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The Cost Effectiveness of Collaborative Mental Health Services In Outpatient Psychotherapy Care

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ABSTRACT

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This study compared the differences in treatment length, cost, cost effectiveness, dropout, and recidivism between a biomedical, talk therapy, and a collaborative mental health model for outpatient psychotherapy insurance claims. A biomedical model was the most cost effective with fewer sessions, but had a significantly higher dropout rate. Collaborative care had the least dropout, but also had higher costs and recidivism rates. Within collaborative care, differences between modality type, diagnosis, and provider type combinations were also examined. Within collaborative models, mixed modes of therapy had the lowest dropout, but at significantly higher costs and recidivism rates. Family therapy had the lowest recidivism and cost, with the highest dropout rate. In terms of specific problems, eating disorders had significantly more sessions and were significantly less cost-effective than any other diagnoses, followed by mood disorders. Relational disorders had the fewest sessions, best cost-effectiveness, and lowest recidivism rates. Finally, the MD/MFT provider type combination had the lowest dropout and recidivism rates, with the lowest cost, and a significantly better cost effectiveness than the MD/psychologist combination. The MD/psychologist combination had a significantly higher recidivism rate, and the MD/MSW combination had the highest dropout. No significant differences were found for any RN/talk therapy combination. Implications of the findings are discussed, along with limitations and future directions for research.

Keywords: collaborative care, integrated care, cost effectiveness, family therapy, medical family therapy, health care, bio-psychosocial

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Introduction

Research has shown that there is a connection between our psychological, relational, and physiological well-being. Most physical illnesses have psychological consequences, and many psychological illnesses have physical implications (Chapman, Perry, & Strine, 2005; DeGruy & Etz, 2010). For example, depressive disorders are linked with increased prevalence of chronic diseases (Chapman, Perry, & Strine, 2005), while patients with a chronic disease have twice the risk of depression and other mental disorders (Katon, 2003). There is also a link between physical illness and family relationship quality and satisfaction. A physical illness may influence family communication, cohesion, closeness, and family roles (Cordova, Cunningham, Carlson, & Andrykoswki, 2001; Lepore, Ragan, & Jones, 2000; Yorgason, Roper, Sandberg, & Berg, 2012). In turn, these family communication patterns and roles may significantly affect adjustment to the disease (Cordova et al., 2001; Lepore et al., 2000; Lewis, Lamson, & Leseuer, 2012), while also increasing morbidity and mortality rates (Coyne et al., 2001; Kimmel et al., 2000; Orth-Gomer et al., 2000). Given these connections, an ideally effective health care model should include physical, psychological, and relational dimensions of health (DeGruy & Etz, 2010). Currently, however, a physical division exists between biomedical and mental health care, making it difficult for practitioners to collaborate about the whole person (DeGruy & Etz, 2010; Farley, 2002; Unutzer, Shoenbaum, Druss, & Katon, 2006).

There are significant costs, both financial and in quality of life, associated with the coupling of physical, psychological, and relational illness in a divided healthcare system. When physical illness is coupled with a psychological disorder, cost of care increases by 50% (Katon, 2003). Patients are also less likely to adhere to self-care treatments (Katon & Ciechanowski, 2002); and since health related behaviors are accountable for up to 40% of avoidable mortality

(McGinnis, Williams-Russo, & Knickman, 2002), increased mortality rates ensue (Colton & Manderscheid, 2006; Katon, 2003). A healthcare system that is unable to integrate these physical, psychological, and relational aspects of health may not be maximizing the effectiveness and cost effectiveness of its services.

A collaborative health care model could be beneficial, not only to practitioners and patients (Felker et al., 2004; Gum et al., 2006), but also to help minimize the cost of care. A review suggests that collaborative models are more cost effective (Chiles, Lambert, & Hatch, 1999). More recent studies have found similar results, demonstrating that the inclusion of mental health treatment does not appear to significantly increase treatment costs, often because of decreases in overall biomedical utilization (Crane & Christenson, 2012). A collaborative health care model, defined in the current study as a mental health provider collaborating with a biomedical (nurse or doctor) provider on the same patient for the same psychotherapy diagnosis, could optimize resources for the treatment of the whole person, while also minimizing overall healthcare costs.

The current study explored cost effectiveness and treatment outcomes of a collaborative care model using health insurance claims from Cigna, a leading health insurance administrator. Dropout rates, recidivism rates, treatment length, costs, and cost-effectiveness were measured for collaborative model health claims (a mental health professional and a biomedical professional treating the same individual for the same psychotherapy diagnosis). In addition, the current study explored the influences that license type, modality type, and diagnosis type may have on the effectiveness of psychotherapy collaborative care models.

Literature Review

The current US health care system is fragmented in several ways that hinder effectual patient care (DeGruy & Etz, 2010; Farley, 2002; Unutzer et al., 2006). This literature review will briefly address some barriers to effective treatment. It will then discuss literature on the different models of collaborative care, as well as its benefits and barriers. Finally, it will address research on the cost-effectiveness of collaborative care.

Barriers to Effective Treatment

Currently, mental health care centers function mainly outside the realm of biomedical health care. This creates physical and cultural separation barriers, making it difficult for providers to communicate, refer, and collaborate about patients' mental and physical health (Farley, 2002). This tendency to focus on specialty care is a barrier to efficient treatment and can result in referral failure, meaning that many patients referred by their biomedical provider to a mental health specialist never make it to treatment. Literature suggests that there is an unbalanced commitment to specialty care that often leads to a lack of integrated holistic care (DeGruy & Etz, 2010). Though providers would like to utilize mental health specialists, the physical separation between biomedical and mental health care centers creates many obstacles. In one study, family physicians were receptive to referring to marriage and family therapists (MFTs), but time constraints, HMO's, lack of therapist-initiated communication, and lack of feedback from mental health providers were significant roadblocks to collaboration (Clark, Linville, & Rosen, 2009). Of those patients who were identified by the physicians as needing family therapy (48%), only 5% made it to an MFT (Clark et al., 2009). Many people do not receive important care because of these barriers to services.

Financial barriers and physician's time constraints also prevent patients from easily accessing mental health care. Financial barriers include an increase in co-pay for services, a reduction in reimbursement amount, restrictions on reimbursement, a limit on the number of reimbursable sessions, and financial incentives to use psychotropic medications in lieu of psychotherapy (Katon et al., 1997; Olfson et al., 2002). One reason physicians do not have the time to treat mental health is because of the emphasis on procedure based care vs. patient centered care. Even highly motivated physicians are limited in what they can do in the standard 15-20 minute appointment (Unutzer et al., 2006). Due to these time and financial constraints, behavioral and mental health disorders are the first elements of care to be neglected (DeGruy & Etz, 2010).

Collaborative Care

One possible solution to these barriers to service is incorporation of a collaborative care model. Collaborative care is a mounting area of interest designed to meet patient's needs and decrease the gap between ideal and actual care. Collaborative care typically refers to programs that aim to improve health care by increasing collaboration and consultation between mental health care specialists and general biomedical providers (Katon, Von Korff, Lin, & Simon, 2001).Varying models of collaborative care exist but usually include a combination of mental health specialists and physicians. These models include stepped-care, dually trained clinicians, and integrated multidisciplinary clinics (Bermudes, 2006). The literature suggests multiple benefits from using a collaborative model as well a few potential barriers, including financial costs.

Benefits. Research in collaborative care practice has begun to flourish and produce results that suggest an advantage over non-collaborative practices. Studies have shown that

collaborative care leads to better treatment outcomes (Gum et al., 2006; Katon, Roy-Byrne, Russo, & Cowley, 2002; Simon et al., 2001), greater patient and provider satisfaction (Felker et al., 2004; Gum et al., 2006; Hunkeler et al., 2006), increased access to preferable treatment (Gum et al., 2006), and enhanced quality of life with improved adherence to medication (Hunkeler et al., 2006; Rollman et al., 2005). Patients and providers, alike, would likely benefit from utilizing a collaborative model, which may result in improved treatment outcomes, increased satisfaction, and increased access to treatment.

Improved treatment outcomes. Research has indicated that collaborative care facilitates improved outcomes for those with depression (Gilbody, Bower, & Whitty, 2006; Richardson, McCauley, & Katon, 2009; Simon et al., 2001), anxiety disorders (Katon et al., 2006; Rollman et al., 2005; Roy-Byrne et al., 2005), bipolar disorder (Bauer et al., 2006), obesity and overeating (Hunter, 2009), and alcohol and substance abuse (Hunter, 2009). Hunter (2009) lists additional disorders that would benefit from a collaborative model: diabetes, irritable bowel syndrome, sexual dysfunction, chronic pain, tobacco and prescription drug misuse, primary insomnia, and somatic complaints. Overall, research suggests that collaborative care models lead to improved treatment outcomes with a reduction in symptoms.

For example, a randomized trial for depressed elderly patients (Hunkeler et al., 2006), including 18 clinics and 1800 primary care patients across eight US healthcare organizations, found significant long-term benefits using a collaborative care model. Outcomes measured included depression, overall functional impairment, and quality of life. Results indicated collaborative care patients fared better than controls in continuation of antidepressant medication, remission of depression, physical functioning, self-efficacy, satisfaction with care, and quality of life at both 18 and 24 month follow ups (Hunkeler et al., 2006). Another

collaborative care study for adults with panic disorder and generalized anxiety disorder randomly assigned patients into a telephone based collaborative group or a care as usual group. The study found that telephone-based collaborative care was better than care as usual in terms of reduced anxiety and depressive symptoms, improved quality of life, and fewer work days absent in the past month. These results remained consistent over 12 months (Rollman et al., 2005).

One reason why collaborative models may lead to improved treatment outcomes over the long-term may be due to its focus on integrating physical, psychological, and relational aspects of health. In a meta-analytic study on military and veteran health, Lewis, Lamson, and Leseuer (2012) found that military personnel's physical health and functioning was connected to their spouse's functioning. They advise that spouses of veterans and military personnel should be included in health assessments, and that medical family therapists are the best trained to deal with these relational aspects of health (Lewis et al., 2012). With an increased focus on psychological and relational aspects of health, a collaborative care model may provide improved treatment outcomes that are longer lasting than current health care models.

Patient and provider satisfaction. Patients of a collaborative model reported that they appreciated the option of receiving mental health treatment in their primary provider's offices, and avoiding the stigma of a mental health clinic (Felker et al., 2004). When a mental health practitioner was present, patients were also more likely to discuss personal problems with primary care providers. Providers appreciated "the easy access to specialty care, advice on treatment options, and the ability to remain the patient's primary provider" (Felker et al., 2004, p. 444). In general, a collaborative care intervention was "associated with improved quality of evidence-based counseling, patient satisfaction, anxiety, depressive and functional outcomes compared to usual primary care" (Katon et al., 2006, p. 354).

Increased access to treatment. Evidence suggests that a collaborative care, multidisciplinary team can more quickly diagnose and stabilize psychiatric conditions, while reducing specialty mental health referrals (Felker et al., 2004), and reducing referral delay (Van Orden, Hoffman, Haffmans, Spinhoven, & Hoencamp, 2009). This may help patients utilize health care services more effectively and reduce costs (Linville, Hertlein, & Prouty-Lyness, 2007). One collaborative study (Van Orden et al., 2009) compared the effectiveness of treating mental disorders in the primary care setting versus referring patients out to specialty mental health clinics. One hundred sixty five clients in over 27 different general practices received either collaborative care or care as usual and outcomes were measured at baseline and then at three-month increments for up to 12 months. Patients' psychopathology, quality of life, satisfaction with treatment, referral delay, duration of treatment, number of appointments, and treatment costs were assessed. The study found no significant difference between models in patients' psychopathology or quality of life, but results indicated shorter referral delay, reduced time in treatment, fewer appointments, and lower treatment costs.

Barriers to collaborative care. Perhaps one of the greatest barriers to the success of a collaborative health care model is concern over cost. During the first phase of managed care's development, the primary focus was placed on cost cutting. There was an assumption that offering more care, such as psychological services, would be more costly (Moran, 1999). However, Moran (1999) contended that managed care must now proceed to a new phase of development, focused on efficient care, which will necessarily be cost-effective care. To be integrated with biomedical care, psychotherapists must assure quality for both the patient and the third-party payer (Cummings, O'Donohue, & Cummings, 2009). Public funding, particularly through TriCare and the Veterans Administration, has been made possible through top-down

decisions, but is often eliminated when funding dries up (Cummings et al., 2009). Private funding will occur only as mental health professionals become more productive and efficient, and publicize this information (Cummings et al., 2009).

Kessler (2008) suggests that "perhaps the most important thing about the integration of behavioral and biomedical care is that much of the behavioral care is done on behalf of medical patients with medical problems who are primarily seeing physicians for medical care." This means that if behavioral and biomedical care is to be integrated, there needs to be a set of billing codes for behavioral health clinicians working with biomedical patients (Kessler, 2008). The APA proposed a new set of codes, called the health and behavioral codes, which will provide an opportunity to bill for psychological treatments, with a biomedical diagnosis as the focus of treatment without necessitating a diagnosable mental disorder (Kessler, 2008). However, there are barriers to the implementation of these newly accepted health and behavior codes. There are no available databases to identify eligible providers, and data indicates that within Medicare, there is wide variation in the procedures and number of sessions that can be reimbursed (Kessler, 2008). The use of these codes is increasing; from 2002 to 2003 the number of health and behavior services billed by psychologists more than tripled (APA, 2006). Their use is likely to continue to increase as providers increase awareness of these codes and promote their use to payers (Kessler, 2008).

Cost Effectiveness Research

In 2003, approximately $51 billion was lost in productivity due to mental illness, and this amount is increasing (Lim, Jacobs, Ohinmaa, Schopflocher, & Dewa, 2008), with depression identified as the health condition most costly to employers (Loeppke et al., 2009). Increasingly, policy-makers are searching for cost and outcome effectiveness research in order to make

decisions about health care resources (Hindley, 2001). Research on cost and outcome effectiveness of collaborative models began in the mid 1960's and continues to grow.

In the foundational Hawaii Project I, Cummings and colleagues conducted a seven year study including all Medicaid patients on the island of Oahu (N = 128,000). Patients were randomly assigned to experimental groups, which included biomedical providers and social workers in a behavioral health care program. After 18 months, the costs of implementing the behavioral health care program were recovered by medical surgical savings (Cummings & Follette, 1968; Follette & Cummings, 1967). The groups that provided the most savings were patients with chronic diseases, including diabetes, hypertension, airway and respiratory diseases, heart disease, and arthritis (Cummings, Cummings, & Johnson, 1997). When mental health and biomedical providers collaborate, the overall cost of care decreases.

Cummings and colleagues have found similar results in multiple studies, with one study demonstrating that the implementation of a collaborative model leads to a 62% reduction in medical utilization that lasted for up to five years (Cummings, Kahn, & Sparkman, 1962; Follette & Cummings, 1967). Further, these reductions resulted in a decrease of overall biomedical costs. This phenomenon, later called the medical cost offset effect, resulted in a number of studies attempting to replicate these findings. Several studies have replicated these results (Crane & Christenson, 2008; Law, Crane, & Berg, 2003); a review indicates a 10-30% reduction in biomedical costs above the costs of the behavioral care (Chiles, Lambert, & Hatch, 1999).

Throughout the years, researchers have continued to study medical cost offset. A meta-analysis (Chiles, Lambert, & Hatch, 1999) evaluated 91 studies, between 1967 and 1997, on the impact of psychological interventions on the use of medical services. Results revealed that 90% of the studies reported a decrease in biomedical and surgical treatment following psychological

intervention; overall savings ranged from 10%-30%. Additionally, one third of the studies showed that savings remained substantial even after subtracting the cost of providing psychological services.

Other meta-analyses, however, have yielded contrary results. A systemic review (Gilbody et al., 2006) of 11 collaborative care randomized control trials of enhanced care for depression found improved outcomes for depression management, but at increased costs. Results indicated a $13 to $24 increase in cost per depression free day. In general, collaborative care interventions were associated with improved treatment outcomes, but an increase in treatment cost (Simon et al., 2001; Gilbody et al., 2006).

Yet, additional research indicates that the use of psychotherapy is associated with a decrease in health care utilization (Crane, 2008; Crane & Christenson, 2008; Crane et al., 2004). One review (Crane & Christenson, 2012), provided a summary of research done on cost-effectiveness with the inclusion of family therapy. Data included subscribers to a state-wide health maintenance organization, the Medicaid system in Kansas, Cigna, and a university family therapy training clinic. Overall, the inclusion of family therapy resulted in a reduction of healthcare utilization, especially for high utilizers (Crane, 2012). These results suggest that collaborative treatment programs may decrease treatment costs (Katon et al., 2002; Katon et al., 2006; Van Orden et al., 2009), as well as decrease treatment duration (Van Orden et al., 2009).

Currently, however, no evidence has been presented regarding the cost effectiveness of collaborative care as a treatment model. Some believe that collaborative work can be costly, especially in the early phases of treatment, and that the financial benefits only appear with time (Simon, 2008). Generally, it is believed that the "economic benefits" of collaborative care are a result of decreased biomedical utilization. For example, Law and Crane (2000) found that

individuals and families who receive psychotherapeutic treatment experienced a significant reduction of overall biomedical health care use; resulting in a biomedical offset effect (Crane & Christenson, 2008). In addition, this offset effect is greater for high utilizers of health care, resulting in significantly less health care utilization when biomedical treatment is paired with conjoint psychotherapy (Law, Crane, & Berge, 2003). Additionally, this decrease in biomedical utilization is found regardless of license type or professional experience (Crane, Wood, Law, & Schaalje, 2004).

Further, Crane and Christenson's summary of numerous studies (2012) indicates that the inclusion of family therapy does not appear to significantly increase treatment costs; this is, in part, due to decreased biomedical utilization. Further, extensive research indicates that the inclusion of family therapy in treating substance abuse and conduct disorders also decreases biomedical utilization and decreases costs (Crane, Hillin, & Jakubowski, 2005; Morgan & Crane, 2010). Additionally, an inclusion of family therapy into the treatment plan resulted in a reduction of "68% in health screening visits, 38% in illness visits, 56% in laboratory/x-ray visits, and 78% in urgent care visits" for "high utlizers" of health care (Crane & Christenson, 2008, p. 127).

Current Study

It is unclear which collaborative models are most cost effective, produce more successful outcomes, and for which disorders (Bermudes, 2006). Because the costs could be higher through the simple addition of another provider, future research is needed to address the issue of cost effectiveness, and the extent to which collaborative care models should identify certain populations and high-risk patients. Additionally, because the majority of these studies have focused on the cost effectiveness of treating anxiety or mood disorders within a collaborative

model, further research is needed to address the cost efficacy of collaborative care within a wide variety of disorders (Marlowe, Hodgson, Lamson, White, & Irons, 2012). However, there is yet to be a comprehensive study investigating the impact of collaboration on a full spectrum of DSM-IV disorders, employing a variety of health professionals and treatment modalities, working in a wide range of treatment locations across the United States. Similarly, there is a lack of research on the use of family therapists in a collaborative model, with the majority of research focusing on collaborative work by biomedical providers, psychologists, and social workers. In addition, the role of family therapy, as a treatment modality, has largely been unexplored in the literature. Finally, the majority of studies evaluating collaborative work have employed data from a limited number of treatment facilities, within a short duration, and with small sample sizes, all leading to limited generalizability. The current study attempted to fill these gaps by including a full spectrum of DSM-IV disorders, a wide variety of health professionals (including family therapists), a variety of treatment models (individual, family, and mixed), and a large sample size from all parts of the United States.

Research Questions

The current study explored the overall effectiveness of collaborative care provided by a variety of mental health professionals, treating a variety of mental health disorders, in a number of treatment facilities using different therapeutic modalities. More specifically, the following research questions were asked:

Differences between types of care. What are the overall differences between each type of care (biomedical care, talk therapy, or collaborative care) in terms of number of sessions, dropout, recidivism rates, cost, and cost effectiveness for the first episode of care?

Differences within collaborative care. The following questions addressed differences within collaborative care.

Modality. Within collaborative care models, what are the differences in number of sessions, dropout, recidivism rates, cost and cost effectiveness, by modality type, for the first episode of care?

Diagnosis. Within collaborative care models, what are the differences in number of sessions, dropout, recidivism rates, cost, and cost effectiveness, by DSM-IV diagnosis group, of the first episode of care?

Provider type combination. Within collaborative care models, is there a difference between different combinations of biomedical providers and different types of talk therapy providers in terms of number of sessions, dropout, recidivism rates, cost, and cost effectiveness for the first episode of care?

Method

Participants

Participants received mental health services administered by Cigna, a leading healthcare administrator in the United States, during the years of 2001-2006. The total sample included 683,576 participants, with ages ranging from 0 to 103 (M = 32.44, SD = 15.668). Of this sample, 2.1% (N = 14,862) were seen only by a biomedical provider, 96.4% (N = 672,069) were seen only by a talk therapy model, and 1.5% (N = 10,233) of the participants were treated with a collaborative model. Within the biomedical model, 54.4% (8,092) were female and 42.1% (6,250) were male, with ages ranging from 0 to 95. Within the talk therapy model, 58.2% (391,017) were female and 39.9% (268,040) were male, with ages ranging from 0 to 100. Within the collaborative model, 59.2% (6,057) were female and 40.3% (4,120) were male, with ages

ranging from 2 to 88. All U.S. states were represented in the study. The Health Insurance Portability and Accountability Act of 1996 authorizes the use of administrative data for the purpose of collecting cumulative statistics and monitoring trends. Neither providers nor patients were identifiable.

Six provider types were used: licensed professional counselors (LPC), marriage and family therapists (MFT), psychologists, master's social workers (MSW), master's nurses (RN), and medical doctors (MD). These profession types were further aggregated into one of two categories: "biomedical" (MD's and RN's) and "talk therapist" providers (LPC's, MFT's, psychologists, and MSW's).

Design

The current study employed a retrospective design, utilizing archival data from Cigna, based on real-world services. At the time of data collection, Cigna managed hundreds of health care plans with several million subscribers. Data for the present study contains over six million psychotherapy claims that span over a period of 5 years (2001-2006). For a complete discussion of the data-cleaning procedure see Crane and Payne (2011).

Procedure

Collaborative care. In the current study, collaborative care was defined as psychotherapy outpatient services provided to an individual for the same DSM-IV diagnosis by both a biomedical provider (MD or RN) and a "talk therapy" mental health practitioner (Psychologist, MFT, SW, LPC) within the first episode of care. In order to avoid potential confounds, all dually trained clinicians were excluded from the study.

Type of care. Patients were categorized into one of three types of care: biomedical, talk therapy, or collaborative care. Biomedical care included patients who only received

psychotherapy from a biomedical provider (MD or RN). Talk therapy included patients who only received psychotherapy from a mental health provider (LPC, MFT, MSW, or Psychologist). Collaborative care consisted of patients who received psychotherapy from both a biomedical provider and a talk therapist for the same DSM-IV diagnosis.

Provider type combination. Collaborative care models were distinguished by different combinations of biomedical and talk therapy providers. This occurred at four levels and included the combinations of MD or RN with a psychologist, MD or RN with an MFT, MD or RN with an MSW, and MD or RN with an LPC.

Modality. Each profession type offered either individual or family psychotherapy. Patients receiving exclusively family psychotherapy or individual psychotherapy were classified as one type or the other. Patients who received a combination of individual and family psychotherapy were classified as receiving a "mixed" mode of therapy.

Diagnosis group. All of the DSM-IV diagnoses were aggregated into 11 groups: anxiety/PTSD, mood disorders, disruptive behaviors, substance use & abuse, dissociative disorders, sexual disorders, schizophrenic/psychotic, eating disorders, adjustment disorders, relational disorders, and "all other"(Crane & Payne, 2011).

Episodes of care (EoC). Episodes of Care were defined by Cigna as a continuous series of psychotherapy services for a single patient. An EoC began with the first appointment and concluded after the patient had no claims for 90 days.

Dropout. In this study, collaborative care required at least two sessions; one from a biomedical provider and another from a talk therapist. As such, dropout was defined as a departure from treatment after only two sessions of psychotherapy services.

Recidivism. In the current study, recidivism was used as an outcome variable in order to measure treatment success. Recidivism was defined as a returning to treatment for the same presenting problem after the completion of a first EoC. Treatment success was defined as patients who used only one episode of care, while patients who used more than one EoC will be defined as recidivists.

Total cost. Total cost of treatment was determined by the total number of sessions multiplied by the amount paid for each session.

Cost effectiveness. In this study, the formula for cost effectiveness included both the cost per session as well as the number of sessions required for successful treatment. The equation used to measure cost effectiveness included the following: the 1st EoC average cost + (1st EoC average cost * recidivism rate) (Crane & Payne, 2011).

Analysis

In order to determine differences between types of care, and differences within collaborative care by modality, diagnosis, and provider type combination, ANOVA and Chi-square were determined to be appropriate. The ratio and interval dependent variables (number of sessions, cost, and cost effectiveness) were analyzed using a one-way ANOVA. Post-hoc analyses were performed using Tukey's t-test to find out which groups were significantly different. Because providers with PhD's and MD's are reimbursed at higher rates, the variables number of sessions, cost, and cost effectiveness were analyzed using ANCOVA to control for degree levels. Also, because diagnosis type may influence the course of treatment, the variables number of sessions, cost, and cost effectiveness were analyzed using ANCOVA to control for diagnosis type. The dichotomous dependent variables (dropout and recidivism) were analyzed using a one-way Chi-square.

Results

Because of the nature of the data, a few changes were implemented in order to attain accurate results. First, in order to statistically adjust for positive skew in the data, number of sessions, cost, and cost effectiveness were log transformed for each research questions below. In order to describe these trends in real units, the descriptive statistics were back-transformed. Second, after preliminary analysis, ANCOVA found that degree level and diagnosis group each accounted for less than 1% of the total variance in number of sessions, cost, and cost effectiveness for each research question. As such, number of sessions, cost, and cost effectiveness were analyzed using ANOVA. Third, because dropouts are not considered to have received a dose of care, they were excluded when performing analysis on recidivism rates. Finally, because the sexual disorder diagnosis group contained only one participant, it was excluded from analysis.

Research Question One

The first question assessed the differences in treatment outcomes (number of sessions, cost, cost effectiveness, dropout, and recidivism) between a biomedical model of care, a talk therapy model of care, and a collaborative model of care. Because degree level and diagnosis group could potentially influence results, ANCOVA was run to control for these confounding factors. However, after preliminary analysis, degree level and diagnosis group were found to only account for less than one percent of the total variance, and ANOVA was used instead. Also, because of unequal sample sizes between each model of care, a random sampling of each group was performed to randomly select an equal number of participants from each group, totaling 10,233 participants in each group, before running ANOVA.

Results revealed a significant difference in the number of sessions between all three types of care, F (2, 30,078) = 3,419.37, p < .001). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed number of sessions for biomedical models of care (M = 0.47, SD = 0.46) had significantly fewer log-transformed sessions than did talk models of care (M = .68, SD = .46), which had significantly fewer log-transformed sessions than did a collaborative model (M = 0.98, SD = .41). See Table 1 to view these results in real units.

Results revealed a significant difference in cost between all three types of care, F (2, 30,078) = 2481.72, p < .001). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed cost for biomedical models of care (M = 2.28, SD = 0.49) had a significantly lower log-transformed cost than did talk models of care (M = 2.34, SD = .48), which had a significantly lower log-transformed cost than did a collaborative model (M = 2.71, SD = .43). See Table 1 to view these results in real units. Results revealed a significant difference in cost effectiveness between all three types of care, F (2, 30,078) = 2525.05, p < .001). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed cost effectiveness for biomedical models of care (M = 2.29, SD = 0.49) had a significantly lower log-transformed cost effectiveness than did talk models of care (M = 2.35, SD = .48), which had a significantly lower log-transformed cost than did a collaborative model (M =2.72, SD = .43). See Table 1 to view these results in real units.

Chi square was performed in order to determine if dropout rates and recidivism rates were different between each type of care (biomedical, talk, and collaborative). Analysis revealed a significant difference in dropout rates between each type of care, x^2(2, 697,154 = 5,199.03, p < .001. Analysis also revealed a significant difference in recidivism rates between each type of care, x^2(2, 697,154) =6,401.99, p < .001. See Table 1 to view dropout and recidivism rates.

Insert Table 1 about here

Research Question Two

The second question assessed the differences in treatment outcomes (number of sessions, cost, cost effectiveness, dropout, and recidivism) by modality (individual, family, or mixed models of therapy) within collaborative care. Because degree level and diagnosis group could potentially influence results, ANCOVA was run to control for these confounding factors. However, after preliminary analysis, degree level and diagnosis group were found to only account for less than one percent of the total variance. As such, a one-way, between subjects ANOVA was conducted to compare the effect that modality had on number of sessions, cost, and cost effectiveness, within a collaborative care model. Table 2 presents a summary of the results in non-log-transformed real units, while the following paragraphs will list results in log-transformed units.

Insert Table 2 about here

Results revealed a significant difference in number of sessions between all three modalities, F (2, 10,180) = 219.66, $p < .001$). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed number of sessions for family therapy (M = .64, SD = .39) had significantly fewer log-transformed sessions than did individual therapy (M = .95, SD = 0.42), which had significantly fewer log-transformed sessions than did mixed modes of therapy (M =1.10, SD = .37).

Results revealed a significant difference in cost between all three modalities, F (2, 10,180) = 189.90, $p < .001$). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed cost for family therapy (M = 2.39, SD = .41) had a significantly lower log-transformed cost than individual therapy (M = 2.68, SD = .44), which had a significantly lower

log-transformed cost than did mixed therapy (*M* =2.80, *SD* = .39). Results revealed a significant difference in cost effectiveness between all three modalities, *F* (2, 10,180) = 191.52, p < .001). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed cost effectiveness for family therapy (*M* = 2.39, *SD* = 0.41) had a significantly lower log-transformed cost effectiveness than individual therapy (*M* = 2.69, *SD* = .44), which had a significantly lower log-transformed cost than mixed therapy (*M* =2.81, *SD* = .39).

Chi square was performed in order to determine if dropout rates and recidivism rates were different by modality (individual, family, and mixed) within collaborative care. Analysis revealed a significant difference in dropout rates between each modality, x^2(2, 10,183) = 342.17, p < .001. Analysis also revealed a significant difference in recidivism rates by modality, x^2(2, 10,183) = 48.49, p < .001. See Table 2 for recidivism and dropout rates.

Research Question Three

The third question assessed the differences in treatment outcomes (number of sessions, cost, cost effectiveness, dropout, and recidivism) by diagnosis group, within collaborative care. Because degree level and diagnosis group could potentially influence results, ANCOVA was run to control for these confounding factors. However, after preliminary analysis, degree level and diagnosis group were found to only account for less than one percent of the total variance. As such, a one-way, between subjects ANOVA was conducted to compare the effect that diagnosis had on number of sessions, cost, and cost effectiveness within a collaborative care model. Table 3 presents a summary of the results in non-log-transformed real units, while the following paragraphs will list results in log-transformed units.

Insert Table 3 about here

Results revealed a significant difference in number of sessions by diagnosis groups F (9, 10,172) = 5.69, $p < .001$). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed number of sessions for each significantly different diagnosis group (in descending order) were: eating disorders (M = 1.18, SD = .44), mood disorders (M = 1.00, SD = .41), anxiety/PTSD (M = .99, SD = .41), adjustment disorders (M = .96, SD = .40), "all other" (M = .96, SD = .41), substance use and abuse (M = .90, SD = .39), and relational disorders (M = .50, SD = .57). Eating disorders significantly differed from adjustment, anxiety/PTSD, mood, "all other," relational, and substance use and abuse disorders. Anxiety disorders also significantly differed from substance use and abuse, while mood disorders were significantly different from "all other," and substance use and abuse disorders. However, disruptive behaviors, dissociative disorders, and schizophrenic/psychotics diagnosis groups did not significantly differ from any other group.

Results revealed a significant difference in cost between diagnosis groups, F (9, 10,172) = 4.78, $p < .001$). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed cost for each significantly different diagnosis group (in descending order) were: eating disorders (M = 2.94, SD = .45), mood disorders (M = 2.73, SD = .43), disruptive behaviors (M = 2.72, SD = .38), anxiety/PTSD (M = 2.72, SD = .43), adjustment disorders (M = 2.7, SD = .43), "all other" (M = 2.69, SD = .43), substance use and abuse (M = 2.67, SD = .42), and relational disorders (M = 2.17, SD = .58). Diagnosis group eating disorders significantly differed from, adjustment disorders, anxiety/PTSD, disruptive behaviors, mood disorders, "all other", relational disorders, and substance use and abuse; and diagnosis group mood disorders significantly differed from eating disorders and "all other". However, diagnosis groups dissociative disorder and schizophrenic/psychotic disorders did not significantly differ from any

other group. Results revealed a significant difference in cost effectiveness between diagnosis groups, F (9, 10,172) = 4.82, p < .001). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed cost effectiveness for each significantly different diagnosis group (in ascending order) were: eating disorders (*M* = 2.95, *SD* = .45), mood disorders (*M* = 2.74, *SD* = .43), disruptive behaviors (*M* = 2.74, *SD* = .38), anxiety/PT*SD* (*M* = 2.73, *SD* = .43), adjustment disorders (*M* = 2.71, *SD* = .43), "all other" (*M* = 2.70, *SD* = .43), substance use and abuse (*M* = 2.68, *SD* = .42), and relational disorders (*M* = 2.18, *SD* = .57). Diagnosis group eating disorders significantly differed from adjustment disorders, anxiety, PTSD, disruptive behaviors, mood disorders, "all other", relational disorders, and substance use and abuse; and diagnosis group mood disorders significantly differed from eating disorders and "all other". However, diagnosis groups dissociative disorder and schizophrenic/psychotic disorders did not significantly differ from any other group.

Chi square was performed in order to determine if dropout rates and recidivism rates were different by diagnosis group within a collaborative care model. Analysis revealed a significant difference in dropout rates between each diagnosis group, x^2(11, 10,233) = 47.89, p < .001. Analysis also revealed a significant difference in recidivism rates by diagnosis group, x^2(9, 10,188) = 23.34, p = .005. See Table 3 for recidivism and dropout rates.

Research Question Four

The fourth question assessed the differences in treatment outcomes (number of sessions, cost, cost effectiveness, dropout, and recidivism) by different combinations of providers within collaborative care (MD or RN with a MSW, MFT, LPC, or psychologist). Because degree level and diagnosis group could potentially influence results, ANCOVA was run to control for these confounding factors. However, after preliminary analysis, degree level and diagnosis group were

found to only account for less than one percent of the total variance. As such, a one-way, between subjects ANOVA was conducted to compare the effect that the eight provider type combinations had on the average number of sessions, cost, cost effectiveness, dropout, and recidivism rates within a collaborative care model. Table 4 presents a summary of the results in non-log-transformed real units, while the following paragraphs will list results in log-transformed units.

Insert Table 4 about here

Results revealed a significant difference in number of sessions between MD and talk therapy combinations $F(5, 9{,}653) = 2.63$, $p = .022$). Post-hoc comparisons using Tukey's HSD test indicated a significant difference between the MD and MSW combination ($M = .95$ $SD = .44$), and the MD and psychologist combination ($M = 1.00$, $SD = .43$). There were no significant differences between the RN and talk therapist groups, in terms of number of sessions.

Results revealed a significant difference in cost between MD and talk therapy combinations $F(5, 9{,}653) = 4.79$, $p < .001$). Post-hoc comparisons using the Tukey HSD test indicated that the mean log-transformed cost for each significantly different MD and talk therapy combination were (in ascending order): MD and MFT ($M = 2.68$, $SD = .42$), MD and LPC ($M = 2.69$, $SD = .43$), MD and MSW ($M = 2.69$, $SD = .46$), and MD and psychologist ($M = 2.76$, $SD = .44$). The MD and psychologist combination was significantly different from the MD and MFT combination, MD and LPC combination, and the MD and MSW combination. MD and MFT, LPC, or MSW combinations did not significantly differ. There were no significant differences between the RN and talk therapist groups in terms of cost.

Results revealed a significant difference in cost effectiveness between MD and talk therapy combinations $F(5, 9{,}653) = 4.72$, $p < .001$). Post-hoc comparisons using Tukey's HSD

test indicated that the mean log-transformed cost effectiveness for each significantly different MD and talk therapy combination were (in ascending order): MD and MFT (M = 2.69, SD = .42), MD and LPC (M = 2.70, SD = .43), MD and MSW (M = 2.7, SD = .46), and MD and psychologist (M = 2.77, SD = .44). The MD and psychologist combination was significantly different from the MD and MFT combination, MD and LPC combination, and the MD and MSW combination. MD and MFT, LPC, or MSW combinations did not significantly differ. There were no significant differences between the RN and talk therapist groups in terms of cost effectiveness.

Chi square was performed in order to determine if dropout rates and recidivism rates were different between different combinations of provider types within collaborative care. Analysis revealed a significant difference in dropout rates between each provider type combination, $x^2(5, 9{,}659) = 22.27$, p <.001. Analysis also revealed a significant difference in recidivism rates by provider type combination, $x^2(6, 9{,}659) = 110.75$, p = .001. See Table 4 for recidivism and dropout rates. There were no significant differences between the RN and talk therapist groups in terms of dropout and recidivism.

Discussion

Analysis of the first research question showed significant differences between types of care in terms of number of sessions, cost, cost effectiveness, dropout, and recidivism. Biomedical models were least costly, with the fewest number of sessions (2.9), but they also produced the highest dropout rate at 50.5%. One reason why dropout may be so high could be due to biomedical providers' preference to treat mental health disorders with medication. Approximately 50% of primary care patients diagnosed with depression or anxiety disorder are treated with antidepressants, but often, with infrequent follow-up, leading to ineffectual dosages

(Simon, 2002). Another reason why biomedical models had fewer sessions and higher dropout could be due to their model of treatment. For example, most biomedical practitioners consider one or two sessions as an adequate dose of care while mental health practitioners usually require eight to twelve sessions. With the current study's definition of dropout being two or fewer sessions, most biomedical models were considered as dropout.

Alternatively, collaborative care models, defined as a mental health professional and a biomedical health professional treating the same individual for the same psychotherapy diagnosis within one episode of care, had the lowest dropout rate at 8.6%, but with the highest cost. With lower dropout rates, collaborative care may lead to better client retention and completion of treatment. A recent Cochrane collaborative care review (Archer et al., 2012) looked at 79 randomized control trials (including 24,308 patients) that compared collaborative care treatment outcomes to care as usual. Results indicated that collaborative care, when compared to treatment as usual, was associated with a significant improvement in both anxiety and depression over the short-term, medium-term, and long-term. Secondary benefits of patient satisfaction, medication use, and mental health quality of life were also reported. These results offer promising evidence for collaborative care as an evidence based treatment model for depression and anxiety (Archer et al., 2012).

Results also indicated an increase in costs with collaborative models. Higher costs associated with collaboration is most likely due to an increase in total number of sessions, while lower costs in the biomedical model could be due to higher dropout rates, and hence, fewer sessions. However, if collaborative models are more likely to retain clients, higher costs may be justified. Additionally, because collaborative models lead to decreases in overall biomedical utilization (Crane & Christenson, 2012; Crane, Hillin, & Jakubowski, 2005; Morgan & Crane,

2010), an increase in collaborative care costs may be small compared to the total biomedical savings achieved through collaboration. Past and current literature suggests that a collaborative model can reduce biomedical and surgical costs far below the cost of implementing a mental health provider into the treatment plan (Chiles, Lambert, & Hatch, 1999; Crane & Christenson, 2008; Crane & Christenson, 2012; Crane et al., 2005; Cummings & Follette, 1967; Follette & Cummings, 1967; Morgan & Crane, 2010). The current study, however, cannot examine this possibility as the data set did not include biomedical health claims. Consequently, it is unknown how collaborative models would influence biomedical savings in the current study.

Also, collaborative models had the highest recidivism rates at 56.3%, while biomedical models had the lowest at 19.4%. Higher recidivism rates could indicate a variety of possibilities. First, the nature of the diagnosis must be accounted for since chronic illnesses, such as ADHD, inherently require more treatment episodes than acute diagnoses, such as an adjustment disorder. Higher recidivism rates, in these cases, would be expected and necessary. Second, recidivism could indicate that collaborative care patients feel more comfortable returning to care because they were satisfied with past treatment results. Finally, it could also indicate that past treatment was not successful long-term, thereby requiring an additional episode of care. As such, caution must be used when interpreting the cause and meaning of higher recidivism rates.

Analysis of the remaining research questions deal with differences within collaborative care by treatment modality, diagnosis group, and provider type combination. Significant differences were found in the number of sessions, cost, cost effectiveness, dropout, and recidivism by treatment modality within collaborative care. A mixed mode of therapy had the lowest dropout rate (3.8%), suggesting better client retention. However, it also had the highest cost ($630.96) and recidivism rates (62.7%). Conversely, family therapy had the highest dropout

(31.6%), with the lowest costs ($245.47) and recidivism rates (45.2%). Although a collaborative family therapy modality had higher dropout, lower recidivism rates may suggest that those who remained in treatment appear to have improved over the long run, and at lower costs. The finding that family therapy is more cost effective, with lower recidivism is consistent with Crane and Payne's findings (2011), and Crane and Christenson (2012).

High dropout rates, however, have been found to be more common among family modalities of therapy (Moore, Hamilton, Crane, & Fawcett, 2011), which may be due to a number of contributing factors. One explanation includes a lack of therapist training in practicing family therapy modalities. Crane et al. (2010) used content analysis to compare the differences between six license types in terms of the amount of family based training required for licensure. Results indicated that family therapists' licensure requirements included at least three times more coursework in family therapy interventions and sixteen times more face-to-face relational hours than did licensure requirements of psychologists, psychiatrists, psychiatric nurses, professional counselors, and social workers. As such, mental health clinicians that are not adequately trained to provide family therapy may produce higher dropout rates, when performing family therapy, than clinicians who have received adequate training. Additional contributing factors that may have led to high dropout in family therapy include difficulties correlating schedules among multiple family members, lack of time, lack of social support, and a lack of optimism for potential treatment outcomes (Kazdin, Holland, & Crowley, 1997; Nock & Kazdin, 2001). This may provide some insight as to why collaborative family therapy had higher dropout rates.

Significant differences were also found in collaborative care treatment outcomes by diagnosis group. Eating disorders had significantly more sessions and were significantly less cost-effective than any other diagnoses, followed by mood disorders. Relational disorders had

the fewest sessions, best cost-effectiveness, and lowest recidivism rates. Results suggest that, within a collaborative framework, eating disorders are the most costly to treat. This is consistent with previous research which indicates that eating disorders are among the most costly mental disorders to treat (Striegel-Moore, Leslie, Petrill, Garvin & Rosenheck, 2000; Pohjolainen et al., 2010). Treatment for eating disorders is often intensive, requiring monitoring of eating behaviors and physical health in addition to mental health (Stuhldreher et al., 2012), which, inevitably, leads to higher costs. Collaborative care, therefore, seems appropriate and potentially advantageous for effective treatment of eating disorders, despite the high costs of treatment.

The final question assessed the difference in number of sessions, cost, cost effectiveness, dropout, and recidivism between different provider type combinations within collaborative care. No significant differences were found for any RN/talk therapy combinations. This was potentially due to a low and fragmented sample size within the RN/talk therapy groups. However, within the MD/talk therapy combinations, results indicated that the MD/MFT combination was the least costly, had a significantly better cost and cost effectiveness than the MD/psychologist combination, and had significantly lower dropout and recidivism rates.

Significantly lower dropout and recidivism rates in the MD/MFT combination group indicate increased client retention and a decreased return to later treatment, which may suggest better treatment outcomes than other provider type combinations. These results are consistent with current research that is becoming increasingly supportive of a systemic approach to healthcare, and MFTs may be the most prepared to move around the health care system (Tyndall et al., 2012; Fox, Hodgson, & Lamson, 2012). MFTs are relationally and systemically oriented (Marlowe et al., 2012). Receiving three times more systemic course work, and 16 times more face to face systemic hours than any other mental health professional, they are trained to see how

health care providers, patients, families, and relationships connect and influence one another (Crane et al., 2010). This relational and systemic component may also be necessary to see how family patterns influence a patient's disease trajectory (McDaniels, 1992), which may improve treatment outcomes and decrease costs.

Finally, the MD/psychologist combination was the most costly, with higher recidivism rates, and the MD/MSW combinations had the highest dropout. Increased recidivism and costs associated with the MD/psychology combination could be due to the types of clients they see. If they are seeing more clients with chronic disorders, recidivism and cost would increase. More research is needed to confirm this assumption. No other known studies have directly assessed and compared collaborative care license type combinations in terms of treatment length, cost, cost effectiveness, dropout, or recidivism. More research is needed to confirm these results.

Limitations

The results of the current study should be interpreted with a little caution as certain limitations of this study could confound results. These limitations include a lack of information about the nature of the collaborative relationship, a lack of knowledge about symptom severity and alleviation, a lack of information about non-DSM-IV related diagnoses, and a lack of equal numbers of participants in each group. First, the type of collaborative model being employed within the data set is unknown. Variations in the definition of collaboration exist, but a truly collaborative model would have consistent interaction between providers. In this data set, the type of relationship that the biomedical provider had with the talk therapist is unknown, and could range from no contact at all (two separate offices with no communication) to consistent contact (same office working side by side). Additionally, the frequency of visits to each provider type and the time between these visits is unknown. Ideally, a collaborative model would have a

similar number of visits to each provider type and within a close time-frame. A clearer definition is needed in order to make sure that collaborative care is truly unique from biomedical or talk therapy care.

Second, the data set does not include information about symptom severity or reduction. As such, it is impossible to know which participants had more severe symptoms or which actually experienced a reduction of symptoms. This could significantly affect results as dropout and recidivism rates are not always synonymous with improved treatment outcomes. For example, recidivism could either mean 1) that clients did not improve with the first episode of care, and needed to return for treatment, or 2) that they were experiencing more severe or chronic symptoms, were satisfied with previous care, and are continuing necessary treatment.

Additionally, due to the nature of the data, we simply do not know if the results related to dropouts are representative of true dropout. Perhaps, with mild symptoms, one to two sessions would be enough for successful termination. In other instances, more than two sessions were required, and the participant truly did dropout before symptom alleviation. Other factors that make dropout difficult to interpret include differences surrounding the nature of treatment with a mental health provider vs. treatment with a biomedical provider. Biomedical models usually include only one or two fifteen minute appointments, while mental health models usually include ten to twelve sessions. However, the currents study defines dropout as being less than three sessions. As such, biomedical models are more likely to have higher dropout rates within the current study, but this may not be indicative of true dropout.

Third, the data set only includes participant claims for DSM-IV mental health disorders, and does not include information about the participants' complete physical medical history. As such, it is difficult to know if a medical cost offset effect exists. It is unknown whether an

increase in cost collaborative care models would lead to a significant decrease in cost in the participants overall medical health claims; thereby, justifying the increased costs associated with collaborative models. Additionally, the participants in this data set differ from the participants of other collaborative studies mentioned above. The participants in this study are only seeing a biomedical provider for psychotherapy claims, whereas participants of other collaborative studies are seeing biomedical providers for biomedical health claims, such as for medication prescriptions and medical diseases, etc. As such, participants in this study are not receiving medical services from biomedical providers, but psychotherapy services. This may influence treatment outcomes to reflect results that are less collaborative in nature than in other studies.

Finally, although measures were taken to equalize sample sizes between biomedical, talk therapy, and collaborative care groups, the current data set had an unequal number of participants in collaborative model types. Differences in sample size existed within modality type, diagnosis groups, and provider type combinations. Differences in sample size can influence the interpretation of statistical results. For example, unequal sample sizes can influence the assumption of homogeneity of variance when using ANOVA. Though ANOVA is considered robust enough to handle mild to moderate departures from this assumption, it could be a potential confound in the current study. Future research could address the issue of unequal sample sizes by using random assignment to group, which was not possible in the current study as it was a retrospective analysis.

Directions for Future Research

The results of this study provide some evidence that collaborative models of care provide better treatment outcomes than either biomedical or talk therapy models alone. However, these improved outcomes may come at increased costs. Whether this increase in cost is justified

through a medical cost offset effect is unknown, and requires additional research. Future research is needed to identify a clear definition of collaboration, assess the most effective contexts for collaboration, and provide a more complete cost-benefit analysis. In order to identify collaborative care as truly unique from biomedical care or talk therapy, future research must create a standard definition of collaborative care. One suggestion is to set parameters on either the time frame or on the number of visits participants make to each provider. For example, researchers could further qualify and define collaborative care as seeing both a biomedical and talk therapy provider within a six week period, or visiting each provider an equal number of times within that time frame.

Additional research could also help identify the most effective contexts for collaborative care. Research should compare the differences in treatment outcomes and cost effectiveness by different levels of collaboration. For example, collaborators working in the same office may be more cost effective than collaborators who work in separate offices. Additionally, collaborators who work side by side may be more effective than those who communicate less frequently. More research is needed to refine and define the most cost effective level of collaboration.

Finally, more research is needed to answer questions about the symptom alleviation associated with each type of treatment. Within the limitations of the data set, there was no information about symptom severity or alleviation over the course of treatment. Future studies should assess not only the costs associated with the delivery of treatment, but also the benefits associated with decreased symptoms and/or improved quality of life. A complete cost-benefit analysis would identify a more complete picture of the impact of treatment.

Clinical Implications

Additional outreach and support for collaborative care programs is needed in order to provide patients with optimal care. Practitioners wanting to improve treatment outcomes for their clients would benefit from collaborating and coordinating treatment across treatment settings. However, increased costs associated with collaborative models need to be carefully considered, as an increase in collaborative costs may lead to decreases in overall biomedical utilization. Policy makers and insurance providers should carefully consider this medical cost offset in order to make effective financial decisions. Within collaborative models, practitioners wanting to cut costs and decrease recidivism rates could incorporate a family therapy modality into their treatment plans. However, practitioners utilizing a family therapy modality need to be cognizant of early dropout in this model. Finally, the most cost and outcome effective provider type combination was the MD/MFT combination. Healthcare providers who want to decrease costs and improve outcomes in collaborative care may consider employing MFTs in medical settings.

Conclusion

These results give some evidence for improved treatment outcomes within a collaborative care model as compared to biomedical or talk therapy treatment alone. More specifically, within collaborative care, the current study suggests decreased costs and better treatment outcomes associated with family modalities and with the inclusion of MFTs specifically. Because this is the only known study to compare MFTs with other treatment providers in collaborative healthcare settings, future research is needed to confirm these findings. Additionally, because this study was unable to compare biomedical and surgical savings with mental health costs, more research is needed to establish a medical cost offset effect in a collaborative model.

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Table 1

Treatment Outcomes by Model Type

Model Type	N	Number of Sessions	Total Dollars ($)	Estimated Cost Effectiveness	Dropout Rate	Recidivism Rate
Biomedical	14,862	2.95	191.82	195.70	50.5%	19.4%
Talk	672,069	4.73	219.99	226.10	29.3%	22.9%
Collaborative	10,223	9.59	513.93	529.79	8.6%	56.3%

Note. $p < .001$

Table 2

Collaborative Care Treatment Outcomes by Treatment Modality

Modality	N	Number of Sessions	Total Dollars ($)	Estimated Cost Effectiveness	Dropout Rate	Recidivism Rate
Family	323	4.37	245.47	251.19	31.6%	45.2%
Individual	6,314	8.91	478.63	501.19	10.1%	56.7%
Mixed	3,546	12.59	630.96	645.65	3.8%	62.7%

Note. $p < .001$

Table 3

Collaborative Care Treatment Outcomes by Diagnosis Group

Diagnosis Group	N	Number of Sessions	Total Dollars ($)	Estimated Cost Effectiveness	Dropout Rate	Recidivism Rate
Adjustment	382	9.12[a]	501.19[a]	501.19[a]	7.9%	58.0%
Anxiety	1,399	9.77[a]	512.86[a]	537.03[a]	8.1%	58.4%
Disruptive	227	9.55	524.81[a]	549.54[a]	5.7%	59.8%
Dissociative	14	12.02	741.31	758.58	7.1%	76.9%
Eating	56	15.14[b]	870.96[b]	891.25[b]	5.4%	60.4%
Mood	4,241	10[a]	537.03[a]	549.54[a]	7.8%	58.9%
Other	3,605	9.12[a b]	489.78[a b]	501.19[a b]	9.8%	59.2%
Relational	5	3.16[a]	147.91[a]	151.36[a]	60.0%	0.0%
Schizophrenic	7	-	-	-	-	-
Substance	246	7.94[a b]	467.74[a]	478.63[a]	11.0%	44.7%

Note. [a] significantly different from eating disorders at $p < .001$; [b] significantly different from mood disorders at $p < .001$

Table 4

Collaborative Care Treatment Outcomes by Provider Type Combination

Provider Type Combination	N	Number of Sessions	Total Dollars ($)	Estimated Cost Effectiveness	Dropout Rate	Recidivism Rate
MD/LPC	664	8.96	487.53[b]	501.19[b]	10.4%	62.7%
MD/MFT	522	9.73	477.53[b]	489.78[b]	7.7%	59.9%
MD/MSW	1339	8.85[a]	488.65[b]	501.19[b]	11.9%	60.4%
MD/Psych	934	10.06[a]	571.48	588.84	9.2%	62.6%

Note. [a] significantly different at $p = .022$; [b] significantly different from MD/Psych combination at $p < .001$