in achieving it. Second, we deal only with groups-i.e. sets of two or more individuals who think of themselves as jointly responsible for the outcome and who are therefore oriented toward a collective decision. Third, we study primarily the power-prestige order of the group, an order that includes only the task-related activities of the members: (a) the opportunities given to members to perform (e.g. by being asked questions, or simply by being looked at); (b) the performance outputs of the members (such as opinions, suggestions, or information relevant to the task); (c) the evaluations of these performance outputs communicated by the members; and (d) influence, i.e. resolution of disagreements in the favor of one rather than another member's views.

When a status characteristic is consciously or unconsciously assumed to be relevant to a task, it becomes salient. However, in the presence of other status information that is (a) also relevant to the task and (b) disproves the relevance of the characteristic for the task inconsistent with the expectation associated with the status characteristic at hand, a status characteristic is no longer salient. In this case, the characteristic is no longer a primary means of expectation formation, and it is not likely to become the basis for behavior.

Work teams can be defined as “a collection of individuals who are interdependent in their tasks, who share responsibility for outcomes, who see themselves and who are seen by others as an intact social entity embedded in one or more larger social systems (for example, business unit or corporation), and who manage their relationships across organizational boundaries” (Cohen and Bailey 1997: 241). In the case of collaborative care, status characteristics and expectation states theories would emphasize that, even though teams are seen as “intact social entities,” social identities from the broader society are imported into team interactions (Berger, Cohen, and Zelditch 1972; Cohen and Zhou 1991; Wagner and Berger 1993; see also Tajfel’s social identification/social categorization Tajfel 1982; Taifel and Turner 1979; and embedded intergroup relations Alderfer 1987).

Table 7: Hypothesized effects of team composition on team processes and decisions

| Independent variable (factor)<br>level of analysis | Factor                          | Outcome                               | Relationship/<br>effect | Mechanism                                                                    |
|----------------------------------------------------|---------------------------------|---------------------------------------|-------------------------|------------------------------------------------------------------------------|
| Prop 1:<br>provider-level                          | Tenure (care coordinators)      | Psychiatrist Input, Level II referral | +                       | Heightened expectations and opportunities for participation.                 |
| Prop 2:<br>provider-level                          | Male gender (care coordinators) | Psychiatrist Input, Level II referral | +                       | Heightened expectations and opportunities for participation.                 |
| Prop 3:<br>provider-level                          | Tenure (care coordinators)      | PTSD screening                        | unknown                 | unknown                                                                      |
| Prop 4:<br>provider-level                          | Male gender (care coordinators) | PTSD screening                        | -                       | Structural aspects of task (discussion of trauma) are sex-typed (female).    |
| Prop 5:<br>provider-level                          | Tenure (care coordinators)      | Amount of deliberation                | +                       | Heightened expectations and opportunities for participation.                 |
| Prop 6:<br>provider-level                          | Male gender (care coordinators) | Amount of deliberation                | +                       | Heightened expectations and opportunities for participation.                 |
| Prop 7:<br>team-level                              | Gender balance                  | Amount of deliberation                | +                       | Reduced costs of interaction across status boundaries.                       |
| Prop 8:<br>team-level                              | Diversity in expertise          | Amount of deliberation                | -                       | Increased costs of interaction across status boundaries.                     |
| Prop 8a:<br>team-level                             | Diversity in expertise          | Amount of deliberation                | +                       | Team member functional expertise is task-relevant, promotes problem-solving. |
| Prop 9:<br>team-level                              | Tenure diversity                | Amount of deliberation                | -                       | Increased costs of interaction across status boundaries.                     |
| Prop 9a:<br>team-level                             | Tenure diversity                | Amount of deliberation                | +                       | Team member expertise is task-relevant, promotes problem-solving.            |

Status boundaries are more salient where job composition is not balanced, and where tasks are sex-typed (Hakim 2001; England 1986; Tomaskovic-Devey 2006). Traditionally sex-typed tasks (such as care-giving as a “female” task) and normative expectations about division of labor (vis-a-vis performance expectations) tend to magnify gender differences (via allocated opportunities for actors to perform given

roles). Any observed effects of sociodemographic characteristics on decisions within teams (as reflected in odds ratios for referral and screening) are expected to differ across tasks.

Status characteristics theory predicts that teams with fewer and less salient status boundaries will perform better than teams with additional or more salient status boundaries. Team composition (increased diversity in social status characteristics) should have negative effects on patient outcomes.

For “team dose” as it relates to patient characteristics, status characteristics theory provides expectations for magnitudes of effects hypothesized in Table 7:

*Gender differences in odds for referral and screening should vary in direction according to the care task. Tasks that may be associated with status characteristics (e.g. discussion of trauma as not masculine) will be associated with directions of observed effects of provider gender and tenure on outcomes (referral and screening); while male care coordinator gender will be associated with greater odds for referral, it will be associated with lesser odds for PTSD screening.*

*Effects of “task-relevant” characteristics (tenure) may be greater where aspects of the task are more certain, and less likely to be sex-typed (e.g. requesting a Level II referral from a fellow provider as opposed to interpersonal discussion of trauma with a patient).*

## Measures

### *Care Decisions and Process Outcomes*

*Level II*: a binary variable indicating whether a patient was ever referred outside of the primary care setting, to Level II care as described in “Setting.” Level II care occurs at a community-based mental health center for mental health care and involves care management by a different type of provider (a care manager). For this reason, *Level II* may be considered referral to an MHIP care manager, but it indicates that patient need is greater than what can be met by MHIP resources available at the primary care location. Referral to *Level II* is made by MHIP care coordinators.

*Psychiatrist input*: a binary variable indicating whether a patient was referred for psychiatric evaluation by a consulting psychiatrist (CP) or whether a psychiatrist note appeared anywhere in the patient's MHITS record. At a minimum, this variable indicates discussion between care coordinators and psychiatrists about specific patients, and may indicate direct psychiatric evaluation of the patient by a psychiatrist (i.e. the consulting psychiatrist conducts an in-person evaluation of the patient his or herself). Summary statistics for psychiatric evaluation (*Evaluation*) appear in Table 8 for reference only.

*Deliberation*: a count variable indicating the total number of times an MHIP provider revised information (such a psychiatrist notes) was revised in a patient's MHITS record.

#### *Provider Attributes*

*CC tenure*: a count variable indicating the number of days of experience in MHIP held by care coordinators as of the day their patient enrolled in MHIP. I.e. if a patient enrolled 120 days after a provider began work with MHIP, then that provider's tenure appears as 120 days). Because this measure is calculated using "datediff" in SPSS based upon patient's start date minus care coordinator start date, *CC tenure* can vary according to the patient/team that he or she is on (e.g. *CC tenure* for care coordinator X on any given day within the study period can vary from team to team).

*CC gender*: a categorical indicator of care coordinator gender, where 1 = male, 2 = female, and 3 = unknown gender. These categories were used to create binary indicators (dummy variables) for each gender (male, female, unknown). As noted in Table 8, gender was unknown in two cases (for two patients/teams). These cases were included in models as having male care coordinator = 0 and female care coordinator = 0 (care coordinators were neither male nor female).

#### *Care Team Attributes*

*Gender balance*: a binary variable indicating that a team's proportion of female providers is greater than or equal to .4 and less than or equal to .6. For reference, summary statistics for teams with all male and all female providers ( $p = 0$  or 1) also appear in Table 8.

*Proportion female*: the proportion of female providers on a team.

*Tenure diversity:* the variance of each team's members' number of days' experience (at the time of patient enrollment) between the most- and least- experienced team members in each team.

*Diversity in expertise:* a count variable based upon the different *types* of providers on a team, without taking team size into account. For example, a team with a care coordinator, primary care doctor and a care manager receives a count of "3" where a team with two care coordinator and one primary care doctor receives a count of "2."

*Team size:* all MHIP providers have unique MHITS user identification numbers, which were assigned unique study identification numbers. Team size is the count of unique provider study identification numbers that appear in a patient's record. Providers' study identification numbers could appear in a patient's MHITS record as a result of one or more of the procedures: initial assessment; follow up assessments; psychiatrist notes; treatment planning; internal referrals<sup>24</sup> (including Level II referrals, psychiatric evaluations, psychiatrist notes, referrals to primary care, and more); and discharge notes. Using documentation of each of these procedures for each patient, I gathered study identification numbers of providers who personally assessed the patient, providers who physically entered information, and providers who modified this information, as applicable. Not all patients at MHIP went through all of these processes, nor did patients always encounter the same provider each time they received care (e.g. a follow up assessment). Teams can include a variety of providers (see *Team composition*, below). However, at minimum teams include the patient, a patient's primary care provider, and a care coordinator, making "three" the smallest possible team size.

*Note Team composition:* To measure team composition, I first created fifteen binary variables indicating whether MHITS users were one of the following types of providers: Administrator, Level 1

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<sup>24</sup> In the present study, "teams" are comprised only of MHIP providers in the Mental Health Integrated Tracking System, as opposed to non-MHITS providers included as part of an extended team. (In practice, Care coordinators may also refer to professionals who work at other organizations such as churches, 12-step programs, and homeless shelters. While these professionals are integrated into MHIP patients' mental health care via referral from an MHIP provider – typically a Care coordinator, these professionals may not be formally involved in the Mental Health Integration Program). An untitled manuscript related to this dissertation will examine the impact of inter-organizational referrals, or extended team size and composition, on patient health and care outcomes.

Site Manager, Care coordinator, Care manager, Primary care provider, Consulting psychiatrist – Unrestricted, Data Manager, Consultant - No PHI, Site Manager L2, Consultant L1, Consultant L2, Community Service Office, Reviewer, Consulting psychiatrist, and Disability Outreach Worker.

### *Patient Factors*

*Case complexity* is operationalized as the number of diagnosed mental disorders a patient is suffering (upon program intake). Complexity will refer to the total count of the following array of diagnosed mental health disorders, as classified by the DSM and as documented in patients' MHITS health records: Depression, Anxiety, Bipolar Disorder, Psychotic Disorder, Chronic Pain, Cognitive Disorder, Post-traumatic Stress Disorder, a pending mental health diagnosis, Substance Abuse Disorder.

*Depression severity*: a count variable indicating a patient's score on a screening and diagnostic tool for depression (a nine-item Patient Health Questionnaire, PHQ-9) where scores range from 0 to 27, and higher scores indicate greater depressive symptom severity.

*Anxiety severity*: a count variable indicating a patient's score on an anxiety screening and diagnostic tool GAD-7 (where scores range from 0 to 21, and higher scores indicate greater anxiety symptom severity).

*PTSD severity*: a count variable indicating a patient's score on a screening tool for posttraumatic stress disorder (the PCL-C) where scores range from 17 to 85, and higher scores indicate greater severity.

*PTSD screened*: a binary variable indicating whether a patient was screened for PTSD symptoms (using the PCL-C) at their initial (first) assessment.

### *Patient sociodemographic factors*

*Age*: a continuous variable indicating years of age as of the patient's date of enrollment in MHIP.

*Gender*: patient's sex as male or female, as two binary variables (male = 1 or 0, female = 1 or 0).

*Race*: four categorical variables indicating whether race information was listed in a patient's MHITS records, as one of the following: African American (1 or 0), Caucasian (1 or 0), Asian (1 or 0) and all else (1 or 0). "All else" included patients whose MHITS record included designation of race as American Indian/Alaska Native, Hawaiian Native/Other Pacific Islander, Multi-racial,

Unreported/refused to report, or which did not include race information. Because race information was unavailable for most of the sample (about 73% of patients in the sample are in the “all else” category, see Table 8), analyses can only be interpreted as suggestions of potential race effects, and may more directly measure factors such as care coordinator caseload (e.g. care coordinators who have lower caseloads may take time to gather race information from patients, while other may not).

*Hispanic*: a binary variable indicating whether Hispanic ethnicity was indicated in the patient’s MHITS record, where 1 = Hispanic, 0 = non-Hispanic. Patients for whom no information was listed were coded as non-Hispanic.

*Immigrant*: a binary variable indicating whether the patient was recorded as having immigrated to the United States, where 1 = immigrant, 0 = non-immigrant. Patients for whom no information was listed were coded as non-immigrants.

*Transportation*: a binary variable indicating whether the patient reported having access to dependable transportation, where 1 = yes and 0 = no or no report.

*Employed*: a binary variable indicating whether the patient reported being employed (either full or part time), where 1 = yes and 0 = no or no report. Although information about transportation and employment status was most likely gathered upon patient’s initial assessment, it is possible that they were gathered and/or updated at any point during a patient’s treatment at MHIP. These measures are assumed to be baseline measure, but are interpreted with much caution.

*For reference: population*: binary variables indicating patient’s source of eligibility for MHIP are included for reference in Table 8. Further analyses might approach such variables as a source of information about patients’ social background and status in MHIP, as this status determined by the funding/insurance mechanism under which the patient receives mental health benefit. *Population* was operationalized as dummy variables for each of the following categories: *general assistance unemployable (GAU)*, *veteran*, *family of veteran*, *mother*, *older adult*, and *chronically mentally ill*.

Summary

Table 8 provides descriptive statistics for patient clinical and sociodemographic factors, care team attributes, and care team decisions and behavior (key outcomes: patient-specific input from consulting psychiatrist, referral to care outside the primary care setting or “Level II care,” screening for PTSD, and amount of deliberation among team members).

| Table 8: Variable names, descriptions, and descriptive statistics. N = 11,614 |                                                                         |          |                     |                   |            |            |
|-------------------------------------------------------------------------------|-------------------------------------------------------------------------|----------|---------------------|-------------------|------------|------------|
| Variable                                                                      | Variable Description                                                    | <i>n</i> | Mean<br>or <i>p</i> | SD                | min /<br>N | max /<br>Y |
| Care decisions and process outcomes (key outcomes)                            |                                                                         |          |                     |                   |            |            |
| Deliberation                                                                  | Total revisions to patient record and notes                             | 11614    | 8.76                | 6.36              | 0          | 65         |
| Level II Referral                                                             | Patient is referred for MH care outside of primary care setting         | 11614    | 0.07                | 0.26              | 0          | 1          |
| Psychiatrist Input                                                            | Psychiatrist gives patient-specific input to the PCP or CC              | 11614    | 0.32                | 0.47              | 0          | 1          |
| Care team attributes                                                          |                                                                         |          |                     |                   |            |            |
| Gender balance                                                                | Proportion female is >.39 and < .61.                                    | 11614    | .056                | .230              | 0          | 1          |
| Proportion female                                                             | Proportion of female providers                                          | 11613    | .789                | .365              | 0          | 1          |
|                                                                               | (All male team) <sup>a</sup>                                            | 11614    | .147                | .354              | 0          | 1          |
|                                                                               | (All female team) <sup>a</sup>                                          | 11614    | .709                | .453              | 0          | 1          |
| Tenure diversity                                                              | Tenure variance across team providers                                   | 11614    | 1.04 <sup>b</sup>   | 1.99 <sup>b</sup> |            |            |
| Team Size                                                                     | Count of providers on the team                                          | 11614    | 4.40                | 0.82              | 3          | 9          |
| Provider attributes                                                           |                                                                         |          |                     |                   |            |            |
| CC tenure                                                                     | Days of experience in MHIP as of patient's enrollment date              | 11614    | 235                 | 278               | -924       | 1098       |
| CC gender                                                                     |                                                                         |          |                     |                   |            |            |
|                                                                               | Male                                                                    | 2175     | .19                 | .39               | 0          | 1          |
|                                                                               | Female                                                                  | 9437     | .81                 | .39               | 0          | 1          |
| Patient factors (at baseline)                                                 |                                                                         |          |                     |                   |            |            |
| Complexity                                                                    | Count of mental health diagnoses at intake                              | 11614    | 1.89                | 1.41              | 0          | 9          |
| Depression Severity                                                           | Score on PHQ-9 depression screener                                      | 11614    | 11.66               | 9.00              | 0          | 27         |
| Anxiety Severity                                                              | Score on GAD-7 anxiety checklist                                        | 11614    | 7.55                | 7.99              | 0          | 21         |
| PTSD Severity                                                                 | Score on PCL-C posttraumatic stress screener                            | 11614    | 8.45                | 21.47             | 17         | 85         |
| PTSD Screened                                                                 | Patient was screened for PTSD                                           | 11614    | 0.14                | 0.35              | 0          | 1          |
| Patient social and demographic characteristics                                |                                                                         |          |                     |                   |            |            |
| Age                                                                           | Age at program intake (in years)                                        | 11614    | 40.51               | 12.00             | 18         | 99         |
| Gender                                                                        |                                                                         |          |                     |                   |            |            |
|                                                                               | Male                                                                    | 6144     | 0.52                | 0.50              | 0          | 1          |
|                                                                               | Female                                                                  | 5470     | 0.47                | 0.50              | 0          | 1          |
| Race                                                                          |                                                                         |          |                     |                   |            |            |
|                                                                               | Caucasian                                                               | 2216     | 0.19                | 0.39              | 0          | 1          |
|                                                                               | African American                                                        | 543      | 0.05                | 0.21              | 0          | 1          |
|                                                                               | Asian                                                                   | 276      | 0.02                | 0.15              | 0          | 1          |
| Other Race                                                                    | All Other Race (includes all except Caucasian, African American, Asian) | 8579     | 0.73                | 0.43              | 0          | 1          |
| Ethnicity                                                                     |                                                                         |          |                     |                   |            |            |
|                                                                               | Hispanic                                                                | 577      | 0.05                | 0.22              | 0          | 1          |
|                                                                               | Non-Hispanic                                                            | 11037    | 0.95                | 0.22              | 0          | 1          |
| Immigrant                                                                     | Patient immigrated to the US                                            | 568      | 0.05                | 0.22              | 0          | 1          |
| Transportation                                                                | Has access to reliable transport                                        | 3642     | 0.31                | 0.46              | 0          | 1          |
| Employment                                                                    | Employed part or full time                                              | 335      | .028                | .167              | 0          | 1          |

## Analysis

I compare predictors of patient-specific psychiatrist input in Table 9. Model 1 analyzes effects of patient sociodemographic factors and provider attributes on consulting psychiatrist involvement. Model 2 investigates effects of patient health factors and sociodemographic characteristics, and Model 3 introduces PTSD screening (as opposed to PTSD severity scores) as a predictor of psychiatrist input.

Tables 3.3 presents logistic regression analyses estimating magnitudes of association between patient and provider factors and Level II referral. Model 4 explores provider and patient attributes as they relate to referral for Level II. Model 5 explores effects of patient severity and complexity measures for predicting referral for Level II referral, and Model 6 results illustrate how associations in Models 4 and 5 are altered when both sets of patient characteristics are included. In similar order, Table 11 presents logistic regression analyses estimating odds ratios for PTSD screening by patient and provider attributes. Finally, Table 12: uses OLS regression to estimate how patient, provider, and team characteristics affect amount of deliberation among team members.

## Results

Male care coordinator gender is associated with much greater odds for psychiatrist input (OR = 2.03, Model 3) as well as with greater odds for Level II referral (OR = 1.38, Model 6). Male gender is strongly associated with strikingly lower relative odds for conducting PTSD screen at intake (OR = .531, Model 9). The directions of these effects are consistent with status characteristics theory both as it relates to opportunities for participation (Table 7, Propositions 1, 2, 4). Also, the directions of gender effects are in keeping with expectations about sex-typing of tasks: Gender differences in odds for referral and screening do vary in direction according to the care task. Male care coordinator gender is associated with greater odds for referral, but it is associated with much lower relative odds for PTSD screening.

Status characteristics hypotheses regarding tenure (Propositions 1 and 3, Table 7) are not supported. However, results are consistent with the idea that effects of provider characteristics vary according to task. While tenure was significantly associated with slightly lower odds for psychiatrist input

and PTSD screening (OR = .998, Models 3 and 9), it was significantly associated with slightly higher odds for Level II referral (OR = 1.07, Model 6).

One hypothesis suggested by an MHIP psychiatrist is that clinical characteristics that are associated with greater uncertainty (PTSD in particular) generate more deliberation within teams (“people are interested in PTSD and looking for ways to help<sup>25</sup>”) and greater likelihood of referring a patient to a consulting psychiatrist (as opposed to discussing the patient during weekly check-ins between care coordinators and consulting psychiatrists). Consistent with this expectation, PTSD screen is significantly associated with greater amounts of deliberation in teams ( $b = 2.46$ ).

Support for hypotheses regarding provider and team-level effects on deliberation is mixed. Care coordinator tenure tends to decrease amounts of deliberation, as does tenure diversity within the team (Propositions 5, 9, and 9a, Table 7). While these results are consistent with the notion of increased costs of interaction across status boundaries (Proposition 9a), effects of care coordinator tenure on deliberation are not consistent with status characteristics. Among other things, this may be due to alternate means of deliberation (in person discussions) for those afforded opportunities, or it may indicate that care coordinators with more experience can revise MHITS records more efficiently than less experienced coordinators. Analysis of professional networks among providers (see Next Steps) may help disentangle effects of experience in MHIP with use of the MHITS system (e.g. making revisions to patient records).

Care coordinator gender is not associated with significant differences in deliberation, once patient and team-level factors were modeled. If anything, male care coordinators are associated with lower amounts of deliberation ( $b = -459$  and  $-234$ , Models 10 and 11;  $b = -.187$  (ns), Model 12), perhaps due to similar factors as regard tenure and deliberation. Results for diversity in expertise are also mixed, and not significant once patient factors were included.

Results for gender balance within teams are consistent with status characteristics expectations associated with reduced cost of interaction across status boundaries (OR = 1.12, Model 12). However, a

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<sup>25</sup> Dr. Wayne Bentham, personal communication, April 13, 2011.

foundational assumption of this analysis is that revisions to patient records are the result of weekly check-ins between care coordinators and consulting psychiatrists, and other interactions within teams. At the least, these results generate interesting hypotheses that may be fruitfully tested with qualitative research, and they may motivate future quantitative analyses of effects of gender balance on other processes within MHIP and other care organizations (for example, effects of gender balance within primary care locations on provider turnover as well as on duration of professional relationships).

Table 9: Odds ratios for psychiatrist involvement by patient and provider attributes

| Variable                         | Model 1<br><i>OR</i> | <i>SE</i> | Model 2<br><i>OR</i> | <i>SE</i> | Model 3<br><i>OR</i> | <i>SE</i> |
|----------------------------------|----------------------|-----------|----------------------|-----------|----------------------|-----------|
| Provider attributes              |                      |           |                      |           |                      |           |
| CC tenure <sup>a</sup>           | .998***              | .005      | .998***              | .005      | .998***              | .005      |
| CC is male                       | 2.11***              | .125      | 2.03***              | .130      | 2.03***              | .130      |
| Patient factors                  |                      |           |                      |           |                      |           |
| Complexity                       |                      |           | 1.49***              | .037      | 1.49***              | .037      |
| Depression Severity              |                      |           | 1.05***              | .003      | 1.05***              | .003      |
| Anxiety Severity                 |                      |           | .983***              | .004      | .982***              | .004      |
| PTSD severity                    |                      |           | .988***              | .001      |                      |           |
| PTSD screen                      |                      |           |                      |           | .512***              | .039      |
| Sociodemographic factors         |                      |           |                      |           |                      |           |
| Female                           | 1.10*                | .047      | 1.11*                | .050      | 1.10*                | .050      |
| Age <sup>a</sup>                 | 1.06***              | .001      | 1.05                 | .001      | 1.05                 | .001      |
| African American                 | 2.12***              | .223      | 2.16***              | .236      | 2.15***              | .234      |
| Asian                            | .715†                | .122      | .880                 | .163      | .879                 | .234      |
| All else (race)                  | 1.26***              | .072      | 1.48***              | .091      | 1.47***              | .091      |
| Hispanic                         | .827                 | .104      | .918                 | .122      | .918                 | .123      |
| Immigrant                        | 1.19                 | .158      | 1.51**               | .212      | 1.50**               | .211      |
| Has access to reliable transport | 1.82***              | .084      | 1.35***              | .068      | 1.35***              | .068      |
| Employed part or full time       | .622**               | .085      | .762†                | .107      | .766†                | .108      |
| <i>X</i> <sup>2</sup>            | 1114.89              |           | 1640.27              |           | 1636.21              |           |
| Prob > <i>X</i> <sup>2</sup>     | 0.00                 |           | 0.00                 |           | 0.00                 |           |
| Pseudo R <sup>2</sup>            | .076                 |           | .145                 |           | .145                 |           |
| Log Pr( <i>X</i> = <i>x</i> )    | -6707.47             |           | -6206.21             |           | -6208.29             |           |
| N                                | 11614                |           | 11614                |           | 11614                |           |

All Other Race (includes all except Caucasian, African American, Asian) was referent category for race variables.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.

Table 10: Odds ratios for Level II referral by patient and provider attributes

| Variable                         | Model 4<br><i>OR</i> | <i>SE</i> | Model 5<br><i>OR</i> | <i>SE</i> | Model 6<br><i>OR</i> | <i>SE</i> |
|----------------------------------|----------------------|-----------|----------------------|-----------|----------------------|-----------|
| Provider attributes              |                      |           |                      |           |                      |           |
| CC tenure <sup>a</sup>           | 1.05                 | .001      | 1.07***              | .001      | 1.07***              | .001      |
| CC is male                       | 1.29**               | .122      | 1.34**               | .129      | 1.37**               | .132      |
| Patient factors                  |                      |           |                      |           |                      |           |
| Complexity                       |                      |           | 1.38***              | .046      | 1.38***              | .046      |
| Depression Severity              |                      |           | .992                 | .006      | .993                 | .006      |
| Anxiety Severity                 |                      |           | .988†                | .006      | .988                 | .006      |
| PTSD screen                      |                      |           | 1.20†                | .132      | 1.24*                | .135      |
| Sociodemographic factors         |                      |           |                      |           |                      |           |
| Female                           | 1.19*                | .087      | 1.20*                | .090      | 1.16*                | .088      |
| Age <sup>a</sup>                 | .995†                | .002      | .997                 | .002      | .997                 | .002      |
| African American                 | .837                 | .156      | .861                 | .163      | .852                 | .161      |
| Asian                            | .711                 | .292      | .853                 | .346      | .336**               | .134      |
| All else (race)                  | .844†                | .079      | .932                 | .088      | .978                 | .093      |
| Hispanic                         | .205**               | .104      | .230**               | .116      | .091***              | .046      |
| Immigrant                        | NO                   | NE        | NO                   | NE        |                      |           |
| Has access to reliable transport | 1.75***              | .136      | 1.39***              | .112      | 1.32***              | .106      |
| Employed part or full time       | NO                   | NE        | NO                   | NE        |                      |           |
| $X^2$                            | 117.37               |           | 289.23               |           | 322.89               |           |
| Prob > $X^2$                     | 0.00                 |           | 0.00                 |           | 0.00                 |           |
| Pseudo R <sup>2</sup>            | .019                 |           | .043                 |           | .052                 |           |
| Log Pr( $X=x$ )                  | -2888.30             |           | 2818.88              |           | -2850.58             |           |
| N                                | 10814                |           | 10814                |           | 11614                |           |

No observations for patients who were immigrants or who were employed.

All else (includes all except Caucasian, African American, Asian) was referent category for race variables.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p < .001.

Table 11: Odds ratios for PTSD screening by patient and provider attributes

| Variable                         | Model 7<br><i>OR</i> | <i>SE</i> | Model 8<br><i>OR</i> | <i>SE</i> | Model 9<br><i>OR</i> | <i>SE</i> |
|----------------------------------|----------------------|-----------|----------------------|-----------|----------------------|-----------|
| Provider attributes              |                      |           |                      |           |                      |           |
| CC tenure <sup>a</sup>           | .998***              | .001      | .998***              | .009      | .998***              | .001      |
| CC is male                       | .505***              | .056      | .557***              | .055      | .531***              | .060      |
| Patient factors                  |                      |           |                      |           |                      |           |
| Complexity                       | 2.67***              | .083      |                      |           | 2.61***              | .083      |
| Depression Severity              | .994                 | .006      |                      |           | .992                 | .006      |
| Anxiety Severity                 | 1.04***              | .006      |                      |           | 1.04***              | .007      |
| Sociodemographic factors         |                      |           |                      |           |                      |           |
| Female                           |                      |           | 1.37***              | .079      | 1.49***              | .101      |
| Age <sup>a</sup>                 |                      |           | .992**               | .002      | .995†                | .002      |
| African American                 |                      |           | .699*                | .099      | .738† <sup>b</sup>   | .114      |
| Asian                            |                      |           | .470**               | .130      | 1.06                 | .307      |
| All else (race)                  |                      |           | .519***              | .034      | .617***              | .047      |
| Hispanic                         |                      |           | .553**               | .124      | .808                 | .307      |
| Immigrant                        |                      |           | .089***              | .037      | .229***              | .096      |
| Has access to reliable transport |                      |           | 2.69***              | .160      | 1.63***              | .112      |
| Employed part or full time       |                      |           | .329***              | .075      | .616*                | .147      |
| $X^2$                            | 1905.42              |           | 1136.48              |           | 1934.63              |           |
| Prob > $X^2$                     | 0.00                 |           | 0.00                 |           | 0.00                 |           |
| Pseudo R <sup>2</sup>            | .359                 |           | .142                 |           | .376                 |           |
| Log Pr( $X=x$ )                  | -3046.87             |           | -4075.80             |           | -2964.71             |           |
| N                                | 11614                |           | 11614                |           | 11614                |           |

No observations for patients who were immigrants or who were employed.

All else (includes all except Caucasian, African American, Asian) was referent category for race variables.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

<sup>b</sup> p = .051

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.

Table 12: Unstandardized regression coefficients and standard errors: how do patient, provider, and team characteristics affect amount of deliberation among team members?

| Variable                                                                | Model 10<br><i>B</i> | <i>SE</i>         | Model 11<br><i>b</i> | <i>SE</i>         | Model 12<br><i>b</i> | <i>SE</i>         |
|-------------------------------------------------------------------------|----------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
| Provider attributes                                                     |                      |                   |                      |                   |                      |                   |
| CC tenure                                                               | -.005***             | .001 <sup>a</sup> | -.003***             | .001 <sup>a</sup> | -.003***             | .001 <sup>a</sup> |
| CC is male                                                              | -.459**              | .141              | -.234†               | .130              | -.187                | .130              |
| Patient factors                                                         |                      |                   |                      |                   |                      |                   |
| Complexity                                                              |                      |                   | .611***              | .053              | .579***              | .053              |
| Depression Severity                                                     |                      |                   | .075***              | .007              | .075***              | .007              |
| Anxiety Severity                                                        |                      |                   | .067***              | .009              | .065***              | .009              |
| PTSD screen                                                             |                      |                   | 2.54***              | .160              | 2.46***              | .160              |
| Team attributes                                                         |                      |                   |                      |                   |                      |                   |
| Gender balance                                                          | 1.35***              | .232              | 1.19***              | .213              | 1.12***              | .121              |
| Tenure diversity                                                        | -2.01** <sup>b</sup> | 2.67 <sup>b</sup> | -.694** <sup>b</sup> | 2.46 <sup>b</sup> | -7.27** <sup>b</sup> | 2.46 <sup>b</sup> |
| Diversity in expertise                                                  | -.462**              | .160              | -.121                | .148              | -.042                | .147              |
| Size                                                                    | 3.17***              | .107              | 1.92***              | .105              | 1.88***              | .105              |
| Patient sociodemographic factors                                        |                      |                   |                      |                   |                      |                   |
| Female                                                                  |                      |                   | -.085                | .096              | -.098                | .095              |
| All else (race)                                                         |                      |                   |                      |                   | -1.16***             | .124              |
| African American                                                        |                      |                   |                      |                   | .471†                | .242              |
| Asian                                                                   |                      |                   |                      |                   | -.957**              | .369              |
| Hispanic                                                                |                      |                   | 1.03***              | .264              | .972***              | .279              |
| Immigrant                                                               |                      |                   | .708**               | .265              | .644*                | .301              |
| Has access to reliable transport                                        |                      |                   | .614***              | .108              | .482***              | .109              |
| Employed part or full time                                              |                      |                   | 1.26***              | .294              | 1.04***              | .294              |
| F                                                                       | 644.19               |                   | 433.20               |                   | 375.31               |                   |
| Prob > F                                                                | 0.00                 |                   | 0.00                 |                   | 0.00                 |                   |
| R <sup>2</sup>                                                          | .249                 |                   | .374                 |                   | .380                 |                   |
| Root MSE                                                                | 5.51                 |                   | 5.03                 |                   | 5.01                 |                   |
| N                                                                       | 11614                |                   | 11614                |                   | 11614                |                   |
| Caucasian was referent category for race variables.                     |                      |                   |                      |                   |                      |                   |
| <sup>a</sup> Multiplied by 100 in order to display significant figures. |                      |                   |                      |                   |                      |                   |
| <sup>b</sup> e-16                                                       |                      |                   |                      |                   |                      |                   |
| † p=.10. * p < .05. ** p < .01. *** p < .001.                           |                      |                   |                      |                   |                      |                   |

## Discussion

As with outcomes explored in Chapter 2 (team size and composition), team decisions and behaviors appear to be driven both by clinical and sociodemographic factors. Consistent with expectations, patient case complexity is positively associated with odds for psychiatrist involvement (OR = 1.49) as shown in Models 2 and 3 in Table 9. Depression severity appears to have a small, positive association with odds for psychiatric input, anxiety and PTSD severity are slightly negatively associated with odds for psychiatrist input (OR = .983 and .988, respectively, in Model 2). Contrary to expectations regarding severity and diagnostic challenge, Model 3 illustrates that odds for input among patients who were screened for PTSD are much lower than for those not screened (OR = .512).

Decisions to include specific input from consulting psychiatrists and to refer patients to Level II care are both consistently associated with greater case complexity, care coordinator gender (males are more likely to seek input and to refer), and patient gender (female patients are more likely than male patients to experience either outcome). Results for gender seem highly consistent with status characteristics hypotheses pertaining to performance expectations within provider and patient roles. Male gender for providers may be associated with greater prestige, as measured by opportunities to (successfully) participate in cross-status interactions (i.e. interactions across status boundaries interfacing areas of medical expertise). Therefore, odds for referral to psychiatrists and Level II providers for male care coordinator gender are a good deal greater than those associated with female care coordinator gender. On the other hand, purported expectations of better relative engagement, adherence, and benefit for female patients may explain why female patient gender is associated with greater odds for referral.

Care processes that had remained largely unconsidered in dissertation hypotheses (e.g. PTSD screening) are cast in a new light: is the presence of screening for PTSD an indication of effects of patient clinical factors, patient sociodemographic factors, or provider attributes? Table 11 suggests that the answer is “all three.” After taking both clinical and sociodemographic patient factors into account (Model 9, Table 11), the odds for PTSD screening for patients with male care coordinators are about half those

for patients who have female care coordinators (OR = 0.53). Considering that gender concordance is moderately common between patients and care coordinators ( $r = .3$ , not reported), Model 9 illustrates a particularly interesting positive association between patient female gender and odds of PTSD screening (OR = 1.49).

Analyses of amount of deliberation (Table 12) do not take into account number of patient encounters. However, in alternate analyses of Models 11 and 12 (results not reported), number of days in the program has a significant but small positive association with amount of team deliberation ( $b = .007$   $p < .001$ ), and associations reported in Table 12 remain mostly stable. It would be fruitful for further analysis to assess how types of visits with patients (in office, by phone, or elsewhere) and types of deliberation which do not include patients (during weekly caseload check-ins between care coordinators and consulting psychiatrists, for example) are related to characteristics of patients and providers.

Tenure diversity is positively associated with deliberation, suggesting that seniority and experience may be perceived as task-related status characteristics, and interactions across these boundaries (specific status characteristics) may carry with them fewer social costs than interaction across gender boundaries. While gender balance was negatively associated with amount of deliberation, it would be valuable to analyze effects of gender-homogenous teams before concluding about effects of gender balance.

## Chapter 4: Equal Treatment or Equal Outcomes? Collaborative Care Team Composition and Patient Mental Health Outcomes

Chapter 2 illustrated variation in patient need and collaborative care teams. Chapter 3 examined provider characteristics, team processes, and their effects on patient health and care outcomes. The present study (Chapter 4) explores whether team size and composition are associated with outcomes, taking into account factors such as team deliberation, and patient and provider characteristics. Is team structure powerful enough to impact patient outcomes over and above individual patient and provider characteristics<sup>26</sup>?

Given the finding of no significant difference in patient response to the collaborative care intervention (the IMPACT depression treatment program) between patients with high vs. low severity (Harpole et al 2005; Unützer et al 2002), is it possible that team-building in response to greater patient need (as measured by case complexity and severity), and other factors as determined by care coordinators, mediate health outcomes? Information processing, status characteristics and group solidarity perspectives provide a conceptual link between patient need, team processes, and outcomes. These theories draw attention to the importance of objective structural elements of the team's task (the patient's health and wellbeing), while focusing on the potential for team members to behave differently based on their own subjective experience (status characteristics).

Literature on team processes includes the following outcomes: patient satisfaction as measured by surveys (e.g. Shortell et al. 2004); care quality conceptualized as consistent prescribing or adherence to guidelines (e.g. Rodriguez et al. 2008); team member attitudes such as employee satisfaction, commitment, trust in management; and behavioral outcomes such as absenteeism and turnover (e.g.

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<sup>26</sup> Team processes such as decision making (i.e. treatment decisions) and participation patterns (level of deliberation in a team) are included in this dissertation as outcomes of patient characteristics, case severity and complexity, and team size and composition, but are not addressed until Chapter 3. In Rodriguez and colleagues' study (2008), care teams composed of three or more clinicians were associated with better technical care, such as more consistent prescribing of medical treatment.

Guzzo 1996; Sundstrom et al 1990; Hackman 1987; Lichtenstein et al 2004; for further review of outcomes, see Cohen and Bailey 1997). Outcomes like these are related to team process and, especially in the case of efficiency, can be ends in and of themselves (Hackman 1987; Lemieux-Charles and McGuire 2006; Rodriguez et al. 2009; Keating et al 2007; Lichtenstein et al 2004; Alexander et al 1996; Shortell et al. 2004; Rodriguez et al. 2008; Fried, Leatt, Deber, and Wilson 1988; and Shweikhart and Smith-Daniels 1996). However, the goals of collaborative care are to coordinate a variety of different professionals with diverse skills, knowledge, and expertise, who are formally bound to consult with one another and work together toward achieving *better health* for patients, and ultimately to reduce the burden of mental illness at the population-level.

Rodriguez et al (2008) suggest that team size and composition may affect several patient outcomes, depending on patients' baseline characteristics. More complicated medical cases (for example, HIV patients with lower baseline physical functioning, more HIV-related symptoms and worse mental health, [Rodriguez et al 2008]) tended to require larger, more interdisciplinarily-diverse teams. These researchers conclude that team care is likely to be superior to single-clinician care with regard to patient satisfaction and uniformity of care *if* it is provided by clinicians who have complementary knowledge, skills, and roles. In an extension of this research, I test whether team characteristics (such as diversity in expertise, gender balance, tenure, and team size) mediate patient health outcomes from program entry to program exit.

Administrative data utilized in the present study includes team member occupation, gender, and tenure. Different combinations of provider occupations, gender, and tenure could therefore affect patient outcomes directly. The focus of this study is: (1) *Are team size and composition valuable predictors of patient outcomes, net of individual patient characteristics at baseline?*<sup>27</sup> 2) *Do team size and composition*

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<sup>27</sup> Chapter 3 main focus: relative to other factors which may affect patient care, which team processes have the most impact on treatment and patient mental health outcomes? Chapter 4 main focus: to what extent can care processes explain disparities in treatment and health outcomes?

*mediate relationship between baseline and exit? (3) Are team size and composition likely to mediate outcomes disparities?*

Individual health outcomes may be commonly viewed as heavily dependent on qualities and characteristics of patients, treatments, and a range of conditions beyond the realm of mental health care settings. However, the logic underlying theories of group processes and the explicit goals and design of collaborative care make it theoretically and empirically crucial to examine patient health outcomes as a function of both individual characteristics and the team-building processes (which may be a response to individual patient characteristics). Since the collaborative care teams analyzed in this study are built to respond and care for the needs of individual patients (based upon the idea of patient-centered care), it seems intuitive to explore team size and composition as a result of the tasks or case presented upon a patient's initial intake into the program. The effects of team size and composition themselves, however, are less intuitive: testing for effects of team size and composition requires social theory.

#### Research Question

*(1) Do team processes mediate health and care outcomes over and above the effects of patient and provider characteristics?*

Analyses in this chapter describe how aspects of composition are associated with patient outcomes, taking into account team behavior (deliberation), provider attributes (tenure and gender), and patient factors.

#### Background

Outside of mental health care, Rodriguez et al's (2008) study of HIV care teams revealed that those composed of three or more clinicians were associated with better technical care, such as more consistent prescribing of medical treatment (2008: 93). These researchers find that, even after adjusting for physician and site specialty, team size is *positively* related to care quality. Study design might explain these unexpected findings: here, team size was operationalized using patient reports of which providers

were involved in their care (2008: 95). Patients were interviewed and asked to report the name of their main HIV physician. Then, patients were asked to report names of other providers who played an important role in their HIV care. If patients reported that no physician was primarily responsible for their care, patients were asked the name and site of the physician they most recently saw. According to these authors, using patient reports instead of administrative data increases the likelihood that each mentioned provider plays a significant role in patient care. However, because the theoretical model piloted in this dissertation treats less significant roles within teams as having potentially equal or greater causal value, the present study relies on administrative data which reports all providers involved in a single patient's care.

Collaborative care is designed to allocate additional resources to patients with greater need. Expectations for stepped care (Bower and Gilbody 2005) include that, regardless of initial severity and complexity, patients with larger teams should have no better or worse outcomes. Chapter 3 explored clinical characteristics of patients and demographic characteristics of providers which may generate more deliberation within teams, and greater likelihood of referral (team size), specialist involvement (psychiatric evaluation) and stepped-up care (referral to a care manager at Level II). The present study (Chapter 4) explores the health and care consequences of team size, composition (including demographic and occupational attributes of the team, specialist involvement [psychiatric evaluation] and stepped up care [referral to a care manager at Level II]), and processes (deliberation within teams), while taking into account how these processes may or may not be based upon clinical characteristics of patients and demographic characteristics of providers.

The present study takes four steps toward better understanding of relationships between tasks, teams, and outcomes. First, this study includes measures of team task complexity more objective than those used previously. Task complexity measures (baseline attributes of patients' health and well-being) contribute greater variation in task complexity than has been examined in previous research. These measures are also directly relevant for outcomes in the present study; these can naturally control for the effect of patient attributes (i.e. health and well-being at baseline) on the outcome (i.e. achieved difference

in health and well-being at exit), while examining effects of team diversity (and indicating team cohesion). Second, the large sample of patient-centered teams in a natural setting avoids validity pitfalls of creating and analyzing “nominal teams.” Third, outcomes are objective, externally valid, and easily understood. Last, this study pilots a series of hypotheses from group solidarity, status characteristics and information processing, and comprises a synthetic theoretical framework to isolate group processes that are potentially most relevant for health outcomes.

Lichtenstein et al (2004) find that females (female nurses in particular) were less likely than males to participate in psychiatric team decision making. These authors conclude that status hierarchies in broader social context affect status, roles, and functions within teams, and these, in turn, affect the team's interpersonal processes. These authors suggest changes in organizational structure and in team leadership styles in order to reduce the likelihood that broader social contexts dictate interpersonal and team processes within the organization. While many reasons exist for making changes in organizational structure, including job satisfaction, it may be unnecessary to assume that gender and tenure differences in work styles (and even propensities to participate) are always harmful to team functioning and team outcomes.

#### Theory

As developed by Berger et al (1977), status characteristics theory suggests that relative status hierarchies within the group can affect outcomes such as decision making and goal achievement. A status characteristic is a categorical distinction among people, such as a personal attribute (like race or sex) or a role (such as supervisor or trainee). These attributes carry with them widely held beliefs about relative status worthiness and competencies (Berger et al. 1977). These characteristics become salient when they explicitly act to differentiate people within the group or when the characteristic is merely believed to be relevant to the task/goal at hand. The theory explains that status hierarchies affect group outcomes because people within the group rely on salient characteristics to guide their own behavior and expectations. “Performance expectations” is the causal mechanism linking status characteristics to

individual behavior, social processes, and group outcomes. The theory holds that individuals will expect more from people with the more valued state of a characteristic (such as the attribute of being male vs. female, and with a role of supervisor vs. trainee). Performance expectations function in self-fulfilling ways, according to the theory: In task groups, higher status individuals are expected to contribute more to the group, and are therefore afforded more opportunities to contribute (in health care, see Litchenstein 2004). These individuals hold more influence in the group, and their performances are evaluated more positively, thus reinforcing the cycle (Ridgeway and Correll and 2004; Ridgeway 2007; Wagner and Berger 1997).

Status characteristics theory suggests that decisions are shaped by social identities, judgments, behaviors and even networks that are ‘imported’ into work teams from the broader society (Berger, Cohen, and Zelditch 1972; Cohen and Zhou 1991; Wagner and Berger 1993; see also Tajfel’s social identification/social categorization Tajfel 1982; Taifel and Turner 1979; and embedded intergroup relations Alderfer 1987). Research shows that broader societal values consistently predict performance expectations and behavior (e.g. male workers are expected to perform better than females, and individuals with whom they interact provide them greater opportunities to do so [Litchenstein 2004; Ridgeway and Correll 2004]). However, in some settings, certain lower-status individuals (such as women) may be expected to “naturally” perform better at tasks (such as nurturing).<sup>28</sup>

#### *Collaborative Care Processes as Causal Mechanisms*

In patient-centered, stepped, collaborative settings, patients and providers engage in collaborative decision making about treatment and care options. For collaborative care teams, improvement of the

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<sup>28</sup> Theoretical explanations of behavioral differences based on gender begin primarily with *sex role theories* as introduced by Parsons and Bales (Parsons and Bales 1955; Parsons et al. 1953). Here, gender differences reflect stable, trans-situational, functionally necessary differences in socialization of men and women. This theory links the individual need dispositions of men and women to role structures in groups. Because men and women each have a limited repertoire of need dispositions, the behavioral consequences of gender are likely to be the same, regardless of the setting and circumstances in which men and women are interacting. However, more recent/subsequent research on the evaluations and behavior of males and females, acting under different circumstances, reveals that evaluations and behavior depend heavily on setting and circumstance. This view, much the opposite of sex role theories, generate a *basic status argument* that many behaviors which approach gender differences in task behaviors as potential rather than immutable reflections of underlying status differences.

patient's health constitutes the task. Arguably, then, there is a great deal of variation in the conditions under which patient care is given.

Social status hierarchies may correspond to poorer team performance measures (see Lichtenstein et al. 2004; Alexander et al 1996). From this perspective, teams which encompass strong "status boundaries" such as those spanning diffuse status characteristics such as gender, age, and race are often problematic, leading to group conflict rather than coordination. Occupational status boundaries may contribute to poorer team coordination, because some professionals (such as physicians and psychologists) may be accustomed to making decisions autonomously and, may experience difficulty sharing authority and decision making roles with members of other occupations (Ridgeway and Berger 1986; Abbott 1988).<sup>29</sup>

One clinical characteristic (occurrence of a PCL screening, but not necessarily PCL severity score) is a main driver of team size and composition. This finding indicates that different clinical characteristics may generate different processes, such as greater deliberation, among teams. One hypothesis suggested by an MHIP psychiatrist is that clinical characteristics that are associated with greater uncertainty (PTSD symptoms or diagnoses in particular) generate more deliberation within teams ("people are interested in PTSD and looking for ways to help"<sup>30</sup>) and greater likelihood of referring a patient to a consulting psychiatrist (as opposed to discussing the patient during weekly check-ins between care coordinators and consulting psychiatrists). This study investigates contexts in which different clinical characteristics may generate more deliberation within teams, and greater likelihood of specialist

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<sup>29</sup> While status differences are almost always present in work groups, teams whose boundaries with the outside social environment are permeable such that teams "become totally caught up in their environmental turbulence and lose a consistent sense of their identity and coherence" (Alderfer 1980 p. 269) are more vulnerable than others to negative effects of status boundaries. That is, negative effects of status boundaries should be magnified by factors such as imbalanced gender composition within teams, clinics and agencies, within occupations that are sex-typed and by the extent to which rules and procedures are formalized within the organizational context (England et al 1996; Reskin and McBrier 2000). Additional hypotheses about permeability of status boundaries could involve testing for differences between clinics in urban versus rural settings.

<sup>30</sup> Dr. Wayne Bentham, personal communication, April 13, 2011.

involvement. Other factors affecting uncertainty in team processes are hypothesized by status characteristics theory, below.

Salient status differences among professionals consistently reflect values of broader social context. However, some evidence suggests that status hierarchies in the field of medicine may be slightly different from those in the broader society, and may at the same time be powerful enough to affect processes and decisions within teams (see Shaw 1990).

Teamwork has been a mainstay in psychiatric care in particular (Brown 1982; Shaw 1990). According to Shaw (1990), psychiatric teams assume a flat authority structure, and suspend authority structures (status hierarchies) that exist in broader settings. They do this in order to coordinate care, bring varied clinical perspectives, and add valuable expertise to patient care, unencumbered by traditional patterns of interaction (Shaw 1990). However, Lichtenstein et al's (2004) analysis of 860 individuals working in psychiatric teams revealed that relationships between health professionals were in fact defined by broader social contexts in that age, sex and race did affect interpersonal behavior within psychiatric teams.<sup>31</sup>

As explained in Chapter 2, Van de Ven and Ferry (1980) find that structural aspects of the task are likely to condition the ways that characteristics alter outcomes. Because they often dictate which characteristics are perceived during initial conditions, tasks are especially important in the creation of status characteristics and performance expectations. Wagner and Berger (1997) provide examples of tasks widely perceived as male (e.g. automotive repair), female (e.g. pattern sewing), or neutral (e.g. vegetable gardening). When tasks (e.g. repair) are associated with a particular state of a characteristic (e.g. the task is a male or female task), that characteristic (e.g. gender) is likely to be perceived as highly relevant to individual actors' success at the task. In this case, individuals who possess the positively associated state of the characteristic (e.g. maleness) are likely to elicit higher expectations for success at the task (auto repair). Then, based on higher expectations, individuals assign higher status to those in possession of the

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<sup>31</sup> These researchers suggest changes in organizational structure and in team leadership styles that might make cross-functional teams (CFTs) more effective. (Lichtenstien et al 2004).

preferred state of the characteristic (e.g. males) with regard to the task (oil changing), and *behave accordingly* by affording those actors (males) greater opportunity to participate in the task (agreement or lack of resistance to changing oil, requests for instruction on how to change oil, etc).

In the case of highly complex and uncertain tasks, relevant information is difficult to discern.<sup>32</sup> In these cases, status characteristics such as race, gender, age, ethnic and socioeconomic status are prone to operate more strongly within the status organizing process. However, in the presence of other status information that is highly relevant to the task and is inconsistent with the expectation generated by a status characteristic (i.e. information that disconfirms the relevance of a status characteristic to a task), the characteristic becomes less salient in the status organizing process. When this happens, power and prestige structures within the group are altered, and the status characteristic becomes less likely to guide

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<sup>32</sup> The definitions of “complex” and “uncertain” remain largely theoretical; few empirical studies that have established “uncertainty” as activating status characteristics rely on *conflicting* information, and never (have I found) do they rely on *absence of information*. With regard to uncertainty, Galbraith (1974) argues, “A basic proposition is that the greater the uncertainty of the task, the greater the amount of information that has to be processed between decision makers during the execution of the task. If the task is well understood prior to performing it, much of the activity can be preplanned. If it is not understood, then during the actual task execution more knowledge is acquired which leads to changes in resource allocations, schedules, and priorities. All these changes require information processing during task performance. Therefore the greater the task uncertainty, the greater the amount of information that must be processed among decision makers during task execution in order to achieve a given level of performance. The basic effect of uncertainty is to limit the ability of the organization to preplan or to make decisions about activities in advance of their execution.” Bodenhausen’s work is similar to Galbraith’s in its conceptualization of uncertainty as conflicting information. Bodenhausen 1998 (p. 510-11). writes: Social psychologists have frequently characterized stereotypes as energy-saving devices that serve the important cognitive function of simplifying information processing and response generation (e.g., Allport, 1954; Andersen, Klatzky, & Murray, 1990; Bodenhausen & Lichtenstein, 1987; Brewer, 1988; Fiske & Neuberg, 1990; Tajfel, 1969). Building on this tradition, Gilbert and Hixon (1991) aptly characterized stereotypes as “tools that jump out” of a metaphorical cognitive toolbox “when there is a job to be done” Anyone who has ever succumbed to the temptation to evaluate others in terms of their social group membership would doubtlessly recognize the power of this contention. Individuation, in its many guises, is a rather time consuming and effortful affair (Brewer, 1988; Fiske & Neuberg, 1990; Fiske & Pavelchak, 1986). Stereotyping, in contrast, relies only on the execution of some rather rudimentary skills: most notably, the ability to assign people to meaningful social categories (see Hamilton, 1979; Hamilton & Sherman, in press; Hamilton, Sherman, & Ruvalo, 1990; Hamilton & Troler, 1986). Once achieved, this categorization provides perceivers with a veritable wealth of stereotypic information. See Reskin’s (2002 p. 225) discussion of cognitive biases for reference to studies establishing “uncertainty” (theoretically, not necessarily empirically) and for background on generally accepted effects of individuating information within organizational processes. As will be mentioned, prior studies in decision making behavior have primarily conceptualized “uncertainty” as either the presence of *conflicting* information or *imperfect* information (e.g. Bodenhausen et al 1998 and Aigner and Cain’s 1977).

behavior, and is far less likely to be associated with inequalities (Ridgeway 1991; Wagner and Berger 1997; Webster and Hysom 1998). In this way, disparities associated with demographic characteristics are overcome.

Traditionally, status characteristics can operate as either diffuse characteristics or specific characteristics (Wagner and Berger 1997). Diffuse characteristics are associated with general expectations across a range of situations. Specific characteristics are associated with an expectation for a given level of performance in a specific, clearly defined situation. For example, when we differentially evaluate 3<sup>rd</sup> grade level readers and 4<sup>th</sup> grade level readers, associate specific levels of ability at a specific task with each reading level, and expect members of one reading level to be more capable than those of the other with regard to the specific task, then reading level operates as a specific characteristic. On the other hand, when we differentially evaluate males and females, associate specific levels of ability at a variety of different tasks with each gender, and expect members of one gender to be generally more capable than those of the other, then gender operates as a diffuse characteristic (1997: 3-5).

Information processing theories approach certainty and complexity of tasks<sup>33</sup> (Van de Ven and Ferry 1980) as an important mediator in relationships between group composition (diversity) and outcomes. From this perspective, certainty and complexity commonly affect any group's ability to coordinate.

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<sup>33</sup> Complexity of a task is the extent to which it is composed of difficult and variable tasks. Difficulty is the extent to which a process is known and understood (Perrow 1967). The degree of difficulty directly affects the type of coordination needed to do a task (Hage 1965; Mohr 1978; Van de Ven and Ferry 1980). Since a highly difficult problem is novel, pre-definition of how to sequence or plan the solution is not possible. Problem solution requires trial and error, feedback, learning over time, and adjustment (Conger 1992: 67)

Table 13: Hypothesized effects of team composition on odds of a patient achieving desirable exit, target duration of treatment, and symptom improvement.

| Independent variable (factor) level of analysis | Effect  | Mechanism                                                                              | Limitations of Measurements                                                                                         | Location in literature                                                                                                       |
|-------------------------------------------------|---------|----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Gender Heterogeneity                            | -       | Poor team functioning via high costs to interaction across gender boundaries.          | Lower costs of interaction (all male or all female teams) may be associated with successful outcomes. <sup>34</sup> | Status characteristics theory: <sup>35</sup> e.g. Hakim 2001; England 1986; Tomaskovic-Devey 2006.                           |
| Gender Heterogeneity                            | - / Nil | Team-member diversity perceived as less relevant to tasks (vs. expertise, experience). |                                                                                                                     | Information processing; Horwitz and Horwitz 2007.                                                                            |
| Diversity in expertise                          | -       | Increased costs of interaction across status boundaries.                               | Baseline clinical characteristics are confounded with diversity in expertise, by program design. <sup>36</sup>      | Status characteristics theory; e.g. Litchenstein et al 2004.                                                                 |
| Diversity in expertise                          | +       | Team member functional expertise perceived as task-relevant.                           |                                                                                                                     | Information processing; e.g. Cohen and Levinthal 1990.                                                                       |
| Tenure diversity                                | -       | Increased costs of interaction across status boundaries.                               | Measure is variance in days of experience among team members.                                                       | Status characteristics theory; e.g. Litchenstein et al 2004.                                                                 |
| Tenure diversity                                | +       | Team member experience is task-relevant, promotes coordination.                        |                                                                                                                     | Individuals with greater relative experience bridge structural holes in communication. E.g. Brass 1984; structural analysis. |
| Amount of Deliberation                          | +       | Increases coordination, reflects/reinforces team cohesion.                             | Measure is time-dependent <sup>37</sup> , confounded with unobserved factors such as number of visits, etc.         | Status characteristics theory; e.g. Litchenstein et al 2004.                                                                 |

<sup>34</sup> According to status characteristics theories, more salient status boundaries will exist for teams that are neither gender balanced nor gender-homogenous. Conclusions about gender balance are subject to much caution.

<sup>35</sup> Hypothetically, all-female teams would be most strongly associated with symptom improvement. The current measure does not account for male vs. female homogeneity in teams.

<sup>36</sup> Identification of direct effects of diversity on outcomes is not possible, but associations will be noted. Patients who are more severe to begin with are more likely to experience a reduction in PHQ, GAD or PCL scores (vs. patients who scored zeros at intake) and, due to program design and intent, are more likely to have been allocated resources (referrals) based on measured and unmeasured need.

<sup>37</sup> Conclusions about deliberation in the present study are limited in that present analyses do not account for patients' number of days in the program (other than via the dependent variable, achievement of target amount of time spent in treatment. Models of other outcomes can include this measure in future analyses.

## Measures

### *Health and Care Outcomes*

*Desirable Exit*: a binary variable to include the following list of patient exit reasons: treatment completed; lost General Assistance-Unemployable eligibility; now on other Medicaid; now employed<sup>38</sup>.

Logistic regressions were used to analyze *Desirable Exit*.<sup>39</sup>

*Less severe symptoms*: a binary variable indicating that some aspect of patients' depression, anxiety or posttraumatic stress disorder symptoms (as indicated by scores on clinical screening tools PHQ-9, GAD-7 and PCL-C, see severity measures, below) lessened between initial intake and program exit. For example, this could be a reduction in the number of days a patient reported feeling as if something terrible were about to happen.

*Target time target*: a binary variable indicating that the patient spent between 30 and 90 days (inclusive) in the MHIP treatment program. Number of days patients spent in the program was calculated using "datediff" in SPSS, based upon calendar days elapsed between each patient's date of program enrollment and disenrollment (enrollment and exit dates inclusive). Number of days in MHIP is expected to vary for many reasons; however a desirable outcome is for a patient to remain in the program for at least 60 days, with at least 90 days being optimal for the patient, indicating significant engagement in treatment.<sup>40</sup>

*Change in diagnosis (for reference only)*: a binary variable indicating whether a patient's mental health diagnosis(es) changed during their time in MHIP. Changes from/to presence or absence of any of the following array of diagnosed mental health disorders, as classified by the DSM and as documented in

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<sup>38</sup> In the cases of losing eligibility and now on other Medicaid, both measures represent significant effort and follow-through on the part of MHIP providers and patients toward better placement of the patient in the mental health benefit system.

<sup>39</sup> Each patient's possible *reason for exit* consists of one of the following categories: treatment completed, patient deceased, patient decision, clinician decision, does not qualify (rejected from MHIP Level One treatment), lost General Assistance-Unemployable eligibility, patient not participating in treatment, now on other Medicaid, incarcerated, now employed, inpatient psychiatric admission, or other.

<sup>40</sup> Jurgen Unutzer, personal communication 12/23/2011; (For certain patient groups, such as American Indians and Alaska Natives, the number of days spent in the program is expected to be low, as a desirable outcome for the Program for these patients is referral to a tailored, integrated mental health program beyond the scope of MHIP.)

patients' MHITS health records, resulted in a score of 1 = change, 0 = no change: Depression, Anxiety, Bipolar Disorder, Psychotic Disorder, Chronic Pain, Cognitive Disorder, Post-traumatic Stress Disorder, a pending mental health diagnosis, Substance Abuse Disorder. Summary statistics for binary indicators of multiple changes in diagnoses (where 1 = more than one change, 0 = less than two changes) as well as for patients' total count of changes in diagnoses also appear for reference (Table 14).

#### *Team Attributes, Decisions and Processes*

*Level II:* a binary variable indicating whether a patient was ever referred outside of the primary care setting, to Level II care as described in "Setting." Level II care occurs at a community-based mental health center for mental health care and involves care management by a different type of provider (a care manager). For this reason, *Level II* may be considered referral to an MHIP care manager, but it indicates that patient need is greater than what can be met by MHIP resources available at the primary care location. Referral to *Level II* is made by MHIP care coordinators.

*Psychiatrist input:* a binary variable indicating whether a patient was referred for psychiatric evaluation by a consulting psychiatrist (CP) or whether a psychiatrist note appeared anywhere in the patient's MHITS record. At a minimum, this variable indicates discussion between care coordinators and psychiatrists about specific patients, and may indicate direct psychiatric evaluation of the patient by a psychiatrist (i.e. the consulting psychiatrist conducts an in-person evaluation of the patient his or herself). Summary statistics for psychiatric evaluation (*Evaluation*) appear in Table 14 for reference only.

*Deliberation:* a count variable indicating the total number of times an MHIP provider revised information (such a psychiatrist notes) was revised in a patient's MHITS record.

*Gender heterogeneity:* a binary variable indicating that a team's proportion of female providers is greater than or equal to .4 and less than or equal to .6. For reference, summary statistics for teams with all male and all female providers ( $p = 0$  or 1) also appear in Table 14.

*Proportion female:* the proportion of female providers on a team.

*Tenure diversity:* the variance of each team's members' number of days' experience (at the time of patient enrollment) between the most- and least- experienced team members in each team.

*Diversity in expertise:* a count variable based upon the different *types* of providers on a team, without taking team size into account. For example, a team with a care coordinator, primary care doctor and a care manager receives a count of “3” where a team with two care coordinator and one primary care doctor receives a count of “2.”

*Team size:* all MHIP providers have unique MHITS user identification numbers, which were assigned unique study identification numbers. Team size is the count of unique provider study identification numbers that appear in a patient’s record. Providers’ study identification numbers could appear in a patient’s MHITS record as a result of one or more of the procedures: initial assessment; follow up assessments; psychiatrist notes; treatment planning; internal referrals<sup>41</sup> (including Level II referrals, psychiatric evaluations, psychiatrist notes, referrals to primary care, and more); and discharge notes. Using documentation of each of these procedures for each patient, I gathered study identification numbers of providers who personally assessed the patient, providers who physically entered information, and providers who modified this information, as applicable. Not all patients at MHIP went through all of these processes, nor did patients always encounter the same provider each time they received care (e.g. a follow up assessment). Teams can include a variety of providers (see *Team composition*, below). However, at minimum teams include the patient, a patient’s primary care provider, and a care coordinator, making “three” the smallest possible team size.

*Note Team composition:* To measure team composition, I first created fifteen binary variables indicating whether MHITS users were one of the following types of providers: Administrator, Level 1 Site Manager, Care coordinator, Care manager, Primary care provider, Consulting psychiatrist –

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<sup>41</sup> In the present study, “teams” are comprised only of MHIP providers in the Mental Health Integrated Tracking System, as opposed to non-MHITS providers included as part of an extended team. (In practice, Care coordinators may also refer to professionals who work at other organizations such as churches, 12-step programs, and homeless shelters. While these professionals are integrated into MHIP patients’ mental health care via referral from an MHIP provider – typically a Care coordinator, these professionals may not be formally involved in the Mental Health Integration Program). An untitled manuscript related to this dissertation will examine the impact of inter-organizational referrals, or extended team size and composition, on patient health and care outcomes.

Unrestricted, Data Manager, Consultant - No PHI, Site Manager L2, Consultant L1, Consultant L2, Community Service Office, Reviewer, Consulting psychiatrist, and Disability Outreach Worker.

#### *Provider Attributes*

*CC tenure*: a count variable indicating the number of days of experience in MHIP held by care coordinators as of the day their patient enrolled in MHIP. I.e. if a patient enrolled 120 days after a provider began work with MHIP, then that provider's tenure appears as 120 days). Because this measure is calculated using "datediff" in SPSS based upon patient's start date minus care coordinator start date, *CC tenure* can vary according to the patient/team that he or she is on (e.g. *CC tenure* for care coordinator X on any given day within the study period can vary from team to team).

*CC gender*: a categorical indicator of care coordinator gender, where 1 = male, 2 = female, and 3 = unknown gender. These categories were used to create binary indicators (dummy variables) for each gender (male, female, unknown). As noted in Table 14, gender was unknown in two cases (for two patients/teams). These cases were included in models as having male care coordinator = 0 and female care coordinator = 0 (care coordinators were neither male nor female).

#### *Patient Factors*

*Case complexity* is operationalized as the number of diagnosed mental disorders a patient is suffering (upon program intake). Complexity will refer to the total count of the following array of diagnosed mental health disorders, as classified by the DSM and as documented in patients' MHITS health records: Depression, Anxiety, Bipolar Disorder, Psychotic Disorder, Chronic Pain, Cognitive Disorder, Post-traumatic Stress Disorder, a pending mental health diagnosis, Substance Abuse Disorder.

*Depression severity*: a count variable indicating a patient's score on a screening and diagnostic tool for depression (a nine-item Patient Health Questionnaire, PHQ-9) where scores range from 0 to 27, and higher scores indicate greater depressive symptom severity.

*Anxiety severity*: a count variable indicating a patient's score on an anxiety screening and diagnostic tool GAD-7 (where scores range from 0 to 21, and higher scores indicate greater anxiety symptom severity).

*PTSD severity*: a count variable indicating a patient's score on a screening tool for posttraumatic stress disorder (the PCL-C) where scores range from 17 to 85, and higher scores indicate greater severity.

*PTSD screened*: a binary variable indicating whether a patient was screened for PTSD symptoms (using the PCL-C) at their initial (first) assessment.

*Patient sociodemographic factors*

*Age*: a continuous variable indicating years of age as of the patient's date of enrollment in MHIP.

*Gender*: patient's sex as male or female, as two binary variables (male = 1 or 0, female = 1 or 0).

*Race*: four categorical variables indicating whether race information was listed in a patient's MHITS records, as one of the following: African American (1 or 0), Caucasian (1 or 0), Asian (1 or 0) and all else (1 or 0). "All else" included patients whose MHITS record included designation of race as American Indian/Alaska Native, Hawaiian Native/Other Pacific Islander, Multi-racial, Unreported/refused to report, or which did not include race information. Because race information was unavailable for most of the sample (about 73% of patients in the sample are in the "all else" category, see Table 14), analyses can only be interpreted as suggestions of potential race effects, and may more directly measure factors such as care coordinator caseload (e.g. care coordinators who have lower caseloads may take time to gather race information from patients, while other may not).

*Hispanic*: a binary variable indicating whether Hispanic ethnicity was indicated in the patient's MHITS record, where 1 = Hispanic, 0 = non-Hispanic. Patients for whom no information was listed were coded as non-Hispanic.

*Immigrant*: a binary variable indicating whether the patient was recorded as having immigrated to the United States, where 1 = immigrant, 0 = non-immigrant. Patients for whom no information was listed were coded as non-immigrants.

*Transportation:* a binary variable indicating whether the patient reported having access to dependable transportation, where 1 = yes and 0 = no or no report.

*Employed:* a binary variable indicating whether the patient reported being employed (either full or part time), where 1 = yes and 0 = no or no report. Although information about transportation and employment status was most likely gathered upon patient's initial assessment, it is possible that they were gathered and/or updated at any point during a patient's treatment at MHIP. These measures are assumed to be baseline measure, but are interpreted with much caution.

*For reference: population:* binary variables indicating patient's source of eligibility for MHIP are included for reference in Table 14. Further analyses might approach such variables as a source of information about patients' social background and status in MHIP, as this status determined by the funding/insurance mechanism under which the patient receives mental health benefit. *Population* was operationalized as dummy variables for each of the following categories: *general assistance unemployable (GAU), veteran, family of veteran, mother, older adult, and chronically mentally ill.*

## Summary

Table 14 provides descriptive statistics for patient clinical and sociodemographic factors, care team attributes, care team decisions and behavior, and patient outcomes (key outcomes: desirable exit, less severe symptoms, and target amount of time spent in treatment).

Table 14: Variable names, descriptions, and descriptive statistics. N = 11,614

| Variable                                     | Variable Description                                                                                              | <i>n</i> | Mean<br>or <i>p</i> | SD                | min /<br>N | max /<br>Y        |
|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------|---------------------|-------------------|------------|-------------------|
| Health and care outcomes                     |                                                                                                                   |          |                     |                   |            |                   |
| Desirable exit                               | Patient became employed, lost GAU eligibility, completed treatment, or gained Medicaid/other healthcare           | 11614    | .486                | .499              | 0          | 1                 |
| Less severe symptoms                         | Patient's depression, anxiety or PTSD symptoms are less severe at exit                                            | 11614    | .269                | .443              | 0          | 1                 |
| Treatment time target                        | Patient spent 30 to 90 days in treatment program                                                                  | 11614    | .124                | .330              | 0          | 1                 |
| (Change in diagnosis) <sup>a</sup>           | (Patient's mental health diagnosis changed during treatment) <sup>a</sup>                                         | 11614    | .562                | .496              | 0          | 1                 |
|                                              | (Multiple mental health diagnoses changed during treatment) <sup>a</sup>                                          | 11614    | .281                | .449              | 0          | 1                 |
|                                              | (Count of mental health diagnosis changes during treatment) <sup>a</sup>                                          | 11614    | 1.10                | 1.35              | 0          | 9                 |
| Team behavior and decisions (care processes) |                                                                                                                   |          |                     |                   |            |                   |
| Level II Referral (Evaluation) <sup>a</sup>  | Patient is referred for MH care outside of primary care setting (CP directly evaluated the patient.) <sup>a</sup> | 11614    | 0.07                | 0.26              | 0          | 1                 |
| Psychiatrist Input                           | Psychiatrist gives patient-specific input to the PCP or CC                                                        | 11614    | 0.32                | 0.47              | 0          | 1                 |
| Deliberation                                 | Total revisions to patient record and notes                                                                       | 11614    | 8.76                | 6.36              | 0          | 65                |
| Provider attributes                          |                                                                                                                   |          |                     |                   |            |                   |
| CC tenure                                    | Days of experience in MHIP as of patient's enrollment date                                                        | 11614    | 235                 | 278               | -924       | 1098              |
| CC gender                                    | Male                                                                                                              | 2175     | .18                 | .39               | 0          | 1                 |
|                                              | Female                                                                                                            | 9437     | .81                 | .39               | 0          | 1                 |
| Care team attributes                         |                                                                                                                   |          |                     |                   |            |                   |
| Gender balance                               | Proportion female is >.39 and < .61.                                                                              | 11614    | .056                | .230              | 0          | 1                 |
| Proportion female                            | Proportion of female providers                                                                                    | 11613    | .789                | .365              | 0          | 1                 |
|                                              | (All male team) <sup>a</sup>                                                                                      | 11614    | .147                | .354              | 0          | 1                 |
|                                              | (All female team) <sup>a</sup>                                                                                    | 11614    | .709                | .453              | 0          | 1                 |
| Tenure diversity                             | Tenure variance across team providers                                                                             | 11614    | 1.04 <sup>b</sup>   | 1.99 <sup>b</sup> | 0          | 2.13 <sup>c</sup> |
| Diversity in expertise                       | Count of provider types on team (CC CM CP PCP)                                                                    | 11614    | 2.39                | .559              | 2          | 4                 |
| Team Size                                    | Count of providers on the team                                                                                    | 11614    | 4.40                | 0.82              | 3          | 9                 |

Table 14 continued next page

| Table 14 continued. Variable names, descriptions, and descriptive statistics. N = 11,614 |                                                                        |          |                     |       |            |            |
|------------------------------------------------------------------------------------------|------------------------------------------------------------------------|----------|---------------------|-------|------------|------------|
| Variable                                                                                 | Variable Description                                                   | <i>n</i> | Mean<br>or <i>p</i> | SD    | min /<br>N | max /<br>Y |
| Patient factors (at baseline)                                                            |                                                                        |          |                     |       |            |            |
| Complexity                                                                               | Count of mental health diagnoses at intake                             | 11614    | 1.89                | 1.41  | 0          | 9          |
| Depression Severity                                                                      | Score on PHQ-9 depression screener                                     | 11614    | 11.66               | 9.00  | 0          | 27         |
| Anxiety Severity                                                                         | Score on GAD-7 anxiety checklist                                       | 11614    | 7.55                | 7.99  | 0          | 21         |
| PTSD Severity                                                                            | Score on PCL-C posttraumatic stress screener                           | 11614    | 8.45                | 21.47 | 17         | 85         |
| PTSD Screened                                                                            | Patient was screened for PTSD                                          | 11614    | 0.14                | 0.35  | 0          | 1          |
| Depression screened                                                                      | Patient was screened for depression                                    | 11614    | 0.74                | 0.43  | 0          | 1          |
| Anxiety screened                                                                         | Patient was screened for anxiety                                       | 11614    | 0.56                | 0.49  | 0          | 1          |
| Social and demographic characteristics in patient records                                |                                                                        |          |                     |       |            |            |
| Age                                                                                      | Age at program intake (in years)                                       | 11614    | 40.51               | 12.00 | 18         | 99         |
| Gender                                                                                   | Male                                                                   | 6144     | 0.52                | 0.50  | 0          | 1          |
|                                                                                          | Female                                                                 | 5470     | 0.47                | 0.50  | 0          | 1          |
| Race                                                                                     | Caucasian                                                              | 2216     | 0.19                | 0.39  | 0          | 1          |
|                                                                                          | African American                                                       | 543      | 0.05                | 0.21  | 0          | 1          |
|                                                                                          | Asian                                                                  | 276      | 0.02                | 0.15  | 0          | 1          |
|                                                                                          | (American Indian/Alaska Native) <sup>a</sup>                           | 116      | 0.01                | 0.10  | 0          | 1          |
|                                                                                          | (Pacific Islander) <sup>a</sup>                                        | 29       | 0.00                | 0.05  | 0          | 1          |
|                                                                                          | (Multiracial) <sup>a</sup>                                             | 159      | 0.01                | 0.12  | 0          | 1          |
|                                                                                          | (Refused to report) <sup>a</sup>                                       | 227      | 0.02                | 0.14  | 0          | 1          |
|                                                                                          | (Unknown) <sup>a</sup>                                                 | 8048     | 0.31                | 0.46  | 0          | 1          |
| Other Race                                                                               | All Other Race. Includes all except Caucasian, African American, Asian | 8579     | 0.73                | 0.43  | 0          | 1          |
| Ethnicity                                                                                | Hispanic                                                               | 577      | 0.05                | 0.22  | 0          | 1          |
|                                                                                          | Non-Hispanic                                                           | 11037    | 0.95                | 0.22  | 0          | 1          |
| Immigrant Population‡                                                                    | Patient immigrated to the US                                           | 568      | 0.05                | 0.22  | 0          | 1          |
|                                                                                          | (General Assistance Unemployable) <sup>a</sup>                         | 9105     | 0.78                | 0.41  | 0          | 1          |
|                                                                                          | (Veteran) <sup>a</sup>                                                 | 384      | 0.03                | 0.18  | 0          | 1          |
|                                                                                          | (Family of veteran) <sup>a</sup>                                       | 161      | 0.01                | 0.12  | 0          | 1          |
|                                                                                          | (Mother) <sup>a</sup>                                                  | 971      | 0.08                | 0.28  | 0          | 1          |
|                                                                                          | (Older adult) <sup>a</sup>                                             | 739      | 0.06                | 0.24  | 0          | 1          |
| Transportation                                                                           | Has access to reliable transport                                       | 3642     | 0.31                | 0.46  | 0          | 1          |
| Employment                                                                               | Employed part or full time                                             | 335      | .028                | .167  | 0          | 1          |

<sup>a</sup> For reference only; variables do not appear in analyses. <sup>b</sup>e+14 <sup>c</sup>e+15

‡Patient eligibility for MHIP through General Assistance-Unemployable (GAU) of Washington State is available across Washington State; all other populations are eligible only in King County.

## Analysis

The extent to which team characteristics (tenure diversity, diversity in expertise, gender homogeneity, and gender balance) processes (such as Level II referral, psychiatrist input, and deliberation) affect patient outcomes will be assessed using logistic regression of health and care outcomes (desirable exit, symptom improvement, and target duration in treatment).

I compare predictors of patient-specific psychiatrist input in Table 16. Model 1 analyzes effects of patient sociodemographic factors and provider attributes on consulting psychiatrist involvement. Model 2 investigates effects of patient health factors and sociodemographic characteristics, and Model 3 introduces PTSD screening (as opposed to PTSD severity scores) as a predictor of psychiatrist input.

## Results

Models 2 and 3 (Table 16) suggest that desirable exit is driven by care decisions, provider attributes, patient factors, and possibly some aspects of team composition as well (diversity in expertise and deliberation).

The effect of patient case complexity at baseline is positive and significant ( $OR = 1.04$ ), and screening for anxiety and PTSD each have positive, significant effects on desirable exit ( $OR = 1.14$ , and  $1.72$  respectively). The association between patient female and treatment outcome (exit) is modest but is as hypothesized ( $OR = 1.08$ ). This effect does not appear to depend on what other factors are included ( $OR = 1.08$  across Models 1, 2 and 3). Once provider and team attributes are accounted for, patient gender appears to have a meaningful effect only on desirable exit. slightly altered when clinical and sociodemographic variables are modeled together (the coefficient for female gender shifts from  $OR = .060$  in Model 2 to  $.054$  in Model 3), however the effect remains significant ( $p < .001$ ). In Model 2, diversity in expertise appears to have one of the largest associations with desirable exit ( $OR = 1.78$ ). While it is difficult to disentangle effects of Level II referral and psychiatrist input from the effects of

diversity in expertise, Table 16 suggests that further exploration of diversity in expertise may be warranted.

Age is positively associated with odds for desirable exit (compared to those not aged an additional year, patients aged an additional year enjoy an odds ratio of 1.07 for desirable exit). Associations between exit and sociodemographic factors such as race and ethnicity are interpreted with caution, but are not inconsistent with hypotheses: compared to odds for patients with race listed as Caucasian, African American race is significantly associated with lower odds (OR = .737). Of course, patients with no race information listed fared better than those listed as Caucasian (OR = 1.25), adding to the tentative nature of possible race effects.

Symptom improvement appears to be driven by team behaviors and decisions, care coordinator gender, and potentially by some patient factors. Table 4.3 suggests consistent positive effects of male gender of care coordinators, across models. The effect of care coordinator gender appears greater as team behavior and structures are controlled for: Model 6 presents results for team structures (attributes such as size, diversity, and gender balance), decisions and behaviors, provider attributes, and patient factors. In this model, male gender among care coordinators is associated with a fairly large increase in odds for symptom improvement over female care coordinator gender (OR = 1.39). While the magnitude of effects for care coordinator gender is striking, patient gender appears to have little to no association with odds for symptom improvement.

It is difficult to gauge whether remaining in treatment for 30 to 90 days may be associated with team-building and decision making processes beyond those influenced by patient clinical and sociodemographic factors.

In Table 17, model results again display consistent gender effects. Compared to odds for target treatment duration for patients of female care coordinators, patients with male care coordinators have lower odds for achieving target duration of treatment (OR = .839 in Model 9). This is interesting in light of association of female patient gender with reduced odds of spending 30 to 90 days in treatment (OR =

.867). Effects of gender balance (OR = .873 at  $p < .05$  in Model 8) become nonsignificant (OR = .829 ns) when psychiatrist input, Level II referral, and deliberation are included (Model 9).

Table 15: Odds ratios for desirable exit, by patient, provider, and team attributes

| Variable                            | Model 1<br><i>OR</i> | <i>SE</i> | Model 2<br><i>OR</i> | <i>SE</i>         | Model 3<br><i>OR</i> | <i>SE</i>         |
|-------------------------------------|----------------------|-----------|----------------------|-------------------|----------------------|-------------------|
| Care team attributes                |                      |           |                      |                   |                      |                   |
| Gender heterogeneity                |                      |           | .782**               | .068              | .815*                | .072              |
| Tenure diversity                    |                      |           | 1.00***              | 1.08 <sup>b</sup> | 1.00                 | 1.08 <sup>b</sup> |
| Diversity in expertise <sup>c</sup> |                      |           | 1.78***              | .114              |                      |                   |
| Team Size                           |                      |           | .958                 | .043              | .930                 | .042              |
| Team behavior and decisions         |                      |           |                      |                   |                      |                   |
| Level II referral                   | 2.68***              | .226      |                      |                   | 2.95***              | .295              |
| Psychiatrist input                  | 1.23***              | .058      |                      |                   | 1.48***              | .102              |
| Amount of deliberation              | 1.01**               | .004      |                      |                   | 1.01**               | .004              |
| Provider attributes                 |                      |           |                      |                   |                      |                   |
| CC tenure                           | .999*** <sup>a</sup> | .006      | .999***              | .005 <sup>a</sup> | .999***              | .006 <sup>a</sup> |
| CC is male                          | 1.18**               | .062      | 1.28***              | .069              | 1.28***              | .069              |
| Patient factors                     |                      |           |                      |                   |                      |                   |
| Complexity                          | 1.04*                | .021      | 1.05*                | .021              | 1.04*                | .021              |
| Depression screened                 | .901†                | .055      | .884†                | .056              | .932                 | .061              |
| Anxiety screened                    | 1.17**               | .069      | 1.16**               | .068              | 1.14*                | .067*             |
| PTSD screened                       | 1.74***              | .119      | 1.82***              | .123              | 1.72***              | .118              |
| Sociodemographic factors            |                      |           |                      |                   |                      |                   |
| Female                              | 1.08†                | .042      | 1.08*                | .043              | 1.08*                | .043              |
| Age <sup>a</sup>                    | 1.07***              | .001      | 1.07***              | .001              | 1.07***              | .001              |
| African American                    | .715**               | .073      | .724**               | .074              | .737**               | .075              |
| Asian                               | .831                 | .130      | .881                 | .139              | .896                 | .142              |
| All else (race)                     | 1.26***              | .066      | 1.22***              | .063              | 1.25***              | .066              |
| Hispanic                            | .734*                | .087      | .733*                | .088              | .736*                | .088              |
| Immigrant                           | .819                 | .106      | .798†                | .104              | .817                 | .106              |
| Transport                           | 1.27***              | .058      | 1.27***              | .058              | 1.26***              | .053              |
| Employed                            | .382***              | .053      | .384***              | .053              | .384***              | .053              |
| $X^2$                               | 864.68               |           | 879.07               |                   | 932.58               |                   |
| Prob > $X^2$                        | 0.00                 |           | 0.00                 |                   | 0.00                 |                   |
| Pseudo R <sup>2</sup>               | .053                 |           | .054                 |                   | .058                 |                   |
| Log Pr( $X=x$ )                     | -7613.4              |           | -7606.3              |                   | -7579.5              |                   |
| N                                   | 11614                |           | 11614                |                   | 11614                |                   |

All else (race) is referent category for race variables.

<sup>a</sup> SE is multiplied by 100 in order to display significant figures. <sup>b</sup> e-16. <sup>c</sup> Diversity in expertise not included in Model 3; in a similar model with psychiatrist input and Level II referral replaced with diversity in expertise, OR = 1.78, p < .001 (results not reported).

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p < .001.

Table 16: Odds ratios for any symptom improvement by patient, provider, and team attributes

| Variable                            | Model 4<br><i>OR</i> | <i>SE</i> | Model 5<br><i>OR</i> | <i>SE</i>         | Model 6<br><i>OR</i> | <i>SE</i>         |
|-------------------------------------|----------------------|-----------|----------------------|-------------------|----------------------|-------------------|
| Care team attributes                |                      |           |                      |                   |                      |                   |
| Gender heterogeneity                |                      |           | 1.04                 | .099              | .990                 | .087              |
| Tenure diversity                    |                      |           | 1.00**               | 1.28 <sup>b</sup> | 1.00***              | 1.33 <sup>b</sup> |
| Diversity in expertise <sup>c</sup> |                      |           | .655***              | .048              |                      |                   |
| Team Size                           |                      |           | 1.86***              | .106              | 1.71***              | .110              |
| Team behavior and decisions         |                      |           |                      |                   |                      |                   |
| Level II referral                   | .600***              | .056      |                      |                   | .343***              | .038              |
| Psychiatrist input                  | 1.31***              | .069      |                      |                   | .778**               | .063              |
| Amount of deliberation              | 1.07***              | .004      |                      |                   | 1.07***              | .004              |
| Provider attributes                 |                      |           |                      |                   |                      |                   |
| CC tenure <sup>a</sup>              | 1.00***              | .007      | .999**               | .007              | 1.00*                | .007              |
| CC is male                          | 1.32***              | .082      | 1.36***              | .085              | 1.39***              | .088              |
| Patient factors                     |                      |           |                      |                   |                      |                   |
| Complexity                          | .932**               | .024      | .966                 | .024              | .926**               | .024              |
| Depression severity                 | 1.09***              | .004      | 1.09***              | .004              | 1.09***              | .004              |
| Anxiety severity                    | 1.02***              | .004      | 1.02***              | .004              | 1.02***              | .004              |
| PTSD severity                       | .995***              | .001      | .997*                | .001              | .995**               | .001              |
| Sociodemographic factors            |                      |           |                      |                   |                      |                   |
| Female                              | 1.03                 | .049      | 1.00                 | .047              | 1.02                 | .049              |
| Age <sup>a</sup>                    | .993**               | .001      | .994**               | .001              | .994**               | .001              |
| African American                    | .873                 | .101      | .988                 | .112              | .927                 | .107              |
| Asian                               | 1.42†                | .259      | 1.38†                | .248              | 1.52*                | .278              |
| All else (race)                     | 1.01                 | .061      | .958                 | .056              | 1.02                 | .061              |
| Hispanic                            | 1.39*                | .189      | 1.44**               | .192              | 1.36*                | .185              |
| Immigrant                           | 1.06                 | .158      | 1.14                 | .166              | 1.07                 | .159              |
| Transport                           | 1.20***              | .061      | 1.25***              | .063              | 1.24***              | .063              |
| Employed                            | .978                 | .141      | 1.08                 | .153              | .989                 | .142              |
| $X^2$                               | 2350.4               |           | 2096.7               |                   | 2443.6               |                   |
| Prob > $X^2$                        | 0.00                 |           | 0.00                 |                   | 0.00                 |                   |
| Pseudo R <sup>2</sup>               | .173                 |           | .154                 |                   | .180                 |                   |
| Log Pr( $X=x$ )                     | -5594.9              |           | -5721.8              |                   | -5548.3              |                   |
| N                                   | 11614                |           | 11614                |                   | 11614                |                   |

All else (race) is referent category for race variables.

<sup>a</sup> multiplied by 100 in order to display significant figures. <sup>b</sup> e-16. <sup>c</sup> Diversity in expertise not included in Model 6.

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p < .001.

Table 17: Odds ratios for target amount of time in treatment by patient, provider, and team attributes±

| Variable                            | Model 7<br><i>OR</i> | <i>SE</i>         | Model 8<br><i>OR</i> | <i>SE</i>         | Model 9<br><i>OR</i> | <i>SE</i>         |
|-------------------------------------|----------------------|-------------------|----------------------|-------------------|----------------------|-------------------|
| Care team attributes                |                      |                   |                      |                   |                      |                   |
| Gender heterogeneity                |                      |                   | .873*                | .072              | .829                 | .201              |
| Tenure diversity                    |                      |                   | 1.00*                | 1.64 <sup>b</sup> | 1.00                 | 1.63 <sup>b</sup> |
| Diversity in expertise <sup>c</sup> |                      |                   | .529***              | .067              |                      |                   |
| Team Size                           |                      |                   | .536***              | .038              | .748***              | .055              |
| Team behavior and decisions         |                      |                   |                      |                   |                      |                   |
| Level II referral                   | .096***              | .025              |                      |                   | .153***              | .043              |
| Psychiatrist input                  | .253**               | .117              |                      |                   | .514***              | .071              |
| Amount of deliberation              | .847***              | .008              |                      |                   | .856***              | .008              |
| Provider attributes                 |                      |                   |                      |                   |                      |                   |
| CC tenure                           | 1.00***              | .009 <sup>a</sup> | 1.00***              | .008 <sup>a</sup> | 1.00***              | .009 <sup>a</sup> |
| CC is male <sup>o</sup>             | .762**               | .064              | .833*                | .072              | .839*                | .073              |
| Patient factors                     |                      |                   |                      |                   |                      |                   |
| Complexity                          | .865***              | .035              | .900*                | .038              | .977                 | .042              |
| Depression severity                 | .958***              | .004              | .962***              | .005              | .967***              | .005              |
| Anxiety severity                    | 1.01                 | .007              | .991                 | .007              | 1.02                 | .007              |
| PTSD severity                       | 1.01***              | .002              | 1.00***              | .002              | 1.01**               | .002              |
| Sociodemographic factors            |                      |                   |                      |                   |                      |                   |
| Female                              | .862*                | .054              | .874*                | .054              | .867*                | .054              |
| Age                                 | 1.01***              | .002              | 1.01***              | .002              | 1.01***              | .002              |
| African American                    | .912                 | .171              | .908                 | .170              | .996                 | .189              |
| Asian                               | .553†                | .174              | .569†                | .178              | .553†                | .175              |
| All else (race)                     | .928                 | .087              | 1.17†                | .109              | 1.04                 | .098              |
| Hispanic                            | .682†                | .153              | .618*                | .135              | .693                 | .154              |
| Immigrant                           | .492**               | .129              | .486**               | .124              | .523*                | .136              |
| Transport                           | .651***              | .056              | .670***              | .057              | .695***              | .061              |
| Employed                            | 1.65*                | .350              | 1.35                 | .281              | 1.55*                | .328              |
| $X^2$                               | 1559.5               |                   | 1395.1               |                   | 1661.8               |                   |
| Prob > $X^2$                        | 0.00                 |                   | 0.00                 |                   | 0.00                 |                   |
| Pseudo R <sup>2</sup>               | .178                 |                   | .159                 |                   | .190                 |                   |
| Log Pr( $X=x$ )                     | -3586.7              |                   | -3669.0              |                   | -3535.6              |                   |
| N                                   | 11614                |                   | 11614                |                   | 11614                |                   |

All else (race) is referent category for race variables.

<sup>a</sup> Multiplied by 100 in order to display significant figures. <sup>b</sup> e-16 for SE. <sup>c</sup>

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.

± Days in the program is positively associated with desirable exit and symptom improvement, as well as with change in diagnoses (results not reported).

<sup>o</sup>On average, patients of male care coordinators remain in the program 20 days longer than patients of female care coordinators (results not reported).

## Discussion

Age is positively associated with odds for desirable exit and with achieving target time spent in treatment. On the other hand, age appears to have a negative impact on the odds of symptom improvement (Table 4.3). Such results may indicate consistency with the view that older adults' symptoms are unlikely to improve (even with adherence to adequate treatment).

Positive effects of patient female gender on outcomes is consistently hypothesized in this and previous chapters. With provider and team attributes accounted for, patient gender appears to have a meaningful positive effect on desirable exit (hypothesized ( $OR = 1.08$ ). This effect does not appear to depend on what other factors are included ( $b = 1.08$  across models of desirable exit). Female patient gender is negatively associated with achieving target duration of treatment ( $OR = .867$ , Model 9), and is not significantly associated with difference in odds for symptom improvement. With regard to patient gender, care processes appear more multifaceted than suggested by the present hypotheses.

Like effects of patient attributes, potential effects of team composition and processes differ across outcomes.

Gender heterogeneity is associated with lower relative odds for desirable exit, however it was not associated with significant effects on achieving ideal time spent in treatment nor on symptom improvement. Diversity in expertise is positively associated with desirable exit ( $OR = 1.78$ , Model 2), and this is consistent with information processing theories. However, much like team size, diversity in expertise is time-dependent; and additional time in the program is positively associated with desirable exit (and symptom improvement), as well as with change in diagnoses (results not reported). For symptom improvement and target amount of time in treatment, diversity in expertise is associated with lower relative odds ( $OR = .655$  and  $.529$ , respectively). While conclusions regarding casual mechanisms explaining these relationships are tenuous, these results are consistent with status characteristics hypotheses.

While team size appears to have an “impact” on patient health outcomes, and this result (OR for team size is 1.71 in Table 4.3) is simple confirmation of Bower and Gilbody’s (2005) characterization of stepped care models, and the intent behind the Mental Health Integration Program. In terms of the expectation that application of more resources (at baseline and over the course of care) toward improving patient health *does* result in better health, findings in Table 4.3 regarding team size make some sense.

Findings suggesting that diversity in expertise and deliberation have positive, significant effects over and above what can be explained by patient and provider characteristics are consistent with information processing theories. Diversity in expertise is not included in Model 6. However, in a similar analysis of odds for symptom improvement (with team size excluded), diversity in expertise is associated with an odds ratio of 1.26,  $p < .001$  (results not reported).

While analyses here (Table 16) suggest some potential association between odds for desirable exit and sociodemographic factors such as age, race and ethnicity. Systematic data collection within MHITS would be extremely useful for identifying possible effects associated with race and ethnicity. The current data seem to confirm that data collection regarding race and ethnicity is systematically associated with other factors, such as program eligibility and location of care. Of the 3,566 patients for whom race information is available, just over half (1,883 patients) are eligible for MHIP through General Assistance – Unemployable of Washington State. Further empirical understanding of how race information is gathered would help solidify analyses here (as would complete race information). Factors such as unobserved severity and complexity of patients (i.e. factors not documented in MHITS and/or not included in the present study) make for causal interpretation of effects of decisions (especially referrals) on patient health outcomes particularly dubious; in striving to achieve its ideal of uniform outcomes across patients, MHITS is designed to allocate more resources to patients who are the least likely to have the best outcomes.

Status hierarchies in broader social context do appear to affect status, roles, and functions within teams. These, in turn, are associated with care processes and patient health outcomes. Over and above

effects of individual patient and provider-level attributes, team composition (especially gender composition) is consistently associated with care processes and patient health and well-being - albeit in complicated ways.

## Chapter 5: Conclusion

Collaborative care teams vary in size and composition according to expectations for the collaborative care model (e.g. clinical characteristics do drive resource allocation). However, support was also found for status characteristics hypotheses; size and composition over the course of care relates both to clinical and sociodemographic characteristics of patients. Core team member characteristics (especially care coordinator gender) were consistently associated with outcomes across the three present studies. Results suggest that, in certain contexts, provider attributes can “activate” to affect team processes (such as amount of deliberation in teams), care outcomes (such as screening for PTSD), and even patient health (improvement in symptoms of mental health disorder). In particular, tasks that are “sex-typed” are associated with greater effects of provider gender. Effects of team-level factors such as gender balance and heterogeneity, as well as diversity in tenure and expertise varied according to tasks and outcomes. Amount of deliberation in teams appeared most consistently both as an effect of status characteristics and as a potentially helpful mediator of care and health outcomes.

are tenuous inasmuch as this measure

### Main findings

Collaborative care teams vary in size and composition according both to patient clinical factors and sociodemographic factors. Even though no systematic variation is suggested by collaborative care expectations interpreted from Bower and Gilbody (2005), sociodemographic differences beyond those explained by differences in severity and complexity are associated with team size.

Several results are also consistent with expectations derived from status characteristics theory and disparities research. Patient characteristics such as gender are associated with otherwise unexplained differences in team size and composition, meanwhile effects of patient and provider gender on patients’ outcomes (desirable exit, symptom reduction, and achievement of target treatment duration) vary in direction and magnitude. This may hint at the importance of task and social context for how status

characteristics may operate within the team-building process and consequent care and decision making processes, even from within the same setting (such as primary care clinics).

While team size appears to have an “impact” on patient health outcomes, these results are consistent with Bower and Gilbody’s (2005) characterization of stepped care models, and the intent behind the Mental Health Integration Program. At best, analyses may confirm the expectation that applying more resources (human resources) toward improving patient health can result in better patient health. Team size does not appear to be a valuable “predictor” of patient outcomes in the sense that adding team members will automatically foster better outcomes for patients. For example, association between larger team size and relatively better odds for symptom improvement indicates that, as a resource allocation mechanism, MHIP is performing as it should

Team decisions and behaviors also appear to be driven by clinical and sociodemographic characteristics of patients and characteristics of providers. Decisions to include specific input from consulting psychiatrists and to refer patients to Level II care are both consistently associated with greater case complexity, care coordinator gender (males are more likely to seek input and to refer), and patient gender (females patients are more likely than male patients to experience either outcome). Support was found for several hypotheses regarding performance expectations for gender within provider and patient roles.

Patient gender is consistently associated with outcomes in this study. Even though odds ratios for psychiatrist input are not significantly different between male and female patients, odds ratios between male and female gender with regard to psychiatric evaluation (a more rare and intensive treatment event than psychiatric input), appear particularly striking. Status characteristics theory and disparities research suggest that provider’s expectations for female patients’ treatment adherence, engagement and benefit are more positive than for males. At minimum, these results generate powerful hypotheses about MHIP providers’ views of patients and gender, to be tested qualitatively.

Male care coordinator gender is associated with much greater odds for psychiatrist input (OR = 2.03) as well as with greater odds for Level II referral (OR = 1.38). Support was also found for hypotheses suggesting interaction between status characteristics and aspects of tasks. Male gender is strongly associated with lower relative odds for conducting PTSD screen at intake (OR = .531). The directions of these effects are consistent with status characteristics theory both as it relates to opportunities for participation (Table 7, Propositions 1, 2, 4). Also the directions of gender effects are in keeping with expectations about sex-typing of tasks: Gender differences in odds for referral and screening do vary in direction according to the care task. Male care coordinator gender is associated with greater odds for referral, but it is associated with much lower relative odds for PTSD screening. Tests of significance were not applied in the present studies, and would be helpful in assessing effects of context and task.

Care coordinator gender differences in the propensity to screen for PTSD draws additional attention to the otherwise consistent finding that male care coordinators are significantly associated with better patient outcomes in MHIP. With the exception of achieving target amount of time in treatment, patients with male care coordinators tend to have greater odds for desirable outcomes. This could be because patients working with male care coordinators spend an average of 20 days longer in the program than patients of female care coordinators (results not reported). Time spent by patients in the program is positively associated with desirable exit and symptom improvement, as well as with change in diagnoses (results not reported). These results motivate future exploration of provider gender differences and treatment engagement.

Considering that gender concordance is moderately common between patients and care coordinators ( $r = .3$ , not reported), Chapter 3 illustrates a particularly interesting positive association between patient female gender and odds of PTSD screening (OR = 1.49). This puzzle motivated additional analysis, the results of which are described in Table 19, below. The case of female patients with male care coordinators suggests greater differences than would be implicated by status boundaries alone (i.e. while I expected male patients with male care coordinators to have the lowest odds for PTSD

screening, as compared with other dyads, it is entirely plausible that male care coordinators may be particularly averse to discussing trauma with female patients).

As explained in Chapter 2, Van de Ven and Ferry (1980) find that structural aspects of the task are likely to condition the ways that characteristics alter outcomes. Because tasks often dictate which characteristics are perceived during initial conditions, they are especially important in the creation of status characteristics and performance expectations. Concluding analyses in Table 19 are consistent with the thesis that gender operates most strongly where status boundaries are salient. Interpreted in concert with results in Chapter 3 (and Table 19), it seems plausible that initiating discussion of trauma is a “female” task, and that gender roles are more salient when status boundaries are present (i.e. within male/female dyads).

The suggestion that status hierarchies in broader social context affect status, roles, and functions within teams, and these, in turn, affect the team's interpersonal processes and, potentially, patient health outcomes (Lichtenstein et al 2004) is plausible given the present study results. Some processes, decisions and behaviors within teams may help foster patient health and well-being, beyond their more immediate associations with patient clinical factors (such as depression severity increasing odds of psychiatrist input) and provider attributes (male care coordinators' increased odds for referral). Patient's health and care outcomes do appear to be driven by complicated interactions between patient factors, provider attributes, as well as by the social context constructed around them.

Table 18: Descriptive logistic regression: provider-patient gender concordance and odds for screening for PTSD

| Provider-Patient Combinations:          | <i>OR</i> | <i>SE</i> |
|-----------------------------------------|-----------|-----------|
| Male patient, female care coordinator   | 2.48***   | .300      |
| Female patient, female care coordinator | 3.11***   | .376      |
| Female patient, male care coordinator   | .824      | .153      |
| $X^2$                                   | 193.6     |           |
| Prob > $X^2$                            | 0.00      |           |
| Pseudo $R^2$                            | .020      |           |
| Log Pr( $X=x$ )                         | -4657.0   |           |
| N                                       | 11614     |           |

Male patient, male care coordinator is referent category.  
† p=.10. \* p < .05. \*\* p < .01. \*\*\* p < .001.

In terms of Bower and Gilbody’s (2005) acceptability assumption, it is interesting to consider how human resource allocation (in terms of provider gender) relates to “stepped” care, especially when tasks which are uncertain or particularly likely to become active status characteristics, reflected in care outcomes.

#### Limitations and Next Steps

By design, allocation of resources (team size, diversity in expertise) in collaborative care is expected to vary by severity and complexity. With regard to effects of care resources on patient outcomes (approached in Chapter 4), confounding by severity and complexity presents a problem: the four measures of severity analyzed in the present set of studies (scores on clinical screeners and diagnostic tools depression, anxiety, PTSD; and count of diagnoses of disorder) captures only a few ways in which patient needs can differ. Because collaborative care is designed to allocate greater resources (additional visits, team members, referrals) to more severe cases, conclusions about direct relationships between particular types of resources (e.g. evaluation of the patient by a consulting psychiatrist) and better or worse patient outcomes are subject to confounding between severity/complexity and health outcomes. Rather than focusing on causality between resources and outcomes, exploration of whether care processes

can be included as valuable causal mechanisms in the relationship between patients' needs of at baseline and their ultimate health outcomes constitutes the main contribution of this set of studies. Inclusion of more fine-tuned outcomes than those piloted in this dissertation may assist with interpretation, however the problem of severity confounded with outcomes remains.

Between-model tests for significant differences in odds ratios are not included in the present analyses. Results suggesting how effects of status characteristics may be altered in direction or magnitude based on social context and aspects of care tasks are descriptive. Additional analyses can clarify and solidify statements about how task and context interact with attributes of patients, providers, and teams.

Consistent with information processing theories, diversity in expertise is positively associated with desirable exit (OR = 1.78). However, diversity in expertise is time-dependent (as is team size). Additional time in the program is positively associated with desirable exit (and symptom improvement), as well as with change in diagnoses (results not reported). Conclusions regarding casual mechanisms explaining these relationships are tenuous and await further analysis of treatment duration. Survival analysis of when patients acquire additional team members, and how long patients tend to take in acquiring diverse sets of patients would provide baseline understanding of the team-building process as it relates to time in treatment.

In these studies, team deliberation (measured by the number of revisions that team members make to a patient's MHITS record) may be capturing other processes such as number and type of patient visits with care coordinators. Including information about frequency and duration of visits is a next step for these and related analyses.

In order to interpret whether the acceptability assumption holds with regard to patient race and ethnicity, systematic data collection within MHITS would be extremely useful for identifying possible effects associated with race and ethnicity. The current data seem to confirm that data collection regarding race and ethnicity is systematically associated with other factors, such as program eligibility and location of care. Of the 3,566 patients for whom race information is available, just over half (1,883 patients) are eligible for MHIP through General Assistance – Unemployable of Washington State. Further empirical

understanding of how race information is gathered would help solidify analyses here (as would complete race information).

Tenure diversity is positively associated with deliberation, suggesting that seniority and experience may be perceived as task-related status characteristics, and interactions across these boundaries (specific status characteristics) may carry with them fewer social costs than interaction across gender boundaries. While gender heterogeneity was negatively associated with amount of deliberation, it would be especially valuable to analyze effects of gender-homogenous teams before concluding about effects of gender composition of teams.

Lovell et al. 2003 find that nurses' orientations toward patient education and self-help are sufficiently beneficial to some patients as part of a stepped-care approach. In addition to collecting information about patient race and ethnicity, information about provider training and occupation would be helpful as well. In particular, this information could supplement analysis of providers' professional networks across the organization. Some effects suggested in this dissertation (e.g. association between male coordinators and better outcomes) could, potentially, be the result of having more far-reaching networks of colleagues, on-hand to answer logistical issues and assist with difficult cases. It is currently possible to map professional networks given the current data. Analysis of consulting psychiatrist gender and tenure are possible with the current data, and would also help disentangle any differences in content and structure of providers' professional networks.

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Appendix A: Additional and Background Analyses

Table A.1: Numbers of patients receiving Level II referrals, psychiatric evaluation and clinical input from a psychiatrist. N = 11,614

| Variable                            | Variable Description                                            | <i>n</i> | Mean<br>or <i>p</i> | SD   | min<br>/ N | max<br>/ Y |
|-------------------------------------|-----------------------------------------------------------------|----------|---------------------|------|------------|------------|
| Care Characteristics (Key Outcomes) |                                                                 |          |                     |      |            |            |
| Team Size                           | Count of providers on the team                                  | 11614    | 4.40                | 0.82 | 3          | 9          |
| Level II Referral                   | Patient is referred for MH care outside of primary care setting | 837      | 0.07                | 0.26 | 0          | 1          |
| Psych Evaluation                    | Consulting psychiatrist evaluated the patient.                  | 223      | 0.03                | 0.16 | 0          | 1          |
| Psychiatrist Input                  | Psychiatrist gives patient-specific input to the PCP or CC      | 3688     | 0.32                | 0.47 | 0          | 1          |

Table A.2: Severity scores (at baseline) for patients screened for depression, anxiety and PTSD at intake. N = 11614 unless otherwise noted.

| Patient Factor      | Variable Description                         | <i>n</i> | Mean<br>or <i>p</i> | SD    | min<br>/ N | max<br>/ Y |
|---------------------|----------------------------------------------|----------|---------------------|-------|------------|------------|
| Complexity          | Count of mental health diagnoses at intake   | 11614    | 1.89                | 1.41  | 0          | 9          |
| Depression Severity | Score on PHQ-9 depression screener           | 8639     | 15.69 <sup>a</sup>  | 6.78  | 0          | 27         |
| Anxiety Severity    | Score on GAD-7 anxiety checklist             | 6532     | 13.43 <sup>b</sup>  | 5.89  | 0          | 21         |
| PTSD Severity       | Score on PCL-C posttraumatic stress screener | 1654     | 59.35 <sup>c</sup>  | 14.78 | 17         | 85         |
| PTSD Screened       | Patient was screened for PTSD                | 11614    | 0.14                | 0.35  | 0          | 1          |

<sup>a</sup> Based on N = 8639 <sup>b</sup> Based on N = 6532 <sup>c</sup> Based on N = 1654

Table A.3: Comparing unstandardized regression coefficients and standard errors predicting team size between severity variables using listwise deletion (Models 1 and 3) vs severity variables using scores of zero for non-screened patients (Models 2 and 4).

| Variable Name            | Model 1           |           | Model 2  |                   | Model 3  |           | Model 4           |                   |
|--------------------------|-------------------|-----------|----------|-------------------|----------|-----------|-------------------|-------------------|
|                          | <i>b</i>          | <i>SE</i> | <i>B</i> | <i>SE</i>         | <i>b</i> | <i>SE</i> | <i>b</i>          | <i>SE</i>         |
| Depression severity      | .003              | .004      | .025***  | .001              | .003     | .003      | .025***           | .001              |
| PTSD severity            | .003*             | .001      | -.004    | .003 <sup>a</sup> | .002†    | .001      | -.004***          | .003 <sup>a</sup> |
| Anxiety severity         | .002              | .005      | .012***  | .001              | .001     | .004      | -.012***          | .001              |
| Complexity               | .042**            | .014      | .207***  | .007              | .042**   | .014      | .203***           | .007              |
| Patient age <sup>a</sup> |                   |           |          |                   | .001     | .001      | .005 <sup>a</sup> | .005 <sup>a</sup> |
| Female                   |                   |           |          |                   | .032     | .033      | .053***           | .013              |
| Hispanic                 |                   |           |          |                   | -.104    | .125      | .055†             | .032              |
| Transportation           |                   |           |          |                   | -.060†   | .033      | .083***           | .015              |
| Employed                 |                   |           |          |                   | -.148    | .137      | -.099*            | .042              |
| F                        | 10.21             |           | 693.82   |                   | 5.15     |           | 315.16            |                   |
| Prob > F                 | 0.00              |           | 0.00     |                   | 0.00     |           | 0.00              |                   |
| R <sup>2</sup>           | .022              |           | .192     |                   | .031     |           | .196              |                   |
| N                        | 1614 <sup>b</sup> |           | 11614    |                   | 1614     |           | 11614             |                   |

Caucasian patients are used as the referent group for race.

<sup>a</sup> Figure was multiplied by 100 in order to display significant figures.

<sup>b</sup> N = 1614 is not a typo; it just worked out to be spookily similar to 11614.

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p < .001.

Table A.4: Unstandardized regression coefficients and standard errors: predicting team size using alternate race variables

| Variable Name            | Model 4  |                   | Model A.1 |                   | Model A.2         |                   |
|--------------------------|----------|-------------------|-----------|-------------------|-------------------|-------------------|
|                          | <i>b</i> | <i>SE</i>         | <i>b</i>  | <i>SE</i>         | <i>b</i>          | <i>SE</i>         |
| Depression severity      |          |                   |           |                   | .025***           | .001              |
| PTSD severity            |          |                   |           |                   | -.004***          | .003 <sup>a</sup> |
| Anxiety severity         |          |                   |           |                   | -.012***          | .001              |
| Complexity               |          |                   |           |                   | .203***           | .008              |
| Patient age <sup>a</sup> | .001†    | .006 <sup>a</sup> | .001†     | .006 <sup>a</sup> | .006 <sup>a</sup> | .005 <sup>a</sup> |
| Female                   | .060***  | .015              | .059*     | .015              | .052***           | .014              |
| Hispanic                 | -.043    | .029              | -.081*    | .034              | .033              | .035              |
| Transportation           | .254***  | .015              | .252***   | .015              | .082***           | .015              |
| Employed                 | -.226    | .035              | -.227***  | .035              | -.102**           | .034              |
| Asian                    | -.133**  | .041              | -.137**   | .041              | .022              | .040              |
| Af American              | .085*    | .033              | .082*     | .033              | .070*             | .034              |
| Pac Islander             |          |                   | -.087     | .146              | -.027             | .136              |
| Multiracial              |          |                   | .134*     | .065              | .100              | .063              |
| Am Indian                |          |                   | -.177**   | .060              | -.152*            | .066              |
| Unknown race             |          |                   | .070***   | .018              | -.009             | .018              |
| Refused to report        |          |                   | -.020     | .047              | .062              | .047              |
| All other race           | -.064*** | .018              |           |                   |                   |                   |
| F                        | 45.20    |                   | 31.38     |                   | 155.01            |                   |
| Prob > F                 | 0.00     |                   | 0.00      |                   | 0.00              |                   |
| R <sup>2</sup>           | .026     |                   | .027      |                   | .197              |                   |
| N                        | 11614    |                   | 11614     |                   | 11614             |                   |

Caucasian patients are used as the referent group for race.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p<.001.

Table A.6: Unanalyzed variable names, descriptions, and descriptive statistics.

| Variable                            | <i>n</i> | Mean      | SD       | min / N | max / Y |
|-------------------------------------|----------|-----------|----------|---------|---------|
| Patient health outcomes             |          |           |          |         |         |
| Change in depression severity score | 4362     | -3.162311 | 6.673454 | -27     | 27      |
| Change in anxiety severity score    | 2978     | -1.99362  | 5.766096 | -21     | 21      |
| Change in PTSD severity score       | 18       | -1.111111 | 9.922576 | -26     | 12      |

Table A.5: Unstandardized regression coefficients and standard errors: predicting team size without race variables (Models A.3 and A.4).

| Variable Name       | Model 1  |                   | Model A.3 |                   | Model A.4         |                   | Model 2   |                   | Model 3           |                   |
|---------------------|----------|-------------------|-----------|-------------------|-------------------|-------------------|-----------|-------------------|-------------------|-------------------|
|                     | <i>b</i> | <i>SE</i>         | <i>b</i>  | <i>SE</i>         | <i>b</i>          | <i>SE</i>         | <i>SE</i> | <i>b</i>          | <i>SE</i>         |                   |
| Depression severity | .025***  | .001              |           |                   | .025***           | .001              |           |                   | .025***           | .001              |
| PTSD severity       | -.004    | .003 <sup>a</sup> |           |                   | -                 | .003              |           |                   | -                 | .003              |
| Anxiety severity    | .012***  | .001              |           |                   | .004***           | <sup>a</sup>      |           |                   | .004***           | <sup>a</sup>      |
| Complexity          | .207***  | .007              |           |                   | .012***           |                   |           |                   | .012***           |                   |
| Patient age         |          |                   | .001      | .006 <sup>a</sup> | .203***           | .007              | .001†     | .006 <sup>a</sup> | .005 <sup>a</sup> | .005 <sup>a</sup> |
| Female              |          |                   | .058***   | .015              | .005 <sup>a</sup> | .005 <sup>a</sup> | .060***   | .015              | .053***           | .014              |
| Hispanic            |          |                   | -.038     | .035              | .055†             | .032              | -.043     | .029              | .060*             | .030              |
| Transport Employed  |          |                   | .266***   | .016              | .083***           | .015              | .254***   | .015              | .083***           | .015              |
| Asian               |          |                   | -.220***  | .046              | -.099*            | .042              | -.226     | .035              | -.100**           | .034              |
| African American    |          |                   |           |                   |                   |                   | -.133**   | .041              | .025              | .040              |
| All other race      |          |                   |           |                   |                   |                   | .085*     | .033              | .073*             | .034              |
|                     |          |                   |           |                   |                   |                   | -         | .018              | .012              | .017              |
|                     |          |                   |           |                   |                   |                   | .064***   |                   |                   |                   |
| F                   | 693.82   |                   | 57.86     |                   | 315.16            |                   | 45.20     |                   | 206.70            |                   |
| Prob > F            | 0.00     |                   | 0.00      |                   | 0.00              |                   | 0.00      |                   | 0.00              |                   |
| R <sup>2</sup>      | .192     |                   | .024      |                   | .196              |                   | .026      |                   | .196              |                   |
| N                   | 11614    |                   | 11614     |                   | 11614             |                   | 11614     |                   | 11614             |                   |

Caucasian patients are used as the referent group for race.

<sup>a</sup> Multiplied by 100 in order to display significant figures.

† p=.10. \* p < .05. \*\* p < .01. \*\*\* p < .001.

## Appendix B: Example Patients: MHITS Case Studies

### First Example Patient: “Fred”

Fred is a 60 year old multi-racial male. He lives alone in a rented apartment, room or house. He is not

**Patient One: “Fred”**

**Severity:** PHQ-9 score: 22. GAD score: 11.

**Complexity:**

Anxiety, Depression, PTSD symptoms

**Team Composition:**

Primary care provider (PCP 152)  
male, 2.8 years’ exp.

Care coordinator (CC 903)  
female, 1.04 years’ exp.

Internal Behavioral Health worker (BH)  
unknown

**Deliberation:**

Total office visits by Fred: 5

Total phone contacts w/ Fred: 0

Total entries by team: 17

17 by CC

0 by PCP

**Treatments Received:**

Behavioral Activation (3x by CC)

BH referral (refused)

**Outcomes:**

Change in GAD: +1 (11 to 12)

Change in PHQ: -2 (22 to 20)

Exit Reason: Patient not participating  
in treatment

No change in diagnoses

**DAYS IN:** 205

**TEAM SIZE:** 3

concerned about his living situation, reports access to reliable transportation, and reports having no children. His PCP is a Caucasian male with 2.8 years’ experience in MHIP. His Care coordinator is a female with 1.04 years’ experience at MHIP.

Fred was not reported as actively participating in his 60 minute intake visit at his CC’s office. He arrived having been diagnosed with anxiety and depression (Axis II was ruled out), with symptoms of PTSD, and he reported attempting suicide. Fred reported having no one to help him. Upon intake (day 1), his GAD score was an 11, he was not assessed for PTSD, and his PHQ score was a 22. At intake, he reported taking no medication and did not receive a referral at that time.

Fred’s first follow up visit was exactly one month after his enrollment/intake. At this visit (Day 31), his GAD was a 14 (up from 11 at intake), and his PHQ was a 19 (down from 22). He was not assessed with a PCL (for PTSD) and received no referrals at this follow up visit. He had changes in diagnoses, and did not receive psychotherapy, behavioral activation or other therapy at this visit.

At Fred’s second follow up with his CC, 44 days into his time at MHIP, his GAD score was 9 and his PHQ score was back up to 22 again. He was not assessed with a PCL (for PTSD) and received no referrals at this follow up. There were no changes in diagnosis, but Fred received behavioral activation from his CC.

At Fred’s third follow up, at 73 days, his GAD score increased to 14 and his PHQ score decreased by 1 point to 21. At this follow up, Fred received an internal behavioral health referral and behavioral activation.

At Fred’s fourth follow up, 86 days in, his GAD was 12 and PHQ was 20. Fred received behavioral activation.

190 days into the program, Fred’s fifth and last follow up entry was made by his female Care coordinator. Fred did not interact with his Care coordinator (there was no visit at all), but his Care coordinator spent 20 minutes reviewing his case. His internal behavioral health referral was closed and reported as “not completed” because Fred was not interested or had refused it. Shortly thereafter, 205 days after enrollment, Fred was discharged from the program. Fred’s Care coordinator had performed his intake assessment, each of his 4 follow up assessments, and all 17 entries to his information in MHITS. His

team size was 3, composed of a PCP, a CC, and an internal BH. The number of notes is 13, all modified or made by the Care coordinator. Number of personal visits is 5 (intake and 4 follow ups at his CC's office).

### Second Example Patient – “Sam”

**Patient One: “Sam”****Severity:** PHQ-9 score: 21. GAD score: 20.**Complexity: 2**

Anxiety, Depression, no other symptoms

**Team Composition:**

Primary care provider (PCP)

Unknown prescriber

Care coordinator (CC 374)

Female, 2.3 years' exp.

Care coordinator (CC 18)

Male, 3.03 years' exp.

Restricted Consulting psychiatrist (RCP 1162)

Female, 4.3 months exp.

Case manager (CM 123)

Female, 2.88 years' exp.

**Deliberation:**

Total office visits by Sam: 8

Total phone contacts w/ Sam: 3

Total entries by team: 27

7 by CC1, 2 by CC2,

17 by CM, 1 by RCP

0 by PCP

**Treatments Received:**

Other treatment (2x w/CC1)

Therapy (3x w/CM)

**Outcomes:**

Change in GAD: -2 (20 to 18)

Change in PHQ: -4 (21 to 17)

Exit Reason: No exit - Still Enrolled

Diagnoses: +1 (2 to 3)

add Schizophrenia)

**DAYS IN:** 196**TEAM SIZE:** 5

Sam is a 38 year old African American male. He lives with his spouse or partner in a rented apartment, house or room. He reports having no children, no concern with housing, no domestic violence concerns. He does not have dependable transportation but does report having someone to help. Sam began his care with a female CC with 2.88 years' experience.

At his initial assessment at HealthPoint in King County, Sam had been diagnosed with anxiety and depression, and had already been prescribed two “other” psychoactives (non-SSRI, non-TCA and not other antidepressants; during the study period, 1469 MHIP patients were taking the first psychoactive, and 275 patients were taking the second psychoactive). Sam's CC was unable to confirm at intake whether Sam was taking his medication. Sam did not report having prior treatment (such as psychotherapy).

Sam was not reported as actively participating in his initial assessment. His GAD score at intake was a 20 and PHQ score was 21. During his initial assessment Sam's CC made a treatment plan for him to receive psychotherapy and other treatment, but Sam did not receive a referral. Sam's intake was performed at his CC office and lasted 30 minutes.

Sam's first follow up happened on Day 43, and was a 30 minute office visit with his CC. Sam's GAD score was 21 and his PHQ score 26. Sam did not receive a referral during this visit, however he was given some treatment other than psychotherapy or behavioral activation. Two days later, on day 45, a new treatment plan was created by Sam's CC, in which he was still to receive “other treatment.” However, this plan was modified

one day later (on Day 46) by a different Care coordinator. Sam was not contacted when these changes were made. This additional Care coordinator was male with 3.03 years' experience in MHIP. That same day, a note was entered in Sam's file by a female (restricted use) Consulting psychiatrist (#1162) with 4.3 months experience.

Sam's second follow up visit occurred on Day 87 days in, a 30 minute visit to his female CC. At this visit, his GAD was 21, his PHQ was 25, and he received got some other treatment (not psychotherapy, not BA).

Three days later on Day 90, his additional CC (#18) followed up with Sam's prescriber. At that time, Sam was referred to Level Two ("stepped") care.

On Day 97, Sam's chart was noted by his new care manager (CM) in Level Two care at Valley Cities, also in King County. This took 15 minutes and Sam was involved over the phone. Sam's female Case manager had 2.88 years' experience at MHIP. His At this point, Sam was also listed as having

Schizophrenia. On Day 101, Sam was again contacted by his Case manager for 15 minutes by phone. On day 109, Sam's Case manager added 2 notes to his file, without Sam's involvement. CM (4 notes)

On day 119, Sam had his official intake assessment for level two, in person with his CM at her office.

Sam's Case manager assessed him as a 31 (of 100) on the GAF, and he scored a GAD of 21 and a PHQ of 24. His Level Two intake lasted two hours.

On day 130, Sam attended a 60 minute therapy session with his CM at Valley Cities. His GAD score was 21. His PHQ was down 4 points to a 20. On day 137, Sam's Case manager made a revision to Sam's file without contacting him (no time was recorded). On Day 137, Sam's Case manager made three more entries to his file, without contacting Sam.

On Day 144, Sam attended therapy session with his Case manager, and his GAD was 21 and his PHQ was 23. One day later (day 145), Sam's CM had a 60-minute visit with Sam's prescriber (assumed to be Sam's PCP or RCP).

On Day 153, Sam's original Care coordinator (#374) entered his GAD (21) and PHQ (21) and created a treatment plan for him involving "other" therapy, and five days later (Day 158), she made a revision to his file. The next day (Day 159), Sam's Case manager called him and spoke with him for 15 minutes, making one revision to his file.

On Day 172, Sam had therapy with his Case manager (60 minutes) and his GAD score was an all-time low of 18, and his PHQ also at an all-time low of 17. On Day 185, Sam's Case manager entered a note, but did not contact Sam.

Sam was still enrolled in Level Two Care at study period end. At study end, Sam had a female Care coordinator (#374), a male Care coordinator (#18), a female Case manager (#123), a female psychiatrist (#1162) and an unknown primary care provider.

Sam's team size was 5; it was composed of a female psychiatrist (#1162 1 addition), a female Case manager (#123 with 17 additions), a female Care coordinator (#374 with 7 additions) and a male Care coordinator (#18 with 2 additions; 3.03 years experience). Additions to Sam's file totaled 28.

Example Patient Three, “Pat”:

Pat is a 32 year old male of unknown race and ethnicity. He reports having access to dependable transportation, and having someone to help. Pat lives with his parents in a rented apartment, room or house. Pat had his initial assessment with a female Care coordinator at SeaMar Community Health Clinic (King-Pierce counties) 201 days after Pat was enrolled at MHIP. Pat’s Care coordinator had 27 days’ experience at MHIP at Pat’s initial assessment. At his initial intake, Pat was recorded as having a

**Patient One: “Pat”s**  
**Severity:** PHQ-9 score: 1, GAD score: 3.  
**Complexity: 1**  
Bipolar Disorder, symptoms Bipolar Disorder  
**Team Composition:**  
Primary care provider (PCP)  
Unknown  
Care coordinator (CC 36)  
Female, 27 days’ exp.  
Care coordinator (CC 18)  
Male, 3.03 years’ exp.  
Restricted Consulting psychiatrist (RCP 1162)  
Female, 4.3 months exp.  
Case manager (CM 123)  
Female, 2.88 years’ exp.  
**Deliberation:**  
Total office visits by Sam: 3  
Total phone contacts w/ Sam: 0  
Total entries by team: 4  
4 by CC  
0 by PCP  
**Treatments Received:**  
None  
**Outcomes:**  
Change in GAD: +1 (3 to 4)  
Change in PHQ: +2 (1 to 3)  
Exit Reason: Patient successfully completed treatment  
Diagnoses: Diagnosis same, no symptoms  
**DAYS IN:** 296 (95 days from initial assessment to completion)  
**TEAM SIZE:** 2

diagnosis of Bipolar Disorder. Pat had a GAD score of 3 and a PHQ-9 of 1. Pat reported no domestic violence or housing concerns. He reported having symptoms of bipolar disorder, and had been hospitalized prior to his treatment at MHIP, and having had some other prior treatment. He did not report any attempts at suicide. No information about medication was recorded. The initial assessment occurred in his Care coordinator’s office and lasted 30 minutes, and no additional information (e.g. referrals) was entered. 32 days after his initial assessment (Day 233 since enrollment), Pat met his care manager at her office for 50 minutes. His GAD score was a 6 and his PHQ score an 8. Pat’s Care coordinator created a treatment plan with him that involved no psychotherapy, no behavioral activation, and no other therapy. No additional notes (other than his GAD and PHQ scores) were made in his file, and his CC did not verify whether Pat was taking any medications. 67 days after his initial assessment (Day 268), Pat again visited his Care coordinator in her office, this time for 25 minutes. Pat’s GAD score was a 4 on Day 268, and his PHQ was a 3. 95 days after his initial assessment, Pat completed his treatment at MHIP. This was 296 days after he officially enrolled in MHIP. Pat’s total team size was 2, composed of his female Care coordinator with 27 days experience, and an unknown primary care doctor.

Curriculum Vitae

Brittin Wagner

*Areas of Specialization:* Medical Sociology; Research Design; Quantitative Methods and Social Network Analysis; Stratification, Race & Ethnicity; Organizations; Mental Health.

Education

PhD August 2012. University of Washington Dept. of Sociology  
Dissertation Title: Team Processes in Mental Health Care  
Committee: David Takeuchi (Chair), Jerald Herting, Gary Hamilton, Jürgen Unützer,  
Major Area Exam: Stratification, Race and Ethnicity *March 2009*  
Minor Area Exam: Social Statistics *June 2009*

M.A. Sociology

University of Washington, Seattle. December 2006  
Master’s Thesis Title: A Social Networks Approach to Visibility  
Master’s Committee: Mark S. Handcock (Chair), Joseph Weis.

BA Sociology; BA History

University of Wisconsin - Madison. May 2004

Awards and Grants:

*Academic Advisor’s Tutor Choice Award 2010-2011* *May 2011*  
Outstanding contributions to  
University of Washington Student-Athlete Academic Services

*Academic Advisor's Tutor Choice Award 2009-2010* *June 2010*  
*Outstanding contributions to*  
*University of Washington Student-Athlete Academic Services*

*Multi-Disciplinary Entrepreneurship Research* *2006-2008*  
Co-Investigator: Brittin Wagner  
The Ewing Marion Kauffman Foundation  
University of Washington, Business School (\$40,991)  
Mina Yoo, Principal Investigator

Spiritual Start-ups: The Demand and Supply Sides of 2005

New Spiritual Nonprofits

Co-Investigator: Brittin Wagner  
Nancy Bell Evans Center on Nonprofits & Philanthropy (\$1500)  
Mina Yoo, Co-Investigator

## Manuscripts

Wagner, Brittin, Sabrina Bonaparte, Danielle Fumia, Junfeng Jiao and William F. Wagner. *“(Re)Modeling Suicide Risk: Data Structure, HLM and Failure to Capture The Sociological Imagination.”* For instruction of advanced undergraduate courses in multilevel modeling.

## Presentations

*“Mental Health Care Team Processes: Organizing against PTSD.”* Paper. Annual meeting of the Pacific Sociological Association, Seattle, Washington, March 2011.

*“Staffing Patterns and Communication: Social Networks in Mental Health Care.”* Paper. Annual meeting of the Pacific Sociological Association, Oakland, California, April 2010.

*“(Re)Modeling Suicide Risk: Data Structure, HLM and Failure to Capture The Sociological Imagination.”* (with Sabrina Bonaparte). Paper. Annual meeting of the Pacific Sociological Association, Oakland, California, April 2010.

*“A Lesson for Teachers: Social Isolation Online and in the Classroom.”* Paper. Annual meeting of the Pacific Sociological Association, Oakland, California, April 2010.

*“Innovation and Efficiency in Current Social Work: achieving the best interests of each child,”* Paper presented at the annual meeting of the American Sociological Association, New York City, New York, Aug 11, 2007

*“A Social Network Analysis of Visibility”* Paper presented at the annual meeting of the American Sociological Association, Montreal Convention Center, Montreal, Quebec, Canada, Aug 11, 2006

*“Building a Safety Net: the Yellow Ribbon Suicide Prevention Program,”* presented at the Annual Conference of the American Association of Suicidology. Miami, FL. April, 2004.

## University of Washington Presentations

*“Team Processes and Mental Health Outcomes.”* Presentation, Social Network Analysis to Study the Effectiveness of Collaborative / Team Care. UW Advancing Integrated Healthcare Solutions (AIMS) Center March Research Meeting. Seattle, WA, March 28, 2011.

*“Testing Identity Theory with a Social Network Analysis of University Students,”* presented at Center for Statistics and the Social Sciences Student Seminar. University of Washington, Seattle, WA. October, 2007.

## Research Experience

University of Washington Business School  
Research Assistant

January 2006-August 2006  
Seattle, WA

*Funded by grant from the Kauffman Foundation*

Research Experience continued

University of Washington Business School June 2005-August 2005  
Department of Management and Organization Seattle, WA  
Research Assistant

*Funded by grants from The Kauffman Foundation and from the Nancy Bell Evans Center on Nonprofits & Philanthropy*

Minnesota State University September 2003-May 2004  
Department of Sociology & Corrections Mankato, MN  
Research Assistant

*Program Evaluation: Yellow Ribbon Suicide Prevention Program*

University of Wisconsin-Madison May 2003-December 2003  
Department of Sociology Madison, WI  
Research Assistant

Minnesota State University May 2002-June 2002  
Center for Rural Policy and Development Mankato, MN  
Data Collection Supervisor

Works in Progress

Does it still pay to be in the Military? Socioeconomic Achievement Outcomes among African Americans, American Indians, Asian Americans, Hispanics & non-Hispanic Whites  
*Kimberly Huyser, Brittin Wagner*

Shock and Awe: US Health Care Costs of the War in Iraq and Afghanistan: a PSR update  
*Report of Physicians for Social Responsibility*  
*With Evan Kanter*

Incidence of Neuropsychiatric Injury in the Current Conflicts in Iraq and Afghanistan  
*For submission to the Journal of Public Health Policy*  
*With Evan Kanter*

Working papers

"Social Isolation and Student-Athletes at the U: A Social Networks Approach to Visibility."  
"Innovation and Efficiency in Current Social Work: achieving the best interests of each child."  
"Building a Safety Net: the Yellow Ribbon Suicide Prevention Program."

Teaching Experience

University of Washington September 2004-Present  
Department of Sociology Seattle, WA  
Law Societies & Justice Program  
Teaching Assistant

*Courses:* Sociology 220 Statistical Methods Sociology/LSJ 276 Drugs & Society  
Sociology/LSJ 110 Survey of Sociology Sociology 270 Social Problems  
Sociology 271 Deviance Sociology 316 Sociological Theory  
Sociology 362 Race Relations Sociology 456 Political Sociology  
Sociology 462 Comparative Race & Ethnic Relations

### Teaching Experience continued

University of Washington June 2008-August 2008; June 2011-August 2011  
Department of Sociology Seattle, WA  
Pre-doctoral Lecturer/Instructor  
*Courses: Soc 346 Group Processes; Soc 271 Social Problems; Soc 110 Introduction to Sociology*

University of Washington January 2005-June 2011  
Department of Intercollegiate Athletics Seattle, WA  
Student-Athlete Academic Services  
Faculty Liaison and Tutor

University of Washington October 2010 – January 2011  
Quantitative Skills Center Bothell, WA  
University of Washington - Bothell  
Tutor

University of Washington March 2008-June 2008  
Comparative History of Ideas Belfast, N.I.  
Teaching Assistant  
*Study Abroad – Belfast, Northern Ireland*

University of Washington September 2006-May 2007  
Department of English Seattle, WA  
Interdisciplinary Writing Program  
Instructor  
*Course: English 198 Expository Writing/Writing for the Social Sciences*

### Departmental and Graduate Involvement

Graduate Student Association, Representative to Alumni, AY 2009-2010.  
Sociology Development Committee, AY 2009-2010.  
Sociology Student Association, "Sociology Cinema" discussant, ongoing.

### Service and Volunteer Involvement

Sociology Department Outreach Committee. University of Washington Department of Sociology. AY 2009 to present.

Assistant to Board of Directors, Country Place at Canyon Park Homeowners' Association. Bothell, WA 2009 to present

Graduate Student Association Representative to Alumni, University of Washington Dept of Sociology. 2009 to present

Seattle Homeless Needs Assessment. University of Washington Department of Statistics and UNICEF. April 2009.

*"Teaching Social Science and Humanities Sections."* University of Washington *Center for Instructional Development and Research 2005 Annual TA Conference*. University of Washington, Seattle, WA. September 2010.

*"Balancing Graduate School Demands."* and *"Teaching Social Science and Humanities Sections."* University of Washington *Center for Instructional Development and Research 2005 Annual TA Conference*. University of Washington, Seattle, WA. September 2005.

Building Coordinator, National Conference on Media Reform, Madison, WI. November 7-9 2003

## Memberships and Association

American Sociological Association

Pacific Sociological Association

Student-Veterans Association (University of Washington-Bothell)

UW Center for Statistics and the Social Sciences (CSSS)

UW Center for Studies in Demography and Ecology

## Training in Quantitative Research Methods:

Social Statistics I/Advanced Quantitative Methodology (CSSS/Soc 504) Theory and practice of likelihood inference. Topics covered include probability modeling, maximum likelihood estimation, models for binary responses, count models, sample selection, and basis time series analysis..

Social Statistics II/Applied Regression (CSSS/Soc 505) Least squares estimation. Hypothesis testing. Interpretation of regression coefficients. Categorical independent variables. Interactions. Assumption violations: outliers, residuals, robust regression; nonlinearity, transformations, ACE, CART; nonconstant variance. Variable selection and model averaging.

Methodology: Quantitative Techniques in Sociology (CSSS/Soc 506) Applied regression analysis with emphasis on interactive computer graphics techniques and interpretation. Application to typical sociological problems.

Event History Analysis (CSSS 544) Examines life course research using event-history analysis with applications to the substantive areas of household dynamics, family formation and dissolution, marriage, cohabitation, and divorce, migration histories, residential mobility, and housing careers. Examines continuous- and discrete-time longitudinal models during practical laboratory sessions.

Hierarchical Linear Modeling/Multi-level Modeling (CSSS 560) Explores ways in which data are hierarchically organized, such as voters nested within electoral districts that are in turn nested within states. Provides a basic theoretical understanding and practical knowledge of models for clustered data and a set of tools to help make accurate inferences.

Structural Equation Modeling (CSSS 526) Structural equation models for the social sciences, including specification, estimation, and testing. Topics include path analysis, confirmatory factor analysis, linear models with latent variables, MIMIC models, non-recursive models, models for nested data. Emphasizes applications to substantive problems in the social sciences.

Sample Survey Techniques (CSSS 529) Design and implementation of selection and estimation procedures. Emphasis on human populations. Simple, stratified, and cluster sampling; multistage and two-phase procedures; optimal allocation of resources; estimation theory; replicated designs; variance estimation; national samples and census materials.

Statistical Analysis of Networks (CSSS 567) Statistical and mathematical descriptions of social networks. Topics include graphical and matrix representations of social networks, sampling methods, statistical analysis of network data, and applications.

CSSS Seminar (CSSS 590) This course offers a stimulating intellectual interaction among faculty and students by running a dynamic seminar series featuring presentations of ongoing social science research that involves cutting edge statistical methods.

Computer Environments for the Social Sciences (CSSS 506) Familiarizes graduate students in the social sciences with modern environments for statistical computing. Provides an overview of available resources and a description of fundamental tools used in quantitative courses and doctoral research. Topics include interfaces to Web-based resources, UNIX-based computing, and major statistical packages (R, SPLUS, SAS and SPSS).

Training in Qualitative Methods and Social Inquiry/Design:

Fieldwork: Observation and Interviewing (SOC 519) Perspective, logic, and techniques of qualitative social research and analysis. Nature and uses of intensive interviewing, participant observation, and analytic ethnography. Application of field research principles. Research project required in addition to reading and analysis of classic studies.

Fieldwork: Observation and Interviewing (SOC 520) Logic and techniques of qualitative social research and analysis. Intensive interviewing, participant observation, qualitative data analysis (including applications of data base technology, problem reformulation, and techniques of visual documentation). Results of student work reported and discussed in class.

Logic of Social Inquiry (SOC 508) Study design from problem formulation to the analysis and interpretation of data.

CSSS Seminar (CSSS 590) This course offers a stimulating intellectual interaction among faculty and students by running a dynamic seminar series featuring presentations of ongoing social science research that involves cutting edge statistical methods.

Teaching Experience in Research Methods and Social Inquiry:

Group Processes (SOC 346 Instructor: Summer 2011) Systematic analysis of social processes in small groups, including conformity, deviance, cooperation, competition, coalition formation, status and role differentiation, inequity, communication, and authority and power. A variety of methods of research are considered: field studies, field experiments, laboratory studies, and the simulation of social processes.

Foundations of Social Inquiry (SOC 300 Faculty Liaison and Tutor: Spring 2010-Winter 2011) Covers what makes social science a science, the components of good research design, and what counts as valid evidence for sociological claims. Pays special attention to links between theory, research questions, and data.

Introduction to Quantitative Sociological Methods (SOC 220 Teaching Assistant: Autumn 2005) Familiarizes students with the logic of analysis in social sciences. Students learn to recognize good research design, understand and interpret main arguments employing different methods, and evaluate whether research findings support stated conclusions.