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PREDICTORS, CORRELATES, AND MEASURES OF COLLABORATIVE PRACTICE  
AMONG HIV PRIMARY CARE PROVIDERS AND CASE MANAGERS

A DISSERTATION

SUBMITTED ON THE FIFTEENTH DAY OF JULY 2010

TO THE DEPARTMENT OF HEALTH SYSTEMS MANAGEMENT

IN FULFILLMENT OF THE REQUIREMENTS

OF THE SCHOOL OF PUBLIC HEALTH AND TROPICAL MEDICINE

OF TULANE UNIVERSITY

FOR THE DEGREE

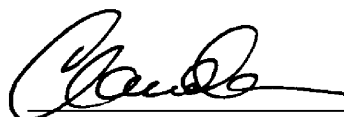
OF

DOCTOR OF PHILOSOPHY

BY



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APPROVED:  7/13/2010

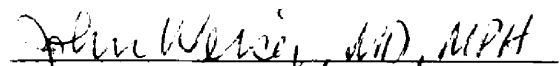
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## ABSTRACT

**Objective:** The primary objective of this study was to test an existing theoretical model of collaborative practice among HIV primary care providers (PCP) and case managers and determine which factors play the most important role in facilitating collaboration.

**Design:** A cross-sectional survey measured participant, context, and exchange factors that influence collaborative practice using a self-administered, anonymous mail survey.

**Subjects:** HIV PCPs and case managers working in New York City in ambulatory care settings.

**Methods:** An adapted survey instrument elicited information on respondent demographic characteristics. Contextual variables included administrative support, professional interaction, and coordinating mechanisms. Exchange factors to capture social exchange included trustworthiness, role specification, and relationship initiation. The dependent variable, case manager/HIV PCP perceptions of collaborative practice, was adapted mainly from the Collaboration and Satisfaction About Care Decisions scale. A hierarchical regression model specifying variable entry order examined the relative importance of each group of factors and of individual variables.

**Results:** Social exchange factors, including trustworthiness, relationship initiation, and role specification, were the dominant drivers of collaboration. Relationship initiation was the most important predictor of collaborative practice. Additional influential factors included organizational leadership support of collaboration, specific practice settings, and frequency of interdisciplinary meetings (quarterly). Dyads that worked for the same organization had a negative and significant influence on collaborative practice.

**Conclusion:** Identifying the most influential predictors of collaboration will help providers and organizations in their structural, hiring, and training strategies to foster effective social exchanges and to adapt organizational factors to promote collaborative working relationships. Future research will need to focus on how HIV PCP-case manager collaboration affects intermediary process outcomes (e.g., provider satisfaction, employee turnover) and health outcomes and organizational performance.

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## LIST OF ABBREVIATIONS

ADAP	AIDS Drug Assistance Program
ADC	Adult Day Care
AIDS	Acquired Immune Deficiency Syndrome
ANOVA	Analysis of Variance
ASO	AIDS Service Organizations
CBO	Community Based Organization
CDC	Centers for Disease Control and Prevention
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CHCC	Community Health Care Center
CMSA	Case Management Society of America
COBRA	Community Follow-Up Program (Medicaid)
CPS	Collaborative Practice Scale
CSACD	Collaboration and Satisfaction About Care Decisions
CTHP	Care, Treatment and Housing Program
CWR	Collaborative Working Relationship
DAC	Designated AIDS Center
DAT	Decision About Transfer
DOHMH	Department of Health and Mental Hygiene
EFA	Exploratory Factor Analysis
FY	Fiscal Year
HAART	Highly Active Antiretroviral Therapy
HAB	HIV/AIDS Bureau
HI	High Intensity
HIV	Human Immunodeficiency Virus
HIV PCP	HIV Primary Care Provider
HREI	Health Role Expectations Index
HRSA	Health Resources and Services Administration
ICU	Intensive Care Unit
IRB	Institutional Review Board
IV	Independent variable
IWS	Index of Work Satisfaction
LGBT	Lesbian Gay Bisexual Transgender
LI	Low Intensity
LOS	Length of Stay
MICU	Medical Intensive Care Unit
MJP	Maximum Joint Profit
ML	Maximum Likelihood
MODE	Management of Difference Exercise
MSM	Men Who Have Sex With Men

NNFI	Non-Normed Fit Index
NVASRS	National Veterans Affairs Surgical Risk Study
NYC	New York City
PPCI	Physician/Pharmacist Collaboration Instrument
RCT	Randomized Controlled Trial
RMSEA	Root Mean Squared Error of Approximation
SD	Standard deviation
SRMR	Standardized Root Mean Square

## ACKNOWLEDGEMENTS

This dissertation was a unique journey that was filled with many highs and lows. In light of this, I learned a great deal and developed on an individual and professional level. This dissertation would not have been possible without the help and support of many parties including my dissertation committee, colleagues, friends, family, and husband.

I am indebted to Dr. Claudia Campbell, the chair of my dissertation committee, for her careful reading of my dissertation, supervision, excellent advice, and insightful feedback. I could not have asked for a better mentor; Dr. Campbell's wisdom, dedication, and support during this process will never be forgotten. I also want to extend a very special thanks to Dr. Arti Shankar for her statistical guidance, expertise, and patience. Working on a dissertation from a distance is never an easy task; I am grateful for the numerous conference calls, meetings, and e-mail correspondence that I had with Drs. Campbell and Shankar. On the same note, I want to acknowledge the other members of my dissertation committee—Dr. John Weiser and Dr. Richard Culbertson for their time and guidance. It truly was a pleasure to work with my dissertation committee and for that I am grateful.

Thanks are due to the New York City Department of Health & Mental Hygiene's HIV Care, Treatment and Housing Program for allowing me to conduct this study. My

heartfelt thanks go to Dr. Fabienne Laraque, the Director of HIV Care, Treatment and Housing Program, for giving me the opportunity to conduct a study that I could use for my dissertation. I am also thankful for Dr. Laraque's feedback on my survey and numerous conceptual conversations.

I would also like to acknowledge Dr. Alan J. Zillich and his colleagues and Dr. Judith G. Baggs for allowing me to adapt their instruments. I also want to recognize Marthe K. Sende, who worked as a research assistant and helped me with survey administration and database management, and brought humor to the dissertation process. Additionally, I want to recognize the HIV primary care providers and case managers in New York City that set aside time to complete the survey.

Most importantly, the support of my family and friends made it possible for me to undertake such a daunting endeavor. A very special thanks goes to my in-laws, Tony and Carol Mavronicolas, whose encouragement, love, and moral support helped me persevere through difficult times. Last, I owe my deepest gratitude to my husband, Greg Mavronicolas, for his support, understanding, and unconditional love. My husband never gave up on me and believed in my ability to complete this dissertation. He read parts of my dissertation, listened to my presentations, provided moral support, and helped me with many other tasks that I could not complete when I was bogged down with dissertation work. I am forever grateful for his tolerance of the wide range of emotions that this dissertation evoked and for encouraging me to overcome many challenges along the way.

## DEDICATION

To my husband, Greg Mavronicolas, whose unwavering love and support made it possible for me to complete this work.

## Chapter 1: Background and Significance

Since the advent of highly active antiretrovirals (HAART) in 1996, life expectancy, quality of life, and patient care have improved tremendously for HIV-infected persons (also referred to as persons living with HIV/AIDS or PLWHA) (Antiretroviral Therapy Cohort Collaboration, 2008; Hammer et al., 2008; New York City Department of Health and Mental Hygiene [NYC DOHMH], 2008a). HIV is now characterized as a chronic disease rather than a fatal and catastrophic disease, contingent upon adequate adherence to treatment and care (Bangsberg, 2008). Despite these advances, many challenges remain. Disparities in prevalence, incidence, access to care and treatment, and survival persist among ethnic/racial minorities, the homeless or unstably housed, substance users, individuals with mental illnesses, and those with low socioeconomic status in the U.S. (Bing et al., 2001; Bogart et al., 2006; Fremont et al., 2007; H. I. Hall, Byers, Ling, & Espinoza, 2007; H. I. Hall, McDavid, Ling, & Sloggett, 2006; NYC DOHMH, 2008a; Rumpitz et al., 2007; Shapiro et al., 1999; Tobias, Cunningham, Cunningham, & Pounds, 2007). Moreover, adequate adherence to antiretroviral regimens is challenging for many PLWHA, even for individuals who do not face psychosocial, logistical or biological difficulties (Golin et al., 2002).

Improvements in HIV care and treatment are not without challenges, especially given the fact that adherence to HIV medications is long-term and often consists of a complex medication regimen (Eldred & Malitz, 2007). In light of this, many factors can exacerbate the likelihood of treatment failure including psychological, social and health issues such as substance abuse, housing instability, mental illnesses, concurrent

diagnoses of chronic disease, and poverty. Many PLWHA face a range of social and physiological issues which make medication adherence and retention in care difficult. With this in mind, HIV case management is beneficial for PLWHA with multiple health and psychosocial needs. Case managers coordinate medical and social services, help patients achieve treatment goals, identify resources for patients, and support patients in becoming self-sufficient. Many studies demonstrate that the provision of HIV case management activities can improve health outcomes, improve medication adherence, and increase primary care utilization ("Adherence strategies.," 2008; Cabral et al., 2007; Gardner et al., 2005; Giordano et al., 2007; Katz et al., 2001; Kushel et al., 2006; Magnus et al., 2001; Messeri, Abramson, Aidala, Lee, & Lee, 2002; B. D. Morgan & Rossi, 2007; Snyder, Kaempfer, & Ries, 1996).

The complex nature of many health problems, particularly chronic illnesses, underscores the need for interdependence among health care providers to coordinate, cooperate, and jointly plan patient care (D'Amour, Ferrada-Videla, San Martin Rodriguez, & Beaulieu, 2005; B. D. Morgan & Rossi, 2007; San Martin-Rodriguez, Beaulieu, D'Amour, & Ferrada-Videla, 2005; Schurmans & McCrank, 1997; Stichler, 1995; Wells, Johnson, & Salyer, 1998). The act of collaboration is a process whereby health care professionals and teams work in unison rather than in parallel, with the goal of maximizing expertise and resources to provide the most optimal quality patient care in an efficient manner (Arcangelo, Fitzgerald, Carroll, & Plumb, 1996; Baggs & Schmitt, 1988; Fagin, 1992; Weiss & Davis, 1985). Collaboration has been advocated by many as a solution to curb health care costs, improve coordination of care, reduce duplication of services, improve health-related outcomes, and promote employee job satisfaction (Fewster-Thuente & Velsor-Friedrich, 2008; Henneman, Lee, & Cohen, 1995; McKay & Crippen, 2008; Stapleton, 1998; Wells et al., 1998).

Collaboration is particularly relevant in the context of HIV/AIDS ambulatory care. The complex interplay of psychosocial, logistical, and biological factors significantly affects morbidity and mortality among HIV-infected individuals. The benefits of HAART are often weakened or negated by high-risk behaviors, poor treatment adherence, and psychosocial issues (H. I. Hall et al., 2007). PLWHA receiving suboptimal care or at risk of suboptimal care have the potential to benefit from collaborative practice among case managers and HIV primary care providers (PCPs). Collaborative care is one intervention that may improve treatment adherence, improve access to and retention in care, and reduce morbidity. Collaborative practice may significantly improve HIV patient care, thereby reducing morbidity and mortality. One way to conceptualize collaboration between an HIV case manager and HIV PCP can be illustrated as a “split treatment” (B. D. Morgan & Rossi, 2007, p. 78) in which one provider manages the clinical treatment and the other manages the coordination of social support services and medication adherence. Collaboration occurs when the HIV PCP and case manager plan together, make decisions jointly, cooperate, and coordinate care.

New York City (NYC) is home to one of the largest HIV/AIDS epidemics in the United States (Centers for Disease Control and Prevention [CDC], 2008b). The city has a significant number of disenfranchised PLWHA who receive intermittent, suboptimal care. Moreover, ethnic, racial, and geographic disparities are marked in AIDS-related mortality and increase the risk of progression to AIDS in NYC (Karpati et al., 2004; Laraque & Weglein, 2008; NYC DOHMH, 2008c). Specifically, PLWHA in NYC have high rates of delayed entry in care and discouraging rates of care interruption (Laraque



& Weglein, 2008).<sup>1</sup> HIV service fragmentation is one possible explanation for the large proportion of PLWHA that are not receiving adequate HIV care in NYC (D. Weglein, personal communication, September 16, 2008).<sup>2</sup>

Suboptimal care may be related to the quality of the relationship between HIV primary care providers (PCPs) and case managers. The state of the HIV epidemic in NYC calls for more drastic measures to improve patient care. A better understanding of the relationship between the HIV PCP and case manager is needed to elucidate the antecedents of HIV PCP-case manager collaboration. When a patient faces a health condition such as HIV, which is chronic and complex in nature, collaboration between HIV case managers and HIV primary care could facilitate timely and appropriate HIV care and treatment. PLWHA can benefit from the specialized knowledge and skills of HIV PCPs and case manager teams. Collaboration allows two providers to work together and use their respective expertise to provide quality, patient-centered care.

In order to meet the complex health and social needs of PLWHA, HIV PCPs and case managers should work collaboratively to facilitate seamless information sharing, patient care planning, joint decision making, and cooperation in managing the patient's care plan (Snyder et al., 1996). The focal point of collaboration is working together; therefore, the relationship between providers commands center attention (D'Amour et al., 2005). Providers do not work in a vacuum: organizational elements may encourage

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<sup>1</sup> Based on unpublished data from the New York City Department of Health and Mental Hygiene, HIV Epidemiology and Field Services Program, Feb. 2008.

<sup>2</sup> Daniel Weglein, MD, MPH is the Director of Public Health Practice for the Care, Treatment & Housing Program (CTHP), Bureau of HIV/AIDS Prevention & Control, NYC DOHMH.

or deter collaborative initiatives, and provider characteristics may also play a role in collaborative efforts.

A cross sectional study was employed to test an existing theoretical model of collaborative working relationships (McDonough & Doucette, 2001) among a case manager-HIV PCP dyad. Anonymous mail surveys were sent to case managers and HIV PCPs that worked in HIV ambulatory settings in NYC. The study adapted an instrument from Zillich, McDonough, Carter, and Doucette (2004) and Baggs (1994) to determine the influence of participant, context, and social exchange factors in explaining collaboration. The dependent variable, collaborative practice, was largely adapted from work by Baggs (1994) and measured shared responsibilities for planning, shared decision-making, cooperation, coordination, and concern for other's interests. A hierarchical regression model specifying variable entry order examined the importance of participant, context, and exchange variables. Psychometric testing assessed internal consistency reliability (Cronbach's alpha) and construct validity (using confirmatory and exploratory factor analysis). The hypothesis was that the social exchange variables (e.g., bi-directional communication, trust, mutual dependency, and helpfulness) would play the most important role in explaining collaborative practice. Testing McDonough & Doucette's (2001) model in an HIV ambulatory setting validated the model's utility in explaining HIV PCP-case manager collaboration and determined which factors play the most important role in facilitating collaboration.

The next chapter will discuss literature that is relevant to the study of collaboration including an overview of collaboration and its measurement, a theoretical framework for the development of collaborative working relationships (CWR), and HIV case management. The third chapter will provide an overview of a study that will examine predictors, correlates, and measures of collaborative practice among HIV PCPs

and case managers and will outline the study's hypotheses, research questions, and research methods. The fourth chapter will discuss the research methods employed including participant recruitment, measurement of variables, and statistical analysis. Next, the findings of the statistical analyses will be presented in the fifth chapter. The sixth chapter will briefly summarize the study's findings and provide an interpretation of the findings. The last chapter will discuss potential implications of the findings for public health practice, the strengths and limitations of the study, and recommendations for future research.

## **Chapter 2: Literature Review**

The first goal of the literature review is to discuss the theoretical concepts that are important for understanding collaboration in health care. The literature review will then highlight studies that have evaluated the relationship between collaboration and provider, patient, and organizational outcomes. Next, the review will provide an overview of a theoretical framework developed by McDonough & Doucette (2001) for assessing collaborative practice and an examination of factors that have been shown to influence collaboration within a working dyad. A discussion of case management and bi-disciplinary collaboration will follow. Lastly, a discussion of gaps in the literature will also describe future areas of research to broaden the understanding of collaboration's role in health care.

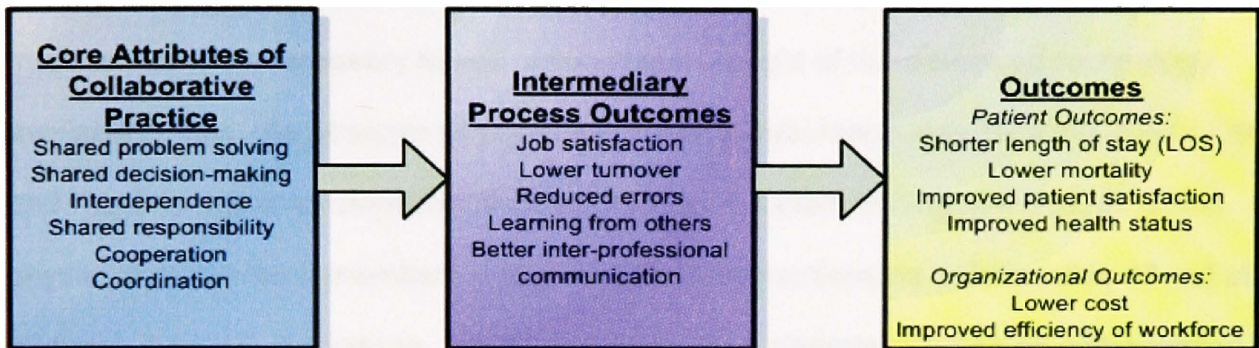
### **Concepts of Collaboration**

Collaboration is not simply the act of working together to deliver care, but rather involves a high degree of interdependent decision-making that draws on the strengths of different collaborative team members to determine the optimal course of patient care (Arcangelo et al., 1996; Baggs & Schmitt, 1988; Fagin, 1992; Silen-Lipponen, Turunen, & Tossavainen, 2002; Weiss & Davis, 1985). Collaboration is inherently a "complex phenomenon" (D'Amour et al., 2005, p. 117; San Martin-Rodriguez et al., 2005, p. 144). This complexity has led to different definitions and interpretations by many researchers and practitioners (Abramson & Mizrahi, 1996; Arcangelo et al., 1996; Baggs & Schmitt,

1988; Dechairo-Marino, Jordan-Marsh, Traiger, & Saulo, 2001; Fagin, 1992; Keleher, 1998; McDonald et al., 2007; McKay & Crippen, 2008; McMahan, Hoffman, & McGee, 1994; Merriam-Webster, 2009; Miccolo & Spanier, 1993; Public Health Service, Centers for Disease Control and Prevention, & The Health Resources and Services Administration, 2008; Stichler, 1995; Weiss & Davis, 1985; Wells et al., 1998; Zwarenstein, Bryant, Bailie, & Sibthorpe, 2000). A synthesis of the various interpretations of collaborative care suggests that collaborative practice is the synergy of expertise, cooperation, coordination, planning and decision making that reflects providers' interdependence and the reciprocal nature of caring for patients to provide the best care possible. The word "collaborate" originates from the Latin word *collaborare*, which means "to labor together" (Merriam-Webster, 2009). A 2008 publication developed by the Public Health Services (PHS), Centers for Disease Control and Prevention (CDC) and the Health Resources and Services Administration (HRSA) (2008) notes that collaboration is "A process that involves agencies or staff in joint work to develop and achieve shared goals and requires them to follow set protocols that support and complement each other's work" (p. 36).

**A model of collaboration.** Figure 2-1 displays a model of collaboration. The first dimension of the model consists of the core attributes of collaborative practice. Given that these collaborative processes have been successfully implemented, they will lead to intermediary process outcomes and subsequently will give way to patient and organizational outcomes (Baggs & Schmitt, 1997). The second dimension of the model consists of intermediary process outcomes including employee satisfaction, lower turnover, learning (Baggs & Schmitt, 1997), and reduced errors. The intermediary process outcomes will lead to the last dimension of the model, which includes patient

and organizational outcomes such as patient satisfaction, better patient outcomes (LOS, mortality, improved health status), and reduced cost. The next sections will discuss the dimensions of the model in greater detail.



**Figure 2-1 Model of Collaboration**

**Definition of collaboration.** Numerous definitions have been presented in the literature. Baggs and Schmitt (1988) perceive nurse and physician collaboration in the context of the intensive care unit (ICU) as “cooperatively working together, sharing responsibility for solving problems and making decisions to formulate and carry out plans for patient care” (p. 145). In the same vein, Miccolo & Spanier (1993) explain that,

True collaboration is a model in which there is a true partnership between parties, where mutual goal setting occurs, where authority and responsibility for actions belong to individual partners and where a deep commitment exists to the belief that patient care will be enhanced through working collaboratively. (p. 446)

Lamb & Napodano (1984) studied nurse practitioner and physician interactions and concluded that a small percentage (5 out of 22) of interactions were collaborative. The researchers taped nurse and physician primary care team interactions and looked for specific collaborative attributes. Their criteria for collaboration was defined as a “face-to-face interaction between team members in which there is a contribution of *each* person

to the problem-solving effort, and the integration of ideas which results in *new* assessment, problem definition, or plan” (Lamb & Napodano, 1984, pp. 26-27). Baggs and Schmitt (1988) argue that this definition is far too prohibitive in the sense that a new plan development is beyond the principles of collaboration and assert that face-to-face meetings are not necessary to fuel collaboration in light of the advanced technology available. Thus, the absence of physician-nurse collaboration may be attributed to Lamb and Napodano’s strict definition of collaboration. A salient finding of the study is that physician-nurse team members designated their interactions as collaborative 13 out of 22 times (Lamb & Napodano, 1984), indicating the moderate reliance on collaboration to coordinate patient care.

Based on prior conceptual work on conflict resolution that focuses on assertiveness and cooperativeness, Weiss and Davis (1985) offer another view of collaboration. They claim that it “attempts to find integrative solutions where both parties’ concerns are recognized and important concerns are not compromised. It merges the insights of persons with differing perspectives, and consensus is gained among those involved in the problem-solving effort through examination and working through of reservations regarding particular aspects of the decision” (p. 299-300). There is a convergence in the literature with respect to the most critical attributes of collaborative practice. These recurrent attributes of collaboration include: shared problem solving, shared decision making, interdependence, shared responsibility, cooperation, and coordination.

### **Core attributes of collaboration.**

***Shared problem solving and shared decision making.*** Shared problem solving and shared decision making are integral to effective collaborations (Baggs & Schmitt, 1988; McKay & Crippen, 2008; Silen-Lipponen et al., 2002; Weiss & Davis, 1985). Problem solving allows the participants to achieve an important goal of collaboration, which is to use the combined expertise of participants to improve patient care (Baggs & Schmitt, 1988; McKay & Crippen, 2008; Miccolo & Spanier, 1993; Weiss & Davis, 1985; Wells et al., 1998). Weiss and Davis (1985) explain that collaborative practice entails “interactions between nurse and physician that enable the knowledge and skills of both professionals to synergistically influence the patient care being provided” (p. 299). Integrating solutions that recognize the expertise and concerns of both parties is inherent to collaboration (Weiss & Davis, 1985). Lamb and Napodano (1984) describe collaboration as a “face-to-face interaction between team members in which there is a contribution of *each* person to the problem-solving effort, and the integration of ideas which results in a *new* assessment, problem definition, or plan” (pp. 26-27). McMahan et al. (1994), however, argue that collaboration does not require face-to-face meetings. Collaboration is more than coordination (Baggs & Schmitt, 1988; Lamb & Napodano, 1984) because it involves shared decision making (Baggs & Schmitt, 1988; McKay & Crippen, 2008; Miccolo & Spanier, 1993; Silen-Lipponen et al., 2002; Wells et al., 1998). According to McKay and Crippen (2008) and Miccolo and Spanier (1993), problem solving and shared decision-making go hand-in-hand because both participants are striving for the same goal of improving patient care. In the context of physician and nurse collaboration, Weiss and Davis (1985) conceptualized collaboration as based on interpersonal behaviors necessary to achieve conflict resolution such as assertiveness and cooperativeness. Lewis (1985) explain that the act of collaboration is



distinct from consultation; Lewis notes that “collaboration involves working together to plan and implement, while consultation involves sharing only during the planning phase” (as cited in Baggs & Schmitt, 1988, p. 146).

***Interdependence of actors.*** An intrinsic part of collaboration is the interdependence of participants. In the context of nurse and physician collaboration, Fagin (1992) stresses that collaboration calls for actors to recognize that they have “complementary roles” instead of roles based on a hierarchy. The notion of interdependence is also related to the reciprocal (ongoing) nature of work processes focusing on coordination—for instance, a case manager helps to coordinate care and may also provide treatment adherence counseling and advocacy while the physician is responsible for overseeing the health of patients. Thompson refers to this type of interdependence as reciprocal interdependence, because “outputs of each become inputs for the others” (Thompson, 1976, p. 55). This conveys a complex reliance on each other to complete an operation (Thompson, 1976). This is illustrated in a situation when a case manager assists a patient with treatment adherence while the PCP handles the clinical aspect of care (e.g., virologic assessment and medication planning). Fagin (1992) asserted that if health professions do not recognize the intersection of their disciplines, it will be “destructive” (p. 302) to respective disciplines in the health care system and patients. Baggs and Schmitt (1988) point out that even though the actors may be interdependent, power often still resides with physicians because they can write an order without nurse consent and not vice versa.

**Cooperation, coordination & shared responsibility.** Cooperation, coordination, and shared responsibility are core elements of collaboration. First, shared responsibility underscores the notion of interdependence of the actors because both actors are dually responsible for patient care (Abramson & Mizrahi, 1996; Baggs & Schmitt, 1988; Corry, Williams, & Stapleton, 1997; Miccolo & Spanier, 1993; Silen-Lipponen et al., 2002; Stichler, 1995). Second, actors must coordinate patient care because autonomous action hinders collaborative practice (Arcangelo et al., 1996; Baggs, 1994; Baggs & Schmitt, 1988). Finally, cooperation entails working and planning with others to help each other care for patients (Arcangelo et al., 1996; Baggs & Schmitt, 1988; Miccolo & Spanier, 1993). According to Arcangelo et al. (1996), “*Cooperation and coordination* promote the use of the skills of all team members, prevent duplication, and enhance productivity of the practice” (p. 107). Wells (1998) suggests that collaboration entails “communication and a balance between cooperation and assertiveness that results in a coordinated plan of care” (p. 162).

**Measuring collaboration.** Several instruments have been developed to measure collaboration (Dougherty & Larson, 2005). The discussion below focuses on three instruments that measure bi-disciplinary collaboration.

**Collaborative practice scales (CPS).** Weiss and Davis (1985) developed the Collaborative Practice Scales (CPS) to measure nurse and physician interactions “that enable the knowledge and skills of both professionals to synergistically influence the patient care being provided” (p. 299). The CPS is made of two separate scales—one for physicians and one for nurses. Both scales are scored on a 6-point Likert scale where 1

= never and 6 = always. Higher scores reflect higher collaborative practice from the nurse or physician perspective based on their own work interactions. The nurse scale consists of nine items while the physician scale has ten items. Drawing on work by Blake and Mouton (1961), Blake, Shepard, and Mouton (1964), and Hall (1969) (as cited in Thomas, 1976, p. 900), Thomas (1976) proposed that collaborative orientation is distinguished by dyadic behavior that is cooperative (desire to satisfy other's concern) and assertive (desire to satisfy own concern). Weiss and Davis (1985) describe this problem-solving orientation as one that "attempts to find integrative solutions where both parties' concerns are recognized and important concerns are not compromised" (p. 299). Weiss and Davis (1985) use this framework of collaborative behavior and other relevant literature to conceptualize collaboration in the CPS. Items in the CPS measure physician and nurse relationship with a focus on the assertiveness of each party, integrative problem solving process, and respect for the other party's involvement. Weiss and Davis (1985) conducted psychometric testing of the CPS using a random sample of 95 nurses and 94 physicians.

*Construct validity.* Weiss & Davis (1985) evaluated construct validity by assessing factor loading of the principal axis analysis and confirmed that two factors made up the nurse and physician scales.

*Concurrent validity.* Concurrent validity was evaluated (Weiss & Davis, 1985) by comparing the results of the CPS with results of participants' scores on two other instruments: Health Role Expectations Index (HREI) and the Management of Difference Exercise (MODE). MODE and HREI instruments also measure similar attributes of

collaboration. The CPS was correlated with the HREI for nurses ( $r_s = 0.25, p < 0.01$ ); however, the physician CPS scores were not significantly correlated with the HREI. Nurse CPS scores were not correlated with MODE while one factor in the physician CPS was significantly correlated with MODE ( $r_s = 0.22, p < 0.05$ ).

*Predictive validity.* Predictive validity was assessed by inter-observer evaluation. Nurse colleagues evaluated physicians' work interactions and physicians evaluated nurses and rated their inter-professional practice (Weiss & Davis, 1985). CPS retest scores for physicians and their nurse evaluators' scores were significantly correlated ( $r_s = 0.42, p < 0.02$ ). The physician CPS scores were significant predictors of the nurses' reported observations of physicians' actual practice. Predictive validity was not established for the nurses' CPS scores; the physician evaluation of nurses' inter-professional interactions were not correlated with nurses' CPS scores. Moreover, nurses' CPS scores were not predictive of their peers' scores based on their actual practice.

*Reliability.* Test-retest was used to evaluate reliability. Spearman coefficients were 0.79 for nurses and 0.60 for physicians' scales (Weiss & Davis, 1985). Reliability was also calculated using Cronbach's alpha using Test-retest, and values ranged from 0.83 for nurses scale to 0.85 for physicians scale (Weiss & Davis, 1985).

***Decision about transfer (DAT).*** The Decision About Transfer (DAT) instrument measures nurse and physician collaboration and satisfaction with regard to a specific

decision to transfer a specific patient (Baggs & Ryan, 1990; Baggs, Ryan, Phelps, Richeson, & Johnson, 1992). The definition of collaboration used for the DAT was “open discussion between nurses and physicians and shared responsibility for problem solving and decision making” (Baggs et al., 1992, p. 19). The instrument included two questions: a global measure of collaboration and a global measure of the decision-making process (Baggs, 1994). The collaboration item was scored on a 7-point Likert scale where 1 = no collaboration and 7 = complete collaboration (Baggs, 1994). Similarly, the satisfaction item was scored on a 7-point Likert scale that ranged from 1 = not satisfied to 7 = fully satisfied. In order to calculate an average DAT score, scores on each transfer decision were summed and divided by the number of transfer decisions.

*Criterion related validity.* A study of 56 registered nurses and 31 medical residents in a medical intensive care unit (MICU) examined collaboration involved in transfer decisions. Baggs et al. (1992) reported that nurses' collaboration scores were significantly and positively related to better health outcomes. In contrast, residents' collaboration scores were not predictive of patient outcomes. A slight correlation between collaboration and satisfaction with how the decision was made was demonstrated ( $r = 0.10$ ). For the most part, nurses were more satisfied with the decision-making process ( $r = 0.67$ ,  $p = 0.000$ ) compared to residents who reported moderate associations of collaboration and satisfaction ( $r = 0.25$ ,  $p = 0.000$ ) (Baggs et al., 1992).

*Concurrent validity.* Concurrent validity was supported through comparing the average DAT scores to participants' scores on the CPS and the Index of Work

Satisfaction (IWS)—instruments that measure collaboration and satisfaction (Baggs et al., 1992). The CPS was given to nurses and residents while the IWS was only administered to nurses. The average DAT score on collaboration for nurses and residents was significantly and positively correlated with the CPS scores (nurses:  $r = 0.27$ ,  $p < 0.05$ ; residents;  $0.36$ ,  $p < 0.05$ ). Nurses' average DAT scores on satisfaction were also significantly and positively related to the IWS ( $r = 0.24$ ,  $p < 0.05$ ).

*Reliability.* Reliability for the DAT could not be evaluated since the instrument only consists of one item to measure collaboration involved in making specific decisions to transfer MICU patients and one item to measure satisfaction.

***Collaboration and satisfaction about care decisions (CSACD).*** In 1994, the Collaboration and Satisfaction About Care Decisions (CSACD) was developed by Baggs (1994) to measure decision-making with respect to ICU transfer decisions and provider satisfaction in the medical intensive care unit (MICU) between nurses and physicians. Baggs (1994) intended to improve the measurement of nurse-physician collaboration and satisfaction involved with making specific decisions to transfer MICU patients by improving the DAT instrument. Reliability could not be evaluated for the DAT and residents' average DAT scores were not related to patient outcomes (Baggs, 1994; Baggs et al., 1992). Moreover, there was only a slight correlation between nurses' and residents' scores on collaboration (Baggs, 1994; Baggs et al., 1992). The instrument is the culmination of prior models of collaboration. Two items from Baggs (1994) CSACD draw on work by Thomas (1976) and Weiss & Davis (1985). In consideration of the work by Thomas (1976) and Weiss and Davis (1985), Baggs (1994) identified co-

*operativeness* and *assertiveness* (interest for others and concern for self, respectively) as two critical attributes of collaboration. Baggs & Schmitt (1988) identified four other critical attributes of collaboration through a survey of related literature, including: *shared responsibilities for planning, shared decision making, open communication, and coordination* (Baggs, 1994). Baggs and Schmitt (1988) define collaboration in the context of ICU nurses and physicians as “cooperatively working together, sharing responsibility for problem solving and decision making, to formulate and carry out plans for patient care” (Baggs & Schmitt, 1988, p. 145). The original CSACD contains seven items related to collaboration: one measures the global collaboration and six items make up the collaboration subscale that measure the critical attributes of collaboration. The CSACD also includes two items that measure provider satisfaction with care decisions, an outcome of collaboration. The collaboration subscale includes the six critical attributes of collaboration and is scored on a seven-point Likert scale (1 = strongly disagree to 7 = strongly agree), and scores ranged from 7 to 49. Two additional questions on the CSACD concern satisfaction with the specific decision making process and with the decision made (Baggs, 1994). One item asks respondents about the amount of collaboration that occurred during the decision making process.

The brevity of the instrument was intentional, as it was designed to be administered to ICU providers while they work in the ICU (Baggs, 1994). **Table 2-1** shows the original CSACD by Baggs (1994). The item measuring global collaboration is scored from 1 = no collaboration to 7 = complete collaboration (Baggs et al., 1999). The items measuring satisfaction are scored 1 = not satisfied to 7 = very satisfied (Baggs, 1994). The instrument was later adapted to measure collaboration involved in discharge planning in a geriatric setting between a nurse, physician, and social workers (Fox & Heinemann, 2002).

Table 2-1 The Original CSACD

	Item	Critical Attribute of Collaboration
1	Nurses and physicians <i>planned together</i> to make the decision about care for this patient	Shared responsibilities for planning
2	<i>Open communication</i> between physicians and nurses took place as this decision was made for this patient	Open communication
3	<i>Decision-making responsibilities</i> for this patient were <i>shared</i> between nurses and physicians	Shared decision making
4	Physicians and nurses <i>co-operated</i> in making this decision	Co-operativeness (concern for other's interests)
5	In making the decision, both <i>nursing and medical concerns</i> about this patient's needs were considered*	Assertiveness (concern for one's own interests and consideration of other's interests)
6	Decision making for this patient was <i>co-ordinated</i> between physicians and nurses	Co-ordination
7	How much collaboration between nurses and physicians occurred in making this decision for this patient	Global measure of collaboration
8	How <i>satisfied</i> were you with the way this decision was made for this patient, that is with the <i>decision-making process</i> , not necessarily with the decision itself?	Satisfaction with decision-making process
9	How <i>satisfied</i> were you with the <i>decision</i> made for this patient?	Satisfied with decision

Note: Baggs, J. G. (1994). Development of an instrument to measure collaboration and satisfaction about care decisions. *J Adv Nurs*, 20(1), 176-182.

\*This wording was revised to reflect suggestions made by experts and subjects.

"Nurses and residents were asked to consider their most recent decision to transfer a patient they had cared for who had been transferred from the ICU to an area of less intense care."

Baggs' original CSACD has undergone rigorous psychometric testing and has strong theoretical underpinnings (Fox & Heinemann, 2002). A pilot study of a non-random sample of 58 NICU nurses and residents (Baggs, 1994) at a U.S. teaching



hospital in the northeast was implemented in order to assess the psychometric properties of the instrument.

*Content validity and face validity.* The development of the instrument was based on a thorough review of literature relevant to collaboration (Baggs, 1994). Furthermore, content validity was also supported by a review by 12 experts in collaborative practice. Baggs (1994) also had potential survey respondents, MICU staff nurses and attending physicians, review the instrument for content. The experts and MICU staff all agreed that the questions were relevant and adequately captured the definition of collaboration. The MICU staff affirmed that there would be sufficient variance and that they understood the questions (Baggs, 1994).

*Criterion-related validity.* Criterion-related validity, also known as concurrent validity, was demonstrated by the strong correlation between the six collaboration items and the global collaboration item ( $r = 0.87$ ) (Baggs, 1994).

*Construct validity.* The original CSACD has sufficient evidence of construct validity. A pilot study of the CSACD reported that the total score of the six critical attributes of collaboration and the total score for satisfaction were moderately correlated ( $r = 0.66$ ) (Baggs, 1994). The relationship between collaboration and satisfaction has been documented in previous work (Alt-White, Charns, & Strayer, 1983; Baggs et al., 1992). Construct validity was additionally supported by the expectation that there would be a differential relationship between collaboration and satisfaction with the decision

process and satisfaction with the decision itself (Baggs, 1994). This held true during validation testing; collaboration was more correlated with satisfaction with the decision-making process ( $r = 0.69$ ) compared to collaboration and satisfaction with the decision made ( $r = 0.50$ ) (Baggs, 1994).

Using principal factor analysis, Baggs (1994) confirmed that all six items of the collaboration subscale made up one dimension. The factor analysis also demonstrated that the six items were appropriate and well constructed. No differences were found between nurses and attending physicians when separate factor analyses were conducted (Baggs, 1994).

*Reliability.* Another strength of the CSACD instrument is its strong internal consistency and reliability. Cronbach's alpha for the six attributes of collaboration was 0.93. The unrotated factor analysis revealed that internal consistency reliability were excellent, and all factors loaded between 0.82 and 0.93 (Baggs, 1994; Fox & Heinemann, 2002). Moreover, the six items explained 75% of the variance in collaboration, and intercorrelations ranged from 0.523 to 0.83 (Baggs, 1994).

In 2004, Zillich et al. adapted work by Baggs (1994) to measure PCP and pharmacist collaborative practice (Doucette, Nevins, & McDonough, 2005). Zillich et al. (2004) included five items from Baggs (1994) original CSACD. **Table 2-2** shows the collaborative practice scale adapted by Zillich et al. (2004). According to A. J. Zillich (personal communication, February 25, 2009), the measure was pilot tested with experts on relationship development and they also performed a factor analysis. Zillich et al. conducted validation testing which revealed adequate psychometric properties (A.J.

Zillich, personal communication, February 25, 2009); the results have not been published.

**Table 2-2 Collaborative Practice Scale**

	Item*	Critical Attribute of Collaboration
1	I work with this pharmacist to plan the goals of drug therapy for our patients.	Shared responsibilities for planning
2	Decision-making responsibilities for our patients' drug therapy are shared between the pharmacist and me.	Shared decision making
3	There is cooperation between this pharmacist and myself in managing the drug therapy of our patients.	Co-operativeness (concern for other's interests)
4	In making decisions for our patients, physician and pharmacist opinions are considered.	Consideration of both physician and pharmacist concerns
5	Decision making for this patient is coordinated between the pharmacist and me.	Co-ordination

Note: Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770.

\*Scored on a 7-point Likert scale where 1 = very strongly disagree and 7 = very strongly agree.

**Expected benefits of collaboration.** A great deal of research has focused on the value and importance of collaboration in health care. The scholarly literature offers evidence that the employment of interdisciplinary teams, nurse-physician collaboration and physician-pharmacist collaboration are beneficial for patient care and organizational performance (Baggs & Schmitt, 1988; D'Amour et al., 2005). Outcomes related to collaboration include patient health outcomes, decreased cost in providing care, increased job satisfaction of caregivers, and decreased length of stay (Baggs & Schmitt, 1997; Gattis, Hasselblad, Whellan, & O'Connor, 1999; Stichler, 1995). Studies have identified a number of ways a nurse and physician can benefit from working together.

Assuming collaboration has been successfully implemented, the expected benefits may include job satisfaction of nurses, job satisfaction of residents or physicians, lower turnover, reduced duplication of work, and better patient care (Arcangelo et al., 1996; Miccolo & Spanier, 1993; Stichler, 1995). Other outcome measures that collaboration may influence include attitude and behavioral changes of health practitioners that improve intra-group processes such as communication, respect and power dynamics (Zwarenstein et al., 2000). Collaborative care models are also germane to ICUs, where successful interaction between providers is essential for optimal patient care (Baggs & Ryan, 1990; Baggs & Schmitt, 1988, 1997; Baggs et al., 1997; Baggs et al., 1999).

Although some studies show that collaboration offers various benefits to the patient, provider and health care system at large, there is evidence that the outcomes of collaborative care models are not always positive. In a review of literature on collaboration, Baggs and Schmitt (1988) recounted claims that collaboration was more time consuming because it relied on communication and coordination between collaborators. Negative aspects of nurse-physician collaboration are twofold: "Nurses may also feel threatened by the increased responsibility and accountability crucial to collaboration" (Baggs & Schmitt, 1988, p. 146). At the same time, physicians may deem collaboration as compromising their autonomy, otherwise referred to as "turf" invasion (Baggs & Schmitt, 1988, p. 146).

***Evidence of benefits of improved collaboration using multi-disciplinary teams.*** A randomized controlled trial (RCT) attributed improved patient care outcomes to team collegiality by means of interdisciplinary teamwork (Feiger & Schmitt, 1979). The researchers assigned diabetic patients in a residential facility to receive either

interdisciplinary care (experiment) or usual care (Feiger & Schmitt, 1979). Thirty patients in the experimental group were assigned to one of four patient care teams, and interaction patterns amongst providers (physicians, nurses and nutritionists) in the group were videotaped and analyzed to see if collegiality was correlated with patient outcomes. Feiger & Schmitt (1979) documented a positive relationship between ranking of team collegiality and patient outcomes (social functioning, physical function, participation function & emotional function). The construct of collegiality is similar to collaboration in the sense that team members coordinated decision making and formulated care plans together based on each team member's contribution to the discussion of patients. However, Baggs and Schmitt (1988) point out that collegiality has no hierarchical social distinction in group status, problem solving or participation, whereas collaboration among nurses and physicians entails these features because the physician maintains power and legal responsibility to authorize and override patient care plans.

The findings of Rubenstein and colleagues (1984) showed that interdisciplinary health care teams can improve patient mortality and lower hospital costs. The researchers conducted a randomized controlled trial in a Veterans Administration Medical Center to test the effectiveness of a geriatric-specific inpatient evaluation unit. The geriatric inpatient unit was designed to provide care tailored to the elderly, with a focus on diagnostic tests, rehabilitation, and interdisciplinary teamwork. The researchers introduced interdisciplinary weekly team meetings to monitor and plan patient care for 63 elderly inpatients in an effort to provide more comprehensive care for patients who no longer required acute care but needed to be hospitalized nonetheless. Members of the interdisciplinary team included attending physicians, social workers, nurses and physicians assistants. Sixty patients in the control group received regular care in an acute care unit. Study participants were followed for two years. After one

year, patients in the experimental group had substantially lower mortality compared to elderly who were in the regular care wards (23.8% in experimental and 48.3% in control,  $p < 0.005$ ). A substantial decrease in annual mean institutional costs was also apparent in the experimental group after one year (\$22,597 vs. \$27,826 in the control group), after controlling for differences in survival. The study also concluded that patients in the control group experienced more acute care hospital days and hospital readmissions.

In a review of interventions to promote collaboration between nurses and physicians (dyad or within a multidisciplinary team) for the Cochrane database, Zwarenstein et al. (2000) identified two interdisciplinary team studies that utilized rigorous methodology to assess the impact of an intervention to improve collaboration and found that they had a positive effect on care process outcomes. However, these interventions were not guided by a theoretical framework of antecedents or barriers to interdisciplinary collaboration (Zwarenstein et al., 2000). Even so, an examination of these studies may enhance our understanding of the causality between collaboration and outcomes. Zwarenstein et al. (2000) identified two intervention studies aimed at improving collaboration between doctors and nurses that met their inclusion criteria for a Cochrane review on collaboration. The two studies reviewed did not report any statistically significant differences in mortality rates but reported significantly shortened length of stay, improved staff satisfaction, and reduced hospital charges (Curley, McEachern, & Speroff, 1998; Jitapunkul et al., 1995).

Jitapunkul et al. (1995) showed that providers were satisfied with an intervention to introduce a multidisciplinary team approach and enhance collaboration between nurses and physicians but that the intervention failed to show improvements in LOS, mortality rates or expenditures. The study was conducted in a Thai academic hospital and compared 199 female patients in an intervention ward to 218 female admissions in

the control ward.<sup>3</sup> The intervention consisted of ward rounds four days per week and weekly interdisciplinary team case conferences (attended by a medical consultant, nurses, psychiatrists and a rehabilitation team). Both ward rounds and team meetings stressed joint planning. The study did not report any significant differences between the intervention and control wards in total average length of stay or mortality rates.

However, after Jitapunkul and associates excluded patients who died in the hospital, the collaborative unit had a reduction in the total average length of stay (intervention ward = 10.5 days, control ward = 11.9 days); however, it was not statistically significant. A questionnaire measuring the intervention group's satisfaction with collaboration and the suitability of standardizing the intervention into regular care showed that team members were satisfied with the interventions and believed the approaches could be implemented into regular care.

Curley and associates (1998) conducted a six month randomized controlled firm trial<sup>4</sup> from 1993-1994 in a 742-bed tertiary academic hospital in Ohio. As part of a quality improvement initiative, a team of medical interns, nurses, and other health professionals developed an intervention based on an analysis of their work process using flow charts. The continuous quality improvement team identified that the

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<sup>3</sup> The researchers did not clarify how the study participants were randomized.

<sup>4</sup> Cebul (1991) describes MetroHealth's Firm System, which was implemented in the early 1970s. The Firm System divides the Department of Medicine into three firms (group practices) including inpatient and outpatient services, which have a similar mix of providers and patients. Provider and patient assignment to firms is random. Patients are randomly assigned at their first encounter with the Department of Medicine and receive ongoing care in the firm to which they were assigned. Residents are randomly assigned to a firm when they commence their training program. Parallel teams of providers treat similar patients, because patients are randomly assigned to firms. The random assignment of providers and patients to firms allows for clinical trials and quality improvement research.

“interactions among physicians, nurses, and other services were minimal and episodic throughout the day” (Curley et al., 1998, p. AS5). Three wards participating in the experimental group held daily, formal interdisciplinary rounds in which physicians, registered nurses (patient care coordinator), pharmacists, nutritionists and social workers met to discuss and jointly plan patient care.<sup>5</sup> The other three wards continued traditional work rounds with physicians only and held weekly multidisciplinary rounds attended by social workers, nutritionists and interns. 567 patients were randomized to the experimental group and 535 patients received traditional care. The study showed that patients in the experimental group had a briefer average length of stay (LOS) (5.46 compared to 6.06  $p = 0.006$ ) and lower average total charges (\$6,681 compared to \$8,090  $p = 0.002$ ) than the patients in the control wards. These differences remained significant after the researchers controlled for patient baseline characteristics in a multivariate regression analysis on the logarithmic transformation of LOS and total charges using propensity scores.<sup>6</sup> Despite the experimental group's shorter LOS and lower hospital costs, the experimental and control groups did not differ significantly on patient mortality rates or hospital discharges to home and skilled nursing facility. In addition, the study assessed a subset of providers' level of satisfaction mid-way through the study and found that providers in the experimental group (nurses, physicians, and

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<sup>5</sup> The Department of Medicine at MetroHealth Medical Center in Ohio has three firms. Each firm maintains its own outpatient and inpatient services. The ward is part of inpatient firm; each ward has two physician teams or ward services.

<sup>6</sup> Log transformation of LOS and total charges was performed to address the skewedness of data or outliers. Significant differences between intervention and control groups remained when using the logarithmic transformation or average values (Curley et al., 1998).



ancillary staff) reported better communication, utilized more of a team approach and had a greater understanding of patient care in comparison to the control group.

A study by McKay & Crippen (2008) identified an association between an intervention to promote system-wide collaboration and lower hospital expenditures and LOS. The study evaluated an intervention in a 375-bed acute health care system to examine whether structural changes and work process changes shorten the average LOS and reduce costs (McKay & Crippen, 2008, p. 112). The study utilized the theoretical Donabedian framework of structure-process-outcome to guide the intervention and analysis. The study defined collaboration as “an interdisciplinary process of problem solving, shared responsibility for decision making, and the ability to carry out a plan of care while working toward a common goal” (McKay & Crippen, 2008, p. 110). The intervention was multi-faceted; a structural intervention introduced unit-based case managers and social workers and clarified the role of providers. Process changes included the development of a CareGraph, a tool used to communicate across different disciplines, and initiated interdisciplinary care meetings with the aim of joint decision making, problem solving and planning. Preliminary results revealed that the average LOS decreased from 4.24 days to 3.37 days. Decreased admission costs were also evident as the cost per admission dropped from \$6,723 to \$5,519 in a year’s time. No substantial impact was found on the readmission rate (McKay & Crippen, 2008). Results showed that global patient satisfaction also improved within a year.

***Evidence of benefits of improved collaboration using bi-disciplinary teams.***

*Nurses and physicians.* Due to the paucity of rigorous studies to substantiate the effects of collaboration among a dyad in health care, we must rely on less methodologically

sound research studies. In these exploratory and observational studies, collaboration is related to improved job satisfaction, better health-related outcomes and health care efficiency. This review relies heavily on the work of Baggs and Schmitt, who have conducted multiple observational studies of the physician-nurse dyad with respect to collaboration and health-related outcomes.

In a correlational study of 446 nurses from 46 patient care units in a large, teaching hospital, Alt-White et al. (1983) examined the personal, organizational and managerial factors that affect nurse-physician collaboration. The results of the research suggest that there is a weak significant and positive association between nurse-physician collaboration and satisfaction ( $r = 0.26$ ,  $p < 0.001$ ). The operationalization of measuring collaboration through a self-administered questionnaire was not articulated by Alt-White and colleagues (Alt-White et al., 1983; Baggs & Schmitt, 1988); however, the results offer some evidence that personal, organizational and managerial factors do affect collaboration. Demographic factors related to collaboration included years of nursing experience. Alt-White and colleagues (1983) found a weak inverse relationship between years of nursing and nurse-physician collaboration. Interestingly, the researchers did not find a significant relationship between education and collaboration. Organizational factors positively and significantly associated with collaboration included primary nursing and critical care units. Managerial factors attributed to collaboration included open communication, organizational support for work (equipment and supplies) and approaches to coordination including standardization of work, standardization of skills, and feedback (also referred to as mutual adjustment).

Knaus, Draper, Wagner and Zimmerman (1987) conducted a prospective, observational investigation of 5,030 patients in ICUs at 13 tertiary hospitals to determine whether structure and processes of care have an impact on effectiveness of care. The

researchers concluded that a hospital's effectiveness of care (measured by a difference between predicted and actual patient mortality) was associated with characteristics of nursing and physician interactions and to the degree of coordination between nurses and physicians?. The investigation found that the highest performing hospitals had effective coordination and communication as compared to the lower performing hospitals. The highest performing hospital's death rate was 41% lower than predicted. The lowest performing hospital reported that communication was difficult and intermittent. The study did not specifically operationalize collaboration, but the features of collaboration are apparent in the researchers' description of the construct (Baggs & Schmitt, 1988). The authors attributed hospital effectiveness largely to the interaction of unit staff rather than the administrative structure, amount of specialized treatment, or whether or not it was a teaching hospital.

An observational study of 66 registered nurses in a MICU at a northeastern university medical center did not find a significant relationship between a general measure of collaboration using the CPS developed by Weiss and Davis (1985) and a measure of general job satisfaction (Baggs & Ryan, 1990). However, when Baggs & Ryan (1990) measured collaboration with decision to transfer using the Decision About Transfer (DAT) questionnaire, they reported a significant and high correlation between collaboration in specific decision-making situation and satisfaction ( $r = 0.67$ ). Baggs and Ryan (1990) noted that this finding emphasizes the importance of collaboration for nurses (Baggs & Ryan, 1990). The researchers also attributed job retention one year later to satisfaction in specific decision making (Baggs & Ryan, 1990).

In the 1990's, several investigators in the nursing field examined physician and nurse collaborative care. A number of these studies demonstrated a positive effect of collaboration on patient outcomes, provider satisfaction, cost, mortality, and readmission

rates. Baggs et al. (1992) examined the relationship between nurse-physician collaboration and patient outcomes in a prospective, observational study of a medical intensive care unit (MICU). They defined collaboration as “open discussion between nurses and physicians and shared responsibility for problem solving and decision making” (Baggs et al., 1992, p. 19). The study was small: it measured 56 registered nurses and 31 medical residents in a large, northeastern university medical center from January-July 1989. The researchers used the DAT instrument to measure collaboration and satisfaction with specific decisions to transfer 286 patients out of the MICU and found that only nurses’ reports of collaboration were associated with positive patient outcomes, controlling for severity of illness. Nurses’ scores on collaboration were predictors of negative patient outcomes, meaning that as nurses’ reports of collaboration increase, negative patient outcomes decrease (Baggs et al., 1992)<sup>7</sup>. In contrast, the study did not report a relationship between residents’ measures on collaboration and patient outcomes. The study also provided evidence that collaboration is associated with satisfaction about decision making, demonstrating stronger satisfaction scores for nurses ( $r=0.67$ ,  $p=0.000$ ) compared to residents ( $r = 0.26$ ,  $p = 0.000$ ).

Another observational study of registered nurses and residents conducted in a MICU located in an urban tertiary hospital in the U.S. by Baggs & Schmitt (1995) found that collaboration in decision making was significantly and positively correlated to satisfaction scores with specific decisions on the level of aggressiveness of care. The

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<sup>7</sup> Readmission or death during same hospital admission.

researchers used the CSACD to measure perceptions of collaboration and satisfaction with respect to specific care decisions.

Baggs et al. (1997), in a longitudinal correlational study of three ICUs in upstate New York, demonstrated that nurses', residents', and attendings' reports of collaboration with decision making using the CSACD were significantly related to satisfaction, but the relationship was stronger among nurses (Baggs et al., 1997). All providers in the three ICUs reported moderate levels of collaboration, with a mean score of 28 (range from 7-49) (Baggs et al., 1997). Nurses and residents in a university hospital's surgical ICU reported lower perceived collaboration in decision making compared to their respective counterparts in a community teaching hospital ICU and a community mixed medical-surgical hospital ICU. However, unlike the results of Baggs & Ryan (1990), nurses' satisfaction did not predict nurse retention.

Baggs et al. (1999) measured the relationship between patient outcomes, including patient mortality and readmission to ICU, and collaboration in three ICUs (medical, surgical and a mixed ICU) in upstate New York using Baggs' CSACD (Baggs, 1994). The prospective observational study included attending physicians, resident physicians, and nurses. The main outcome variable of interest was the perceived level of collaboration with specific transfer decisions. The study only partially supported the hypothesis that collaborative practice is associated with improved patient outcomes (e.g., mortality) (Baggs et al., 1999). After controlling for severity of illness, only the reports of collaboration from nurses in the medical ICU were associated with positive patient outcomes in multiple logistic regression models. Baggs et al. (1999) suggest that because nurses associate more satisfaction with collaborative practice (Baggs et al., 1997), they may be more aware of collaboration when it takes place. Baggs et al. (1999) noted that nurses may be more sensitive to the indicator because they do not have the

power to make decisions autonomously (unlike physicians) and thus are in a position to influence decision making through collaboration. No relationship of collaboration and mortality or readmission to the ICU was found among resident and attending physicians or amongst nurses in the surgical and mixed ICU (Baggs et al., 1999). However, when the study examined a separate collaboration score, constructed by the presence of coordinating mechanisms such as integrated patient records, rounds, written policies to support collaboration, and interdisciplinary in-service, there was a positive relationship with patient outcomes (perfect rank order correlation). For example, the MICU had the highest collaboration score on coordination mechanisms and the lowest (best) ratio of actual negative outcome to predicted mortality.

In California, a multifaceted Collaborative Initiative (Initiative) used a pretest/posttest design to evaluate an intervention to foster collaboration between nurses and physicians (Dechairo-Marino et al., 2001). In 1993, the Initiative introduced interdisciplinary education, increased clinical and non-clinical staff communication through interdisciplinary rounds and weekly meetings, and utilized protocols, standards, monitoring tools, and patient pathways to support team integration. Based on a 1997 report that indicated dissatisfaction with nurse/physician collaboration, an Operating Principles for Collaboration and Quality Patient Outcomes (OPC) and interdisciplinary activities were developed to further promote nurse/physician collaboration. The OPC defined collaboration as "a personal commitment to seek in every way to work with another person with respect, strong communication and in an unconditionally constructive relationship" (Dechairo-Marino et al., 2001, p. 227). An interdisciplinary training session was also offered to nurses to promote problem solving, conflict resolution and team building skills. The study recruited a convenience sample of registered nurses from three medical-surgical units and two intensive care units. The

study limited measurement to nurses only, believing they would be an adequate proxy for evaluating the impact of the Initiative, and assessed their perceptions of general decision making process with physicians using an adapted version of the CSACD developed by Baggs (1994). The CSACD measured 87 nurses' perceptions of collaboration and satisfaction with care decisions before the interventions commenced and 65 registered nurses at posttest. Dechairo-Marino et al. (2001) did not find any significant difference in nurses' measurements on collaboration before and after the multifaceted Initiative. The finding was consistent when comparing ICUs to medical-surgical units. Dechairo-Marino et al. (2001) attributed insignificant findings of improved collaboration partly to high levels of collaboration prior to the intervention (pretest mean 27.68 and posttest mean 27.46) and a small sample size. The researchers reported a significant and positive correlation between nurses' perceptions of collaboration and satisfaction with decision-making processes (pretest  $r = 0.76$ ,  $p < 0.01$  and posttest  $r = 0.69$ ,  $p < 0.001$ ) (Dechairo-Marino et al., 2001).

*Pharmacists and physicians.* In a quasi-experimental study, Chiquette, Amato, and Bussey (1998) demonstrated that pharmacist and physician partnerships can reduce adverse clinical events. Patients treated in an anticoagulation program run by pharmacists with support from physicians had fewer related and unrelated complications compared to patients who received usual care from physicians only.

In a randomized controlled trial by Gattis et al. (1999), 181 patients with heart failure and left ventricular dysfunction were allocated to usual care or care from a clinical pharmacist (intervention group). The clinical pharmacist recommended pharmaceutical therapy and monitored patient care in conjunction with physicians. Patients in the

intervention group had significantly lower all-cause mortality and heart failure. This is evidence that pharmacists can collaborate with physicians and offer unique expertise to improve patient care (Gattis et al., 1999).

A before and after study of two medical ICUs (Leape et al., 1999) introduced a senior pharmacist to medical rounds and demonstrated that pharmacist participation in patient care consultations are a valuable asset to physicians. Leape et al. (1999) reported a substantial decrease in prescribing errors and physician support for pharmacist interaction. One measure of physician support noted that physicians accepted 99% of drug recommendations from pharmacists.

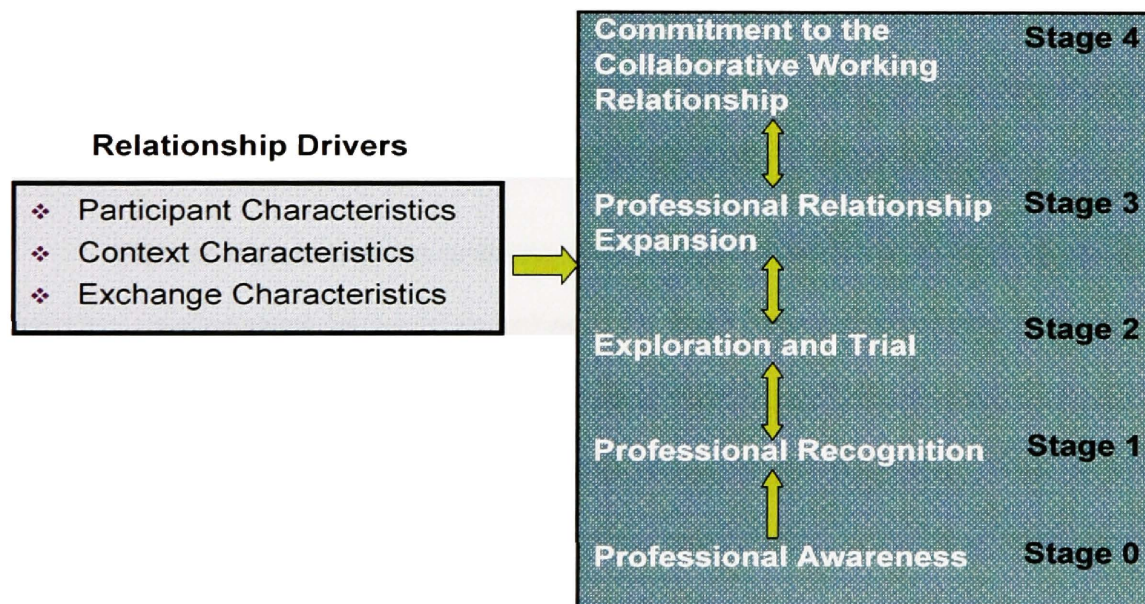
*Case manager-physician collaboration.* Despite the fact that empirical literature on case manager and physician collaboration is sparse, a few descriptive and qualitative studies exist focusing on this topic. A qualitative study of the Generalist Physician Initiative (Netting & Williams, 1996) evaluated a nine site demonstration project to enhance case manager and physician collaboration in caring for the elderly. The researchers conducted semi-structured interviews of 40 physicians and 32 case managers. The study revealed mixed sentiments about the case manager and physician relationship among the participants. The sample of case managers consisted of professionals and para-professionals from different backgrounds. Case managers emphasized the value they attached to building an interpersonal relationship with the physician in leading to a successful outcome. Many case managers stressed how they “added a new dimension to physician practice” (Netting & Williams, 1996, p. 222). Likewise, some physicians had a favorable attitude toward case managers and even went so far as to label them as “extenders” of their own clinical practice. Yet, physicians



and case managers did not have consistent views of the role of the case manager, the professional identity of the case manager, or the case manager's relationship with the physician.

### Theoretical Model to Explain Collaborative Working Relationships (CWR)

This section will identify and discuss the salient aspects of a theoretical model for a working relationship developed by McDonough and Doucette (2001). McDonough & Doucette postulate a staged model (see **Figure 2-2**) of a pharmacist-physician collaborative working relationship (CWR).



**Figure 2-2 Theoretical Model of Physician-Pharmacist Collaborative Working Relationship**

Note: Model adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770, based on theoretical work by McDonough, R. P., & Doucette, W. R. (2001). Developing collaborative working relationships between pharmacists and physicians. *J Am Pharm Assoc* 41(5), 682-692.

McDonough & Doucette's model postulates that a relationship progresses through five stages: stage 0- professional awareness; stage 1- professional recognition; stage 2-exploration and trial; stage 3- professional relationship expansion; and stage 4- commitment to the CWR. The authors explain that as the two actors (in their case, physician and pharmacist) increasingly rely on each other for patient care, the relationship strengthens and they transition to a higher stage. McDonough and Doucette (2001) surveyed the interpersonal, nurse-physician collaboration and business literature to develop their framework. The literature based on interpersonal relationships is quite extensive; however, the objective of the subsequent discussion is simply to complement McDonough & Doucette's theoretical framework in order to provide the reader with a more in-depth understanding of notable research on interpersonal and working relationship development. The literature discussed emphasizes the development of a dyadic relationship, in contrast to a health care team or organizations.

Before discussing the underlying processes inherent in the development of working relationships between members of a dyad, several important distinctions must be discussed. First, a working relationship is defined as "an interpersonal relationship that is task-based, nontrivial, and of continuing duration" (Gabarro, 1987, p. 173). An inherent feature of the evolution of a working relationship is that it is "temporal and cumulative" in nature (Gabarro, 1987, p. 176). Second, a working relationship is a type of social relationship; however, it is distinct from an interpersonal relationship (Gabarro, 1987). The working relationship exists to achieve a task; consequently, attributes related to the task accomplishment such as competence and task performance are influential in the development of a dyadic relationship (Gabarro, 1987). Another distinguishing element in a working relationship is the heightened importance of role and role expectation (Gabarro, 1987, p. 180). Gabarro explains that an "institutionalized role" (p.

180) is configured even before the dyad forms a relationship. In this event, the dyad is locked into a role. Gabarro (1987) notes that "The operational question for such a dyad is not whether to get 'married' but rather how to make the marriage work" (p. 180).

McDonough & Doucette's model is largely based on interpersonal, collaborative, and marketing research. They assert that there are three underlying types of determinants that will allow for the collaborative relationship to either strengthen or remain at a stalemate; these include participant, context and exchange characteristics. First, participant characteristics are important to the development of the relationship because they affect "his or her willingness to accept changes and risks involved in developing a collaboration" (McDonough & Doucette, 2001). Such participant characteristics include education, socialization, age, gender, years of experience and practice setting. Second, context characteristics are critical to the development of collaboration because they describe the conditions of the setting that may enable or impede collaboration (McDonough & Doucette, 2001; San Martin-Rodriguez et al., 2005). The third important set of factors that strengthen collaborative relationships is social exchange characteristics. Exchange elements refer to overt processes (Gabarro, 1987) including "attraction, communication, power and justice, norm development, expectation assessment, performance assessment, and conflict resolution" (McDonough & Doucette, 2001, p. 685).

McDonough and Doucette's model also relies on the work of Scanzoni (1979). Scanzoni offers a conceptual framework of behavioral interdependence among four types of dyads: peers, lovers, husbands-wives, and parents-children. Even though Scanzoni does not specifically discuss a task-based relationship, many aspects of his discussion on social exchange and behavioral interdependence are applicable to a working dyad. Scanzoni (1979) defines interdependence as "the reliance of actors (or

larger units) within any social system on the actors (units) within that system for valued rewards, benefits, gratifications” (p. 61). He postulates three stages of behavioral interdependence: exploration; expansion; and commitment. Progression through the three stages is related to what Coleman (1975) (as cited in Scanzoni, 1979, p. 95) refers to as “purposive action”. Scanzoni (1979) theorizes that for exchange partners to transition to the next stage of interdependence the actors need to initiate “purposive action”. According to Scanzoni (1979), “purposive action” was chosen because “it suggests the idea of some choice or volition on Actor’s part to increase or terminate the level of behavioral interdependence by evolutionary participation in each of a number of specific processes” (p. 95). Purposive action includes processes such as attraction, social exchange, bargaining, power, and maximum joint profit. In other words, these processes need to be activated to move to the next level. In essence, exchange elements describe the interactions between actors as they exchange information. In this respect, as exchange elements increase, the working relationship will strengthen and become more permanent, allowing for successful collaboration (McDonough & Doucette, 2001). McDonough and Doucette suggest that as actors increasingly exchange information they are assessing one another’s performance, building trust and placing a value on the relationship with the other actor (McDonough & Doucette, 2001). The framework proposed by McDonough & Doucette (2001) reveals that in order to progress to a more collaborative relationship, social interactions must change from discrete to relational (relational refers to ongoing). As the actors transition to higher stages, collaboration and interdependence evolve; the last stage is a testament to the interdependence demonstrated by a commitment to a collaborative working relationship (McDonough & Doucette, 2001; Scanzoni, 1979).

Work by Baggs and Schmitt (1997) also converges with the theoretical model proposed by McDonough et al. (2001). Baggs and Schmitt used grounded theory method to conceptualize a model of nurse-physician collaboration. They conducted interviews with 10 ICU nurses and 10 medical residents from a teaching hospital in a city in the northeast. The inductive method identified a model consisting of two antecedent conditions for nurse-physician collaboration. First, "being available", described as place, time and knowledge influenced the core process of working together collaboratively. Second, "being receptive", comprised of interest, open and active discussion, respect and trust, was an important antecedent of collaboration.

The next section provides an in-depth review of the main stages that are inherent in the progressive development of a collaborative working relationship (CWR).

### **Stages of a CWR.**

**Stage 0: professional awareness.** The professional awareness stage is characterized by very discrete interactions which are limited in scope and frequency. Drawing on work of stage paradigms of the relationship development in interpersonal research, Gabarro (1987) identifies that early stages of an interpersonal relationship are characterized by safe and routine interactions. Moreover, Gabarro points out that interactions at this juncture are primarily based on role expectations. Typically, the pharmacist would initiate the interactions (McDonough & Doucette, 2001).

**Stage 1: professional recognition.** This stage is still characterized by unilateral efforts to develop and promote the relationship. McDonough and Doucette underscore

the role that “attractiveness” plays in promoting the relationship. Purposive actions that characterize exchanges include “attraction, communication, and power and justice” (McDonough & Doucette, 2001, p. 687). The main focus of unilateral exchange on the part of the pharmacist is to make the physician aware of services the pharmacist can provide. At this juncture, the participant provides helpful information on a regular basis to the physician (McDonough & Doucette, 2001). Moreover, power (McDonough & Doucette, 2001) is unbalanced and in favor of the physician. Justice refers to whether the collaboration favors the patient and actors. Dwyer, Schurr, and Oh (1987) characterize power as “the ability to achieve intended effects or goals” (p.17). Dwyer et al. remark that this stage involves “party A’s recognition that party B is a feasible exchange partner” (1987, p. 15).

**Stage 2: exploration and trial.** As the name suggests, the actors test the relationship to gauge whether they want to deepen or contract the relationship. To this end, they begin to test and explore their working relationship. McDonough and Doucette (2001) explain that pharmacists initiate the exchange, but now physicians will gauge whether they see potential benefits or risks in the relationship (Dwyer et al., 1987). Scanzoni (1979) describes how each purposive action in the exploratory phase may be overlapping, but they are sequential in the sense that attraction and norm rule governing gives way communication and bargaining. For instance, attraction among peers may develop, and norms that govern exchanges may also occur simultaneously (Scanzoni, 1979). With each emergence of purposive-action processes, the relationship becomes more interdependent (Scanzoni, 1979). The process of norms development or exchange rules, as Scanzoni (1979) maintains that it “provides some guidelines for the initial probes that potential exchange partners may make towards each other” (p. 68).

Furthermore, expectations are assessed throughout this stage, although commitment is limited (McDonough & Doucette, 2001; Scanzoni, 1979). When expectations are met, trust builds and providers perceive a value in continuing with development of this relationship. Scanzoni (1979) underscores the importance of power and justice in the progressive development of an interdependent relationship and argues that “if partners can tolerate the exercise of power or injustice by one another, then we may say that the degree of their interdependence has substantially increased” (p. 73). Maximum joint profit (MJP) is a condition in which actors seek more than personal advantage and “will negotiate and bargain so as to promote mutual or group interests rather than individual advantage” (Scanzoni, 1979, p. 77).

**Stage 3: professional relationship expansion.** The interdependence between participants continues to build and the benefit of exchange to both actors continues (Dwyer et al., 1987). Participants who have reached this phase perceive benefits in the relationship, and social interactions are characterized by the capacity for conflict resolution, bidirectional communication, norm development, and ongoing performance assessment (McDonough & Doucette, 2001). Expectations and norms may develop and change through feedback of performance assessment during this phase (McDonough & Doucette, 2001; Scanzoni, 1979). The authors note that conflict, and its resolution, will most likely emerge during this stage, which is a sign that a committed relationship is in the process.

At this juncture, trust and interdependence are building and play a pivotal role in achieving conflict resolution (McDonough & Doucette, 2001). Actors in this stage have a higher degree of shared “interest-spheres” (goals, ends, or objectives). Scanzoni (1979)

asserts that maximum joint profit (MJP) and trust are highly influential in the segue from exploratory to expansion (p. 79). Scanzoni (1979) refers to these purposive-action processes as a “catalyst or critical juncture” (p. 79). Exchanges may be expanded in three ways: attraction, obligation and negotiations (Scanzoni, 1979). Attraction is a force that makes exchange desirable; obligation refers to “negotiated reciprocities or moral obligations” (Scanzoni, 1979); and negotiations imply a set of further exchanges leading to a progressive expansion of the relationship, regardless of intentions for this to occur. “Expansion, therefore, is a kind of stochastic process in which attractions, obligations, negotiations continually lead to an ever widening network of intermeshed or interdependent interests” (Scanzoni, 1979, p. 81).

***Stage 4: commitment to the collaborative working relationship.***

Commitment to the collaborative working relationship is the final stage. The dominant exchange characteristics include mutual trust and respect (Doucette et al., 2005), conflict resolution, performance assessment, attraction, bi-directional communication, and norm development. Participants that have reached this stage exhibit interdependence in the sense that they rely on each other to care for patients (McDonough & Doucette, 2001). Commitment can be defined as the “degree to which persons feel solidarity with or cohesion with an association,” (Scanzoni, 1979, p. 87).

Another feature of this stage is that power is mainly equitable between participants (Zillich, Doucette, Carter, & Kreiter, 2005). The amount of time to reach stage 4 may vary among participants, depending on participant and context characteristics (Gabarro, 1987; McDonough & Doucette, 2001). This commitment is a pledge of allegiance to the other actor and is achieved once both actors are satisfied and



benefit from the ongoing, relational exchange (Dwyer et al., 1987). Actors that have reached this stage have overcome various degrees of conflict; the conflict is a test of commitment and its resolution affirms that two actors are invested in an interdependent relationship (Gabarro, 1987; Scanzoni, 1979). On that note, commitment can be undermined by the inability of actors to resolve conflict (Scanzoni, 1979), but conflict resolution substantiates the trust and maximum joint profit (MJP) that the two actors have in each other. At this stage of commitment, the primacy of individual interests is replaced with a balanced set of interests of the two parties (Scanzoni, 1979).

Gabarro (1987) also notes the presence of conflict resolution in developed relationships whereas it would not be germane to discrete encounters. Team members that act unilaterally and concentrate on independent actions will not evolve or become collaborators (Miccolo & Spanier, 1993). McDonough and Doucette (2001) characterize stage 4 (final stage) of the collaborative working model as a durable relationship that will be distinguished by commitment, trust, mutual respect, bilateral communication, power balance and conflict resolution (McDonough & Doucette, 2001). In other words, at the highest level of a collaborative relationship, successful collaborative practice should be demonstrated by the following attributes: shared planning, coordination, joint decision making, and cooperation (Baggs & Schmitt, 1988, 1995). Hence, stage 4 would be characterized by a compilation of social exchange factors -- participant and context factors that support collaboration.

Work by Gabarro (1987) also illustrates the strength of McDonough & Doucette's (2001) framework. Gabarro highlights several models of dyadic relationship development by research in organizational behavior and concludes that there are several commonalities. First, early stages of (dyads of social and intimate nature) relationship development are characterized by safe and routine interactions with no

bearing on commitment and with unilateral concerns. As relationships progress, commitment builds and exchanges are more substantial and then reach a state of stability and durability. The three models of relationship formation reviewed also share similar processes including self-disclosure, exploration, testing and negotiation. Based on his review of interpersonal research and a three-year longitudinal study of managerial relationship development, Gabarro postulates four stages of the development of a working relationship: (1) orientation and impression formation; (2) exploration; (3) testing and working through; (4) stabilization. Gabarro's paradigm of relationship development factors in the importance of task competence—an element missing in purely social relationships.

Gabarro further argues that similar to other social relationships, "The underlying processes of expectation formation, attribution, assessment, and evaluation will operate in the development of working relationships just as they do in other types of relationships" (Gabarro, 1987, p. 181). As the working relationship evolves, the dyad sizes up their expectations, forms impressions, explores impressions, tests expectations and finally stabilizes as mutual expectations are met and trust is ongoing. Gabarro's model places a great deal of emphasis on the role of mutual expectations in the evolution of the four stages of working relationships. If interpersonal processes in Gabarro's (1987) paradigm do not occur or develop effectively, then the relationship will stabilize at a "relatively superficial level" (p.184). Gabarro elucidates further by pointing out that "An implicit assumption has been that when the work of two people makes them highly dependent on each other, it is desirable to develop a relationship that is mutual and robust enough to be rewarding and effective" (p. 184).

It is important to note that McDonough and Doucette's theoretical framework for the development of a collaborative working relationship (CWR) does not address the

economic incentives for engaging in collaboration. Work by Feldman, Ong, Lee, and Perez-Stable (2006) considers whether economic incentives may influence PCPs' willingness to engage in collaborative treatment of patients dually diagnosed with depression. A "Depression in Primary Care" project in California attempted to improve the primary care provider's participation in treating patients for depressive disorders. In turn, the project incorporated changes in payment mechanisms to allow PCPs to bill directly for depressive care for patients in BSC, a managed care plan. This was a departure from the payment mechanism before the project was implemented in which PCPs did not receive a financial incentive to spend additional time with patients with depressive disorders. Early results indicate that the change in payment mechanisms did not increase the number of 15-minute visits dedicated to behavioral health, but Feldman et al. (2006) suggest that it may have led to higher referral rates to a Managed Behavioral Health Organization, which may be an indicator of collaborative treatment for depressive disorders.

### **Predictors of Collaboration based on the CWR Theoretical Model**

As discussed earlier, McDonough & Doucette (2001) propose three groups of factors that influence the development of a collaborative relationship between a physician and pharmacist: participant, context, and exchange. The next section will briefly highlight some unique features of these determinants. Various obstacles, including conflicts, lack of coordination, and separate work processes between health care disciplines can impede the collaborative process. Collaboration requires several key factors that are relevant to McDonough & Doucette's theory of the development of CWRs.

**Participant factors.** Participant characteristics include age, gender, education, experience, and practice type (McDonough & Doucette, 2001). According to Andersen (1968; 1995), who has done a substantial amount of work on determinants of health care utilization, these are individual characteristics that are relatively difficult to modify when trying to change behavior. In particular, the demographic characteristics such as age, gender, practice type, and education are difficult to change because they are what he refers to as “predisposing” characteristics (Andersen, 1995).

**Age.** Age may influence the development of collaborative working relationships. Younger individuals are more likely to collaborate with participants, particularly those with educational experiences that focused on collaboration (McDonough & Doucette, 2001). Several findings in the literature suggest that younger participants are more open to collaboration. Bradshaw and Doucette (1998) capture this relationship in a random, descriptive study of 209 physicians’ attitudes toward pharmacists’ role expansion in patient care in different practice types in Utah in 1995. The study assessed physician characteristics and attitudes and showed that age is negatively correlated to physicians’ attitude with respect to a pharmacist aiding with drug selection (Bradshaw & Doucette, 1998). This implies that younger physicians are more in favor of working with pharmacists to select drugs (Bradshaw & Doucette, 1998). This may be attributed to a greater emphasis on interdisciplinary education for the younger generation or could be reflective of experienced physicians feeling they do not need help from pharmacists (Bradshaw & Doucette, 1998). Another empirical study by Ritchey & Raney (1981) highlights the influence of age on the development of collaborative practice. A random study of physicians in Jefferson County, Alabama measured physician perceptions of expanding the role of pharmacists. Similar to the findings of Bradshaw and Doucette

(1998), correlation analyses also revealed an inverse relationship between age and attitude toward pharmacists' feedback (Ritchey & Raney, 1981). Another interesting finding was that physicians who spent a great deal of time in hospitals had more positive attitudes with regard to pharmacists' feedback.

The findings of Ritchey & Raney also demonstrated that older physicians, psychiatrists and physicians in high malpractice risk specialties felt threatened by the pharmacists. Moreover, the study also revealed that age is negatively associated with time spent in the hospital and positively associated with high risk malpractice—revealing the central role that age may play in attitudes toward pharmacists. On that front, this finding suggests that once again age may somehow be related to socialization and professionalization (Ritchey & Raney, 1981).

**Education.** Education, and its inherent socialization and professionalization processes, has an effect on the development of collaborative practice. Education is frequently cited as a barrier to collaboration among physicians and nurses (Fagin, 1992; Keleher, 1998; McDonough & Doucette, 2001; McMahan et al., 1994; Miccolo & Spanier, 1993; Stapleton, 1998). Separate professional trainings have implications on the ideology and the understanding of roles, and socialization may play a role in creating conflicts among professions (Abramson & Mizrahi, 1996; McMahan et al., 1994; Miccolo & Spanier, 1993; Stapleton, 1998). In spite of the belief that education influences collaboration, the empirical evidence is mixed. A correlational study of nurses by Alt-White et al. (1983) found no relationship between educational level and collaboration ( $r = -0.02$ ,  $p > 0.05$ ) when examining personal, organizational and managerial determinants of nurse-physician collaboration in patient care units. Yet, it is not clear how Alt-White et

al. measured collaboration in their study, because the details are not described in their research. However, in a study assessing the validity of the CPS (Weiss & Davis, 1985), nurses with a baccalaureate degree or higher reported significantly higher scores on a dimension of nurse collaborative practice describing direct assertion of professional expertise/opinion than nurses with a diploma or associate degree ( $t = 2.10$   $df = 91$ ,  $p < 0.04$ ). Alt-White and colleagues found a greater correlation between in-service education at the hospital and collaboration ( $r = 0.22$ ,  $p < 0.001$ ) and hospital orientation ( $r = 0.24$ ,  $p < 0.001$ ) in comparison to education preparation ( $r = -0.02$ ,  $p > 0.05$ ).

In a discussion of an academic medical center's experience with an interdisciplinary, interagency HIV primary case management team in Utah, Snyder et al. (1996) emphasizes that the lack of education is a principal barrier to successful interdisciplinary HIV case management. Interdisciplinary educational experiences are widely believed to play an integral role in promoting collaborative practice in health care teams (Bradford, 1989; Dechairo-Marino et al., 2001; Devereux, 1981; Fagin, 1992; Miccolo & Spanier, 1993; San Martin-Rodriguez et al., 2005; Stichler, 1995). Another barrier cited in the literature to collaboration is the dominance of the medical profession or the hierarchical relationship between professions (Keleher, 1998; McMahan et al., 1994; Stapleton, 1998). Stapleton (1998) comments on a hierarchy within the health care system, noting that the system "is hierarchical and does not involve equality and autonomy for all professions within their scope of practice, and therefore, is not conducive to providers practicing collaboratively" (p. 12).

***Relevant work experience.*** The number of years practiced may also impact collaborative practice, because professionals with greater experience may have more

familiarity with collaboration. Using grounded theory method to elucidate the core antecedents of collaborative practice, Baggs & Schmitt (1997) found that nurses ( $n = 10$ ) and residents ( $n = 10$ ) (from a non-probabilistic sample) working in an ICU identified knowledge (a dimension of being available) as an important antecedent condition of collaboration. The researchers described collaboration as working together as a team process, with a focus on shared patient-centered work. Study participants generally agreed that knowledge was related to work experience. Experience was perceived as an important determinant of a colleague's knowledge of patient care (Baggs & Schmitt, 1997). The study participants indicated that they were more likely to collaborate with experienced providers because they were perceived to be more knowledgeable. Likewise, other scholarly discussions underscore the critical role that competence or knowledge plays in facilitating collaborative practice (Miccolo & Spanier, 1993; Stapleton, 1998).

A quasi-experimental, one-group, pre-post study (Wells et al., 1998) using a convenience sample of health care providers including nurses, physicians, case managers, and pharmacists, assessed an intervention to improve collaborative practice after several strategies were implemented. The strategies included the development of four critical paths with a standard interdisciplinary plan of patient care led by different providers—for example, led by case manager only or by registered nurse and physician. Wells and associates (1998) measured collaborative practice using a modified CPS scale (Weiss & Davis, 1985) and tested whether provider experience was associated with a change in collaboration. The finding of the analysis was that experience did not explain differences in collaboration (Wells et al., 1998). To the researchers' surprise, collaboration actually declined over time ( $t(df_{332}) = 2.25, p < 0.01$ ). In light of this, the researchers cite the heightened awareness of the intervention which led to high score at

baseline and note the possibility that the revised CPS scale did not sufficiently capture the true scope of collaborative practice. Meanwhile, study participants who took part in the National Joint Practice Committee's hospital project that focused on increasing nurse and physician collaboration stressed the importance of competence in building collaborative working relationships (Devereux, 1981).

A correlational study of nurses by Alt-White et al. (1983) provides evidence that experience may not impact collaborative efforts. The study found a weak inverse relationship ( $r = -0.09$ ,  $p < 0.05$ ) between nursing experience (measured as length of employment at hospital) and collaboration with physicians in inpatient units at a large, eastern teaching hospital. Alt-White and associates suggest that low turnover of hospital staff and low levels of medical staff participation in patient care activities may have influenced the results. Low turnover levels may imply that dissatisfied staff stay onboard because of incentives to remain employed and could explain why unsatisfied nurses are not eager to collaborate. The lack of medical attending physicians involved in patient care may be indicative of the lack of collaboration (Alt-White et al., 1983).

Implicit in a working relationship is the achievement of a task; consequently, attributes related to task accomplishment such as competence and task performance are influential in the development of a dyadic relationship (Gabarro, 1987). To this end, Gabarro (1987) argues that the "role of competence, the nature of self-disclosure, and the importance of role" (p. 179) are more important than social/personal factors in a working relationship. Task competence has an effect on trust and one individual's ability to influence another (p. 180).



**Gender.** Gender may influence the development of collaborative working relationships; however, the evidence is mixed. Gender played a role in predicting physicians' CPS scores on one factor of physician collaborative practice describing acknowledgement of nurse contribution, which Weiss & Davis (1985) defined as an inherent attribute of collaboration. In this instance, female physicians reported higher CPS scores than male physicians ( $\mu = 24.1$  and  $20.8$  respectively) ( $t = 2.69$ ,  $df = 87$ ,  $p < 0.008$ ) (Weiss & Davis, 1985). Doucette et al. (2005) and Zillich et al. (2004) examined influential determinants of collaborative practice among physicians and pharmacists and reported that gender did not play a significant role in promoting collaboration.

**Practice type.** Practice type may also impact collaborative practice because multi-service practices may be more proficient and knowledgeable in different practice areas (McDonough & Doucette, 2001). Specialists may be less likely to have a broad understanding of other areas of medicine (McDonough & Doucette, 2001). In a study examining the influential factors of physician and pharmacist collaborative practice, internal medicine was a significant predictor of physician collaboration (Zillich et al., 2004). However, internal medicine only became significant after the complete model was fitted; hence, only after the authors conducted a hierarchical analysis and entered participant factors, then context factors and finally entered exchange factors into the model. Upon closer examination, the authors found that internal medicine was related to academic institution in which pharmacists were co-located on site. A major limitation to Zillich and colleagues' study is the low response rate (34%), attributable to participants' unwillingness to participate in the study ( $n = 20$ ) and the fact that several physicians ( $n = 23$ ) could not identify a pharmacist that they would work with on a regular basis. In a similar study, Doucette et al. (2005) measured pharmacist-physician collaboration from

the perspective of the pharmacist, and the findings indicate that the practice type of the physician was not a predictor of collaborative practice (internal medicine (referent category was family medicine)  $\beta = 0.012$ ,  $p = 0.789$ ).

**Context factors.** Context determinants are elements in the work (organizational) environment in which actors interact (McDonough & Doucette, 2001; San Martin-Rodriguez et al., 2005). Context characteristics are features of the setting where the dyad works such as patient mix, system relationship (e.g. if dyad works in the same organization or within the same organizational rules), volume of professional interaction, and physical proximity of practice setting (McDonough & Doucette, 2001).

**Administrative Support.** Another requirement for the development of collaboration is administrative support. In this respect, leadership is a clear factor that can affect collaborative practice among professionals (Miccolo & Spanier, 1993; San Martin-Rodriguez et al., 2005; Stichler, 1995). In a descriptive study of nurses and physicians randomly selected from a sample of six urban hospitals, Prescott and Bowen (1985) examined factors that impact a nurse-physician relationship. Interviews revealed that administrative leadership had a positive impact on relationship. A stepwise regression found that administrative adequacy of the care unit was a significant predictor of physician and nurse respect and competence (Prescott & Bowen, 1985). Organizational support must embrace open communication that is characterized by frank discussions and differences in opinions in order to facilitate collaborative behavior (Stichler, 1995). A correlational study in the United Kingdom (Borrill et al., 2002) assessed 113 health teams in the National Health Service and reported that leadership

had a positive influence on team effectiveness; lack of leadership was related to lower levels of participation, low commitment to quality care, and ambiguity about care objectives. Leadership also plays a crucial role in initiating partnerships and facilitating collaboration between HIV PCPs and case managers in NYC HIV ambulatory care settings (S. Duke and J. Samuels, personal communication, February 20, 2009). In this sense, leaders can create a culture of collaboration, design work procedures to facilitate collaboration, and encourage active collaboration among their staff.

***Professional interaction.*** Another key facilitator of collaborative practice is the volume of interaction and bi-directional nature of interaction. Lamb and Napodano (1984) measured nurse-physician collaboration through audiotapes of provider-provider interactions at two primary care settings and found a relationship between minimal interaction between this dyad and low levels of collaboration. According to Zillich et al. (2004), professional interactions between physicians and pharmacists over the past two weeks had an influential effect on physicians' collaboration. In a random, cross-sectional, self-administered (Zillich et al., 2004) survey of 300 physicians in Iowa (70% male), the frequency of professional interaction regarding patient care was positively and significantly related to collaborative practice ( $p = 0.006$  full model). A similar study of physician and pharmacist collaboration operationalized by the same dependent variable by Doucette et al. (2005) found similar results, but from the perspective of the pharmacist. Professional interaction was reported to be a positive and significant determinant of collaborative practice. Sixty-four percent of pharmacists who responded to the survey were male. A higher score of professional interaction indicated that two-way communication was occurring at a higher rate (Doucette et al., 2005). As

participants increase their interaction, the likelihood of developing a working collaborative relationship is greatly increased (McDonough & Doucette, 2001).

**Practice setting.** McDonough and Doucette (2001) proposed that practice setting may encourage or discourage the development and progression of a collaborative working relationship. Yet, studies by Doucette et al. (2005) and by Zillich et al. (2004) have not demonstrated this relationship. Doucette et al. (2005) studied influential determinants of physician and pharmacist collaboration from the perspective of the pharmacists and found no relationship between practice setting and collaborative practice. In the same vein, but from the perspective of the physician, Zillich and associates (2004) also demonstrated that practice setting did not influence collaboration. These results suggest that practice setting may not have a strong influence on collaborative practice between two disciplines.

**Coordination and collaboration.** Another important context characteristic for the development of collaboration is coordination. Coordination is defined as “the deliberate organization of patient care activities between two or more participants (including the patient) involved in a patient’s care to facilitate the appropriate delivery of health care services” (McDonald et al., 2007, p. 41). The central activity in care coordination is information exchange (McDonald et al., 2007). In this respect, coordination is related to collaboration because coordination is an antecedent of collaboration and because coordination allows professionals to have bi-directional information exchange and organize decision-making. Allred et al. (1995) point out that

“Coordination is important because it facilitates collaboration between the case manager and other providers and integrates their efforts” (pp. 33-34).

McDonald et al. (2007) suggest that organizational theory literature can be used to understand approaches to care coordination. McDonald et al. (2007) propose that Nadler and Tushman’s (1988) model of design elements can illustrate how care coordination mechanisms enable organizations to exchange information.. Nadler and Tushman (1988) discuss organizational design elements that influence an organization and its members’ ability to process information. Three design elements can enhance an organization’s information processing capacity: grouping, structural linking, and operational processes (McDonald et al., 2007; Nadler & Tushman, 1988). The design element particularly relevant to bi-disciplinary collaboration is operational processes (San Martin-Rodriguez et al., 2005), which can be further broken down into four types of operational processes (McDonald et al., 2007).

The first operational process is what organizational theorists refer to as coordination by standardization, whereby organizations formally prescribe roles, rules and operating processes. Standardization enables participants to know their respective roles and coordinate work (McDonald et al., 2007; Thompson, 1976). The second is what organizational theorists refer to as mutual adjustment—these include mechanisms that allow a process of feedback and performance adjustment and adjusted roles based on ongoing assessment through activities such as multidisciplinary patient rounds, interdisciplinary case conferences or one-on-one meetings (McDonald et al., 2007; McDonough & Doucette, 2001; Thompson, 1976). Mutual adjustment is facilitated by case conferences, team meetings, rounds and consultations among participants. The third type of operational process is monitoring mechanisms such as group visits or automated relay of patient information to providers, in an effort to provide up-to-date

information on patient need and clinical performance (McDonald et al., 2007). Finally, the fourth operational process is what McDonald et al. (2007) refers to as operational supports. Operational supports include “resources that influence the ability of an organization to implement coordinating mechanisms” (McDonald et al., 2007, p. 118) including co-location of sites, information systems, incentives and staffing decisions.

*Standardization.* Overall, empirical evidence regarding operational processes’ influence on coordination in the health literature is somewhat mixed (McDonald et al., 2007). Standardization is beneficial to the pursuit of collaboration because it clearly outlines participants’ roles and elucidates the scope of disciplines that work together (Stapleton, 1998). Standardization is also central for establishing a collaborative relationship because it clearly defines role and responsibilities of actors, which Miccolo & Spanier (1993) note is an important element of collaboration. Alt-White et al. (1983) reported a weak and significant correlation between standardization of work policies and protocols and collaboration ( $r = 0.13$ ,  $p < 0.01$ ). In contrast, Doucette and colleagues (2005) found that written protocols had no effect on pharmacist collaboration with physicians.

Studies have found that standardization has a positive influence on patient health outcomes and coordination (McKay & Crippen, 2008; Pogach et al., 2004; Wrobel et al., 2003; Young et al., 1997). Young et al. (1997) conducted site visits at 20 Veterans Affairs surgical ICUs, as part of the National Veterans Affairs Surgical Risk Study (NVAERS), and found that the surgical units with low rates of mortality or morbidity had formalized roles and responsibilities to coordinate care in the unit. Yet, in a cross-sectional correlational study of 10 Veterans Affairs diabetes foot care programs, Wrobel

and colleagues (2003) only revealed a significant association between standardization and minor amputations ( $p = 0.02$ ) and total amputations ( $p = 0.04$ ), but did not find a relationship between standardization and major amputations. Meanwhile, a cross-sectional study by Young et al. (1998) did not find a difference in mortality in relation to standardization but did report a relationship between high standardization and perceived quality of care and morbidity.

The findings of Sicotte et al. (2002) offer mixed evidence that formalization of work activities is influential in fostering collaboration. The study examined 343 programs of the Quebec Community Health Care Centre (CHCC) to study the effect of organizational and professional factors on interdisciplinary collaboration among a work team. Sicotte et al. (2002) described collaboration as a two dimensional construct consisting of care sharing activities and interdisciplinary co-ordination. Program coordinators completed a questionnaire with questions on program manager characteristics, structural characteristics (formalization of care activities, group work design, budget, size of workforce), and intragroup processes (level of conflict, social integration, and beliefs in collaboration). The questionnaire included discrete variables on the presence or absence of formal written rules for interdisciplinary service delivery and a formal case management protocol. Nonetheless, regression analyses showed that these formalizations were not associated with interdisciplinary co-ordination or interdisciplinary care sharing activities; however, formalization of the assessment of quality of care (administrative formalization) was positively associated with interdisciplinary co-ordination and interdisciplinary (two dimensions of collaboration) care sharing activities. Administrative formalization pertained to standardized procedures for program evaluation, a quality assurance activity, and does not related to care activities directly.

*Mutual adjustment.* Feedback between health care professionals enables bi-directional communication and joint problem solving. A study by Alt-White and colleagues (1983) reported that weekly meetings were moderately and positively related to collaboration, for example, discussions with other clinical nurses ( $r = 0.15$ ,  $p < 0.001$ ) and medical and nursing rounds ( $r = 0.14$ ,  $p < 0.01$ ). In contrast, Sicotte et al. (2002) did not find a relationship between regularly scheduled interdisciplinary case discussions and collaboration when measuring collaboration among a work team (measured with two variables: interdisciplinary coordination and interdisciplinary care sharing activities). Work by Bickell and Young (2001), Young et al. (1997), and Wrobel et al. (2003) demonstrates the importance of mutual adjustment for care coordination and patient outcomes. In a qualitative study using content analysis, Bickell and Young (2001) showed that regularly scheduled multidisciplinary meetings can facilitate care coordination for early-stage breast cancer patients. Bickell and Young emphasized that weekly multidisciplinary meetings provide a forum to discuss treatment issues and casually discuss patient information. Furthermore, Young et al. (1997) documented that surgical units with lower scores on mortality or morbidity used mutual adjustment (peer interaction) to coordinate care. Conceptual work by Henneman et al. (1995) suggests that patient care rounds are an excellent forum to assess whether joint planning for patient care, or collaboration, is taking place. In a system-wide effort to improve interdisciplinary collaboration in a 375-bed acute care system, McKay and Crippen (2008) found that frequent weekly team meetings and an improved clinical information tool, in addition to other structural and process elements, were related to a decrease in length of stay and cost.



*Operational support.* Information systems are purported to aid the development of collaboration because they facilitate information transparency. However, Pogach et al. (2004) and Bickell and Young (2001) offer mixed evidence on the use of information systems for coordinating care. Pogach et al. (2004) showed that information systems can be beneficial for care coordination. On the other hand, a case study of care coordination for early-stage breast cancer reported that physicians' attitudes were not favorable towards information systems (Bickell & Young, 2001). Work by Sicotte et al. (2002) demonstrated that a unique single clinical tool to collect and share information was a positive and significant predictor of interdisciplinary coordination among work teams in 343 programs in CHCC; the researchers conceived of coordination as one of two dimensions that make up collaboration.

Physical proximity is also believed to influence the development of collaborative practice (Alt-White et al., 1983; Baggs & Schmitt, 1997; McDonough & Doucette, 2001; San Martin-Rodriguez et al., 2005). In particular, two empirical studies emphasize the importance of physical proximity (San Martin-Rodriguez et al., 2005). First, a study by Alt-White et al. (1983) examined personal, organizational and managerial factors that impact nurse and physician collaboration in critical and non-critical inpatient units. As hypothesized, greater collaboration was reported by nurses in critical care units, which the authors attributed to the geographically small work space of critical care units compared to non-critical units where the geographic layout is larger. Second, a study by Baggs & Schmitt (Baggs & Schmitt, 1997) reported that the "smallness" of the space contributed to collaboration by facilitating provider interaction and patient discussion. Indeed, close physical proximity increases opportunities for interaction, enabling participants to build collaborative relationships (McDonough & Doucette, 2001). Dwyer et al. (1987) also confirm the significance of proximity of exchange participants to facilitate

awareness; they noted, "Situational proximity between the parties facilitates awareness" (Dwyer et al., 1987, p. 15). According to Bickell and Young (2001), physical proximity did not play a key role supporting or preventing care coordination, a fundamental attribute of collaboration.

***Time available.*** The development of collaboration is also dependent on whether two professionals have time to interact to build a collaborative working relationship. Work by Baggs & Schmitt (1997) underscores the influence of time in their qualitative study of nurse and resident physicians' perceptions of the development of collaboration. The study demonstrates that the availability of time is integral to collaboration. For instance, medical intensive care unit nurses had lighter patient load compared to floor nurses, and both nurses and residents explained this meant more time for MICU nurses to discuss patients with residents.

Collaboration does require time to develop (Baggs & Schmitt, 1997). Participants at the 2003 Case Management Society of America (CMSA) & Professional Resources in Management summit also identified time as a factor that can hinder the relationship between case managers and physicians (Moreo, 2003a, 2003b). Time pressure is an element that both case managers and physicians confront (Moreo, 2003a). Nonetheless, both providers must make take time to develop a collaborative relationship (McKay & Crippen, 2008; Stapleton, 1998). Moreover, making time for collaboration was part of a larger, system-wide intervention to enhance multidisciplinary collaboration (McKay & Crippen, 2008). The Trinity Regional Health System recognized that "the process of collaboration requires healthcare providers to spend time together developing relationships, learning how to effectively communicate and trust each other" (McKay &

Crippen, 2008, p. 111). To this end, the Trinity Health System introduced frequent unit-wide meetings to jointly discuss patient care and complex care meetings, a more interdisciplinary team meeting, with the "goals of problem recognition, management and resolution" (McKay & Crippen, 2008, p. 112) for complex inpatients.

***Complexity of patient care.*** Organizational theory postulates that task complexity and uncertainty intensify the need for coordination and interdependence among providers (McDonald et al., 2007; Nadler & Tushman, 1988; Thompson, 1976; Van De Ven, Delbecq, & Koenig, 1976). Health care organizations are believed to "face relatively unpredictable or uncertain work requirements that also entail high levels of staff interdependencies" (Charns & Schaefer, 1983; Flood, 1994 as cited in Young et al., 1998, p. 1216). Illness severity and patients' unpredictable response to treatment often result in patient care that is characterized as uncertain and complex in nature; this may necessitate the joint work of specialists and high levels of interdependence (Charns & Schaefer, 1983 as cited in Young et al., 1998; McDonald et al., 2007). Patients with chronic conditions often require care from diverse providers whereby care becomes complex in nature (McDonald et al., 2007). Moreover, complexity increases as the number of providers responsible for aspects of the patient's care increases (Charns & Schaefer, 1983 as cited in Young et al., 1998; McDonald et al., 2007). Charns and Schaefer (1983, as cited in Young et al., 1998) point out that mutual adjustment approaches are better suited for healthcare organizations, because standardization is less effective in light of the unpredictable, complex nature of patient care.

A prospective, descriptive study of nurse-physician collaboration in an ICU and patient outcomes by Baggs et al. (1992) demonstrated that complexity of a shared

decision between nurses and residents, indicated by perceived levels of alternative choices in making transfer decision for ICU patients, was significantly related to the amount of collaboration and patient outcomes for nurses' reports of collaboration. In this study, collaboration was measured using the DAT and was defined as "open discussion between nurses and physicians and shared responsibility for problem solving and decision making" (Baggs et al., 1992, p. 19). Alternative choices were measured by respondent's agreement with whether they believed "there was no alternative choice" (Baggs et al., 1992, p. 20) using a four-point Likert scale. When alternative decision choices were available, nurses' reports of collaboration were significantly related to patient outcomes, controlling for patient severity using APACHE II scores. An interaction between collaboration and alternative choices was slightly significant for nurses ( $\beta = 0.15$ ,  $p = 0.056$ ), demonstrating that complexity influences collaboration. The findings also indicated that as the number of alternatives increased, greater levels of collaboration were associated with fewer negative patient outcomes (Baggs et al., 1992). Baggs et al. (1992) stress caution when interpreting these results because decision complexity may have been influenced by spurious variables such as family anxiety about transfer decision. Nonetheless, the study underscores the notion that collaboration is influenced by the complexity of the situation; specifically, more complex situations call for more collaboration between disciplines (Baggs et al., 1992).

A study examining the relationship between interdependence and clinical resource utilization using a hierarchical regression found that task complexity, measured by patient and episodic care characteristics (e.g., age, admission to intensive care, illness complication) was significantly related to the use of clinical resources (e.g., utilization of laboratory tests or diagnostic exams) and systematically explained a moderate level of variance (Sicotte, Pineault, & Lambert, 1993). In fact, severity of tasks

was more important in explaining resource utilization than provider interdependence. “Complementarity interdependence” (Sicotte et al., 1993, p. 601), in which providers with specialized expertise work together, was a positive and significant predictor of resource utilization. Sicotte et al. (1993) explain that this is related to task complexity, since complementarity interdependence demands that specialists work together. In other words, task complexity demands that providers with specialized knowledge intervene in the patient’s care.

A study that used video recording of over 100 tracheal intubation procedures in a trauma center over three years concluded that as task complexity (e.g., multiple, concurrent tasks, and uncertainty) increases, coordination challenges arise between providers (Xiao, Hunter, Mackenzie, Jefferies, & Horst, 1996). In sum, task complexity can affect team performance during crises (Xiao et al., 1996). Xiao et al. (1996) discussed the potential benefits of training and work design procedures to help improve coordination among the care team.

***Academic affiliation and position in an organization.*** Zillich et al. (2004) postulated that academic affiliation would be an influential predictor of physician collaborative practice. Nevertheless, academic affiliation produced no effect on collaborative practice (academic affiliation = yes,  $\beta = -0.016$ ,  $p = 0.607$ ). On a similar note, Doucette et al. (2005) examined influential factors of collaborative practice between physicians and pharmacists, from the viewpoint of pharmacists, and found that pharmacist’s position (manager, staff, clinician, other, independent) did not explain collaborative practice (referent = independent;  $p$  values ranged from 0.106 to 0.780). On the contrary, the type of professional responsibility predicted nurses’ CPS scores in a

validation study of the CPS scales (Weiss & Davis, 1985). In the validation study, nurses who had clinical responsibility had significantly lower CPS total scores compared to nurses who were charged with duties that emphasized education, administration, or research ( $t = 2.8$ ,  $df = 93$ ,  $p < 0.006$ ) (Weiss & Davis, 1985).

**Social exchange factors.** Collaborative practice requires that professionals exhibit an interest and behavior that aids the development of collaborative working relationships. To this end, trust, communication, interest in others' work, commitment to the relationship and an equitable dependency on each other allows for a collaborative relationship to evolve. The very nature of collaboration—joint planning, cooperation, coordinated decision making and considering other's opinions—demands that professionals build a strong interpersonal relationship (Gabarro, 1987; McDonough & Doucette, 2001; San Martin-Rodriguez et al., 2005; Scanzoni, 1979).

Zillich and associates (2004) developed the Physician-Pharmacist Collaboration Instrument (PPCI) to examine social exchange characteristics that contribute to collaborative practice. The PPCI was based on McDonough and Doucette's theoretical framework of physician-pharmacist development of collaborative relationships. The PPCI consists of three subscales: relationship initiation; role specification; and trustworthiness. The development of the PPCI was motivated by seven influential "themes surrounding a professional relationship: collaborative care, commitment, dependence symmetry, bidirectional communication, trust, initiating behavior, and conflict resolution" (Zillich et al., 2005, p. 60).

Two studies, one by Zillich et al. (2004) and another by Doucette et al. (2005) utilized the PPCI to measure the effect that these "relationship drivers" (Zillich et al,

2004, p. 766) have on a pharmacist-physician collaborative practice. Both studies used a cross-sectional design to assess the determinants of collaborative practice.

Specifically, trustworthiness and role specification were consistently significant and positive across both studies. In contrast, all three subscales of the PPCI were found to be significant in Zillich and colleagues' (2004) study of physician perceived collaborative practice.

***Relationship initiation.*** The construct, relationship initiation, plays a key role in the development of collaborative working relationships. This construct refers to behavior of one party to identify how they might help the other party (McDonough & Doucette, 2001; Zillich et al., 2005). Items reflect a person's willingness to interact and also a person's desire to promote a relationship with the other. This is often common beginning in Stage 1—professional recognition (McDonough & Doucette, 2001), as the pharmacist may make unilateral interactions with the physician to determine how they can move the relationship forward. A random cross-sectional survey of the physician-pharmacist dyad in Iowa revealed that relationship initiation was a significant predictor of physician collaborative practice (Zillich et al., 2004). On a similar note, a small-scale (N = 21) Finnish qualitative study by Silen-Lipponen et al. (2002) found that helpfulness promoted collaborative practice in operating room teams. On the contrary, Doucette et al. (2005) surveyed 160 pharmacists using the PPCI and found that relationship initiation did not have a significant influence on collaborative care using a hierarchical linear regression.

***Trustworthiness.*** Trustworthiness is a construct that plays a significant role in the evolution of collaborative practice within a working dyad. According to the developers, Zillich et al. (2004), this construct is a composite of items that measure bi-directional communication, trust, and commitment. Both actors need to partake in this social exchange to facilitate relationship development. Studies by Zillich et al. (2004) and Doucette et al. (2005) validated the relationship between trustworthiness and collaborative practice in physician-pharmacist dyads. Both studies used hierarchical analysis to examine participant, context and social exchange factors' influence on collaboration. The trustworthiness subscale was positive and significant in both studies ( $p < 0.001$ ).

*Trust & commitment.* A vast range of conceptual work and empirical studies purport that trust and commitment play an essential role in collaboration between interpersonal dyads because they are critical to the progression of collaborative working relationships (Arcangelo et al., 1996; Crosby, Evans, & Cowles, 1990; Doucette et al., 2005; Gabarro, 1987; Henneman et al., 1995; McDonough & Doucette, 2001; McKay & Crippen, 2008; R. M. Morgan & Hunt, 1994; Scanzoni, 1979; Stapleton, 1998; Zillich et al., 2004). Trust is one of the most central elements required for establishing collaborative working relationships because this is most frequently cited as an antecedent variable in the literature (Arcangelo et al., 1996; Keleher, 1998; Miccolo & Spanier, 1993; Scanzoni, 1979; Stichler, 1995). In a cross-sectional study assessing the quality of salesperson-customer relationships, Crosby et al. (1990) found that trust influenced the customers' plans for future interactions with the salesperson. This suggests that trust plays a crucial role in cultivating future sales.



Scanzoni (1979) also underscored the importance of trust in the evolution of behavioral interdependence between peers. Scanzoni even went as far as to call it a “catalyst” (p. 7) for interdependence. Trust fosters future interactions; in other words, an actor is confident that the other will carry out or be able to perform a particular role or task (Zillich et al., 2005). Study participants who took part in the National Joint Practice Committee’s hospital project focused on increasing nurse and physician collaboration emphasized the critical role that trust plays in fostering a collaborative working relationship (Devereux, 1981). Indeed, trust plays an important role in relational (ongoing) exchange in interpersonal dyads. Morgan and Hunt (1994) conceptualized trust as “existing when one party has confidence in an exchange partner’s reliability and integrity” (p. 23). Morgan and Hunt (1994) used data from 204 independent tire retailers to explore the relationship between trust and commitment and characteristics closely related to marketing success. Their research supported their hypothesis that trust and commitment influenced successful marketing relationships by mediating behaviors believed to be related to marketing success (acquiescence and propensity to leave; cooperation; functional conflict; and decision-making uncertainty). The study also corroborated previous work which suggested that trust is an antecedent to commitment (Morgan & Hunt, 1994).

*Communication.* Another key social exchange is two-way communication, which allows for open dialogue and enhances trust (McDonough & Doucette, 2001; Zillich et al., 2005). Two-way communication facilitates collaboration by allowing both actors to express their opinions and contribute to problem resolution (Devereux, 1981; McDonough & Doucette, 2001; Mohr & Nevin, 1990). Communication is an inherent component of problem solving because it allows all team members to negotiate and

contribute (Stapleton, 1998). Baggs and Schmitt (1988) point out that communication is “a necessary, but not sufficient, condition for collaboration” (p. 148). Baggs and Schmitt (1997) found that communication “described as discussion, indicating a conversation with give and take, where all parties contributed” (pp. 75-76) was a key antecedent of collaborative practice between nurses and physicians in ICUs. On a similar note, Alt-White and colleagues (1983) reported a strong association between open communication and nurse-physician collaboration. Mohr & Nevin (1990) explored the role of communication in marketing and concluded that bi-directional, frequent and informal communication improves coordination, satisfaction and buyer commitment. Mohr asserts that communication plays a key role in building interdependent relationships.

Moreover, Doucette (1999), in a study of 111 health maintenance organizations, demonstrated that bidirectional communication significantly and moderately related to long-term trading relationships with pharmaceutical manufacturers (adjusted  $R^2 = 0.40$ ). Bi-directional communication was also positively and significantly related to commitment to the business relationship (adjusted  $R^2 = 0.42$ ). A qualitative study of operating room nurses in a Finnish university hospital revealed the salience of active communication in fostering collaborative practice (Silen-Lipponen et al., 2002). Another qualitative study conducted in 12 hospital settings using grounded theory (Abramson & Mizrahi, 1996) showed that physicians and social workers valued communication as an influential determinant of both negative and positive collaborative experiences. Poor communication is also cited frequently as a barrier to working collaboratively (Abramson & Mizrahi, 1996; Keleher, 1998; McDonough & Doucette, 2001; Miccolo & Spanier, 1993; Stapleton, 1998). McMahan et al. (1994) stress that two-way communication that takes place provides a forum to build trust and develop a working relationship.

**Role specification.** Role specification is the third subscale of the PPCI. This construct encompasses the purposive-action processes of conflict resolution and dependence symmetry (Zillich et al., 2005; Zillich et al., 2004).

*Dependence symmetry.* Zillich and colleagues (2005) perceive dependence symmetry as an equal distribution of role assignments. Zillich and colleagues point out that “The more equitably the roles are assigned, the more balanced will be the dependence of the practitioners on each other” (p. 63). A equitable distribution of power among the providers is an ideal state to facilitate the development of a collaborative relationship (McDonough & Doucette, 2001). In the same vein, Stichler (1995) notes that “Power differences between members can impede effective communication, but in collaborative relationship, power is equalized or balanced because each member contributes a resource needed to accomplish the goal” (p. 54). Based on a survey of the literature, McDonough and Doucette (2001) note that “power can derive from various sources, including authority, ability to reward or coerce, and expertise” (p. 686). McKay and Crippen’s (2008) review of literature also emphasized that inequitable power balance between nurses and physicians can impede collaboration (pp .110-111). McDonough and Doucette’s (2001) development of a collaborative working relationships framework draws on work by Emerson (1962). In a model of power-dependence relations, Emerson (1962) postulates that the power of one participant “*resides implicitly in the other’s dependency*” (p. 32). With this perspective, actors in a mutually dependent relationship rely on the other to achieve goals or gratifications (Emerson, 1962) and vice versa. In this respect, power resides in one actor’s ability to “control or influence” (Emerson, 1962, p. 32) the other actors’ activities. If one participant holds more power, such as ability, resource or expertise, the power would then tilt in favor of one actor

(Scanzoni, 1979). Emerson explains that relationships can be unbalanced and equalized by changes in actors' dependency on the other.

Role specification, as measured by five items scored on a 7-point Likert scale, was the most influential determinant of physician-perceived collaborative practice ( $\beta = 0.645$ ,  $p < 0.001$ ) (Zillich et al., 2004). A study by Doucette et al. (2005) produced a similar finding ( $\beta = 0.418$ ,  $p < 0.001$ ), supporting the notion that dependence symmetry and conflict resolution greatly influence collaboration between working dyads. A small study of operating room (OR) nurses in Finland revealed the importance of fair division of work in promoting collaboration in OR teams (Silen-Lipponen et al., 2002).

*Conflict resolution.* Collaborative relationship development depends on actors' abilities to resolve conflicts in the process of negotiating differences. Scanzoni (1979) asserted that conflict resolution is a "test of commitment" but also reinforces commitment (p. 91). Moreover, trust and maximum joint profit (MJP) burgeon during negotiations (Scanzoni, 1979). Scanzoni explains that "Resolution takes place when Actor is able and willing to exert enough power during renegotiating processes so as to end Other's resistance (change the conflict situation, or stalemate) and to achieve intended effects in this interest sphere. Yet Actor has done so in such a way that Other feels it is fair—a case of MJP" (p. 91). With this in mind, when a working dyad is able to negotiate activities, they are effectively developing their collaborative relationship. In turn, this expansion of the working relationship influences collaborative practice. Furthermore, Nichols, DeFries and Malone (2002) stress the importance of conflict resolution in facilitating group development; they note that it is a forum for participants to "define their roles more clearly and develop common norms and values" (p. 79). Stichler (1995)

asserts that “The ultimate goal of collaborative effort is to promote a ‘win-win’ situation where all parties gain in the conflict resolution” (p. 55).

A case study of Utah’s HIV interdisciplinary primary care team emphasizes the extent to which conflict resolution and communication play a role in collaboration. They stressed that members of HIV case management teams must possess an “ongoing commitment to cooperate with a collectively agreed-upon course of action for a given case, to participate in ongoing dialogue and communication with team members, and to report any perceived mistakes or errors in judgment, as well as successes, so that others on the team can learn from them” (Snyder et al., 1996, p. 77). Indeed, the ability to resolve conflicts is an essential exchange characteristic that helps providers transcend their differences and strengthen their relationship (McDonough & Doucette, 2001).

## **Review of Methods**

Zillich et al. (2004) used a cross-sectional study to test the McDonough & Doucette (2001) theoretical model of CWR development. Zillich and colleagues developed a questionnaire to measure participant, context and exchange variables that are hypothesized to influence collaborative practice between primary care physicians and pharmacists from the viewpoint of physicians. The researchers performed a hierarchical analysis by entering the groups of factors one at a time; the last model included participant, context, and exchange factors in the model. A linear regression of the full model produced an  $R^2$  of 0.804,  $p < 0.001$ . One major limitation of their study was the modest response rate of 34%. Another limitation of the study was the reference point for the questionnaire, which asked physicians to consider the pharmacist with whom they

worked the most. Zillich and associates commented that this may have contributed to response bias because respondents who lacked a pharmacist with whom they worked closely did not participate in the study (n = 23 out of 1,000). Moreover, the study only assessed the physician's point of view.

Doucette and colleagues (2005) also used McDonough & Doucette's theoretical framework to explain physician-pharmacist collaboration from the pharmacists' perspective. They used a relatively similar instrument to Zillich et al. (2004) in all aspects except they included an extraversion scale to measure personality and added a dichotomous question (Yes/No) on the presence of a written protocol. Doucette et al. (2005) also asked pharmacists to select one physician that they worked with, but they only surveyed pharmacists who were identified as "innovative." In a similar manner to Zillich et al. (2004), Doucette and colleagues performed a hierarchical regression in which they loaded participant, context and exchange factors into the model, one group at a time. Their full model produced an  $R^2$  of 0.805,  $p < 0.01$ . Both studies reported the most substantial changes in  $R^2$  values when the exchange variables entered the model (Zillich et al., 2004: participant only:  $R^2 = 0.036$ ,  $p = 0.099$ ; participant + context:  $R^2 = 0.194$ ,  $p < 0.001$ ; participant + context + exchange:  $R^2 = 0.804$ ,  $p < 0.001$  / Doucette et al., 2005: participant only:  $R^2 = 0.071$ ,  $p = 0.163$ ; participant + context:  $R^2 = 0.350$ ,  $p < 0.01$ ; participant + context + exchange:  $R^2 = 0.805$ ,  $p < 0.01$ ).

**Psychometric testing of the physician/pharmacist collaboration instrument (PPCI).** The Physician/Pharmacist Collaboration Instrument (PPCI), which consists of three subscales that measure relationship initiation, trustworthiness, and role specification, has undergone rigorous validation testing (Doucette et al., 2005). The

trustworthiness subscale elicits information on bi-directional communication, trust, and commitment between the physician and pharmacist. The role specification subscale measures the mutual dependence and ability of the dyad to agree on roles and activities. The relationship initiation subscale includes items that measure the pharmacist's initiation behaviors to elucidate whether the pharmacist asks how he or she can be helpful to the physician. All three subscales are scored on a 7-point Likert scale whereby one indicates very strongly disagree and seven equals very strongly agree. Scores can be summed to create a total PPCI score; however, Zillich et al. (2004) and Doucette et al. (2005) have used the subscale scores for analysis and interpretation.

The PPCI originally was comprised of 27 items and then was reduced to 14 items, based on results from validation testing. The exchange factors, which Zillich et al. (2004) and Doucette et al. (2005) refer to as the PPCI, have been validated by Zillich et al. (2005). Validation testing was conducted on the sample of physicians drawn from the Zillich et al. (2004) study of physician-pharmacist influential determinants of collaborative care. The sample used for the validation was primarily composed of ambulatory/primary care physicians (Zillich et al., 2005; Zillich et al., 2004). Thus, the validity of the PPCI for hospital-based and specialty physicians is unsubstantiated. The validation of the PPCI was also based on a relatively small, random sample of physicians in Iowa ( $n = 340$ ), largely made up of males (70%) with a mean age of 45.8 who were private practitioners. However, the authors contend that it was a sufficient sample size for validation testing (Zillich et al., 2005).

**Face validity.** Five physicians with pharmacist interaction experience reviewed an initial draft of the 27-item PPCI and concept definitions and gave feedback to the

researchers (Zillich et al., 2005). The researchers used the feedback to modify the items.

**Content validity.** Items of the PPCI were developed based on theoretical work by McDonough and Doucette (2001), including literature from interpersonal, business, and collaboration fields of study (Zillich et al., 2005).

**Construct validity.** Pilot testing of a 27-item PPCI and a modified Collaboration and Satisfaction About Care Decisions (CSACD) instrument developed by Baggs (1994) was conducted on a sample of 110 physicians. The researchers made slight modifications to the 27-item PPCI following the initial pilot testing of the instrument. Subsequently, the PPCI and an adapted CSACD instrument by Baggs (1994) to measure collaborative care and satisfaction were sent out to a random sample of 1,000 primary care physicians in Iowa (Zillich et al., 2005). Zillich et al. (2005) conducted a principal component analysis of the 27 items in the original PPCI. Based on screen plots and eigenvalues, the principal component analysis supported a three-factor solution. The authors then conducted confirmatory factor analysis to evaluate items for inclusion and exclusion in an effort to make a shortened, more efficient and refined version of the instrument. Zillich and colleagues (2005) ended up with a 14-item reduced PPCI. The reduced 14-item model has excellent psychometric properties. Confirmatory factor analysis also produced a meaningful, three-factor solution made up of trustworthiness, role specification, and relationship initiation. The three factors were highly correlated, ranging from 0.52 to 0.79 in the reduced 14-item model. Based on prior research, it was hypothesized and confirmed that the refined 14-item PPCI was positively and



significantly correlated with Baggs's (1994) collaborative practice and satisfaction scales (Spearman's correlation with Baggs's collaboration scale ranged from 0.62 to 0.77; Spearman's correlation with Baggs' satisfaction scale ranged from 0.25 to 0.40).

***Criterion-related validity (predictive validity).*** Zillich, Milchak, Carter and Doucette (2006) examined the utility of the PPCI through a sub-study of an unblinded, randomized controlled trial to assess the impact of a physician-pharmacist intervention to improve patients' blood pressure. Six pharmacies were randomly assigned to the high intensity (HI) group and six were randomly assigned to the low intensity (LI) control group. Pharmacists in the HI group were proactive with patients and provided education on hypertension control and met with patients face-to-face on four occasions. Pharmacists also made drug recommendations to physicians and used a variety of approaches to communicate with the physician. Additionally, the physicians and pharmacists worked together to agree on a treatment plan. Throughout the study, pharmacists completed the PPCI after the baseline and last visit with the patient.

In the control arm of the study, the pharmacists had no interactions with the patients' physicians. Fifty-four PPCIs were completed by 38 different physicians in the HI group. Pharmacists in the LI group completed 49 PPCIs with reference to 38 physicians. The study assessed the sensitivity and criterion-related validity of the 14-item PPCI. The researchers hypothesized that pharmacists' collaborative relationship score in the HI group would improve more between the baseline and final assessment. To assess the sensitivity of the PPCI, Zillich and colleagues administered the PPCI at baseline and at the three month follow-up. The researchers investigated the sensitivity of the PPCI by comparing changes in the PPCI scores at baseline and follow-up in the

HI and LI group. The Mann Whitney U test was significant for all three subscales of the PPCI ( $p < 0.01$ ), indicating that change scores were different in the two groups. Spearman's correlation coefficient was calculated to investigate the criterion-related validity. Researchers hypothesized that PPCI scores would be significantly and inversely associated with blood pressure. The hypothesis was not supported; blood pressure and PPCI were not significantly correlated. Even so, the low correlation was negative revealing the direction posited by Zillich et al. (2006) [the p-value was set at  $p < 0.01$  because of multiple comparisons]. The researchers claimed that the insignificant finding could be attributed to patient factors (e.g., adherence to medication) and system factors such as access to patient information. Patients in the intervention group, however, did report lower diastolic blood pressure and pharmacists reported higher PPCI scores. Limitations to the study may have included selection bias because the pharmacists recruited patients and the intervention was an unblinded study; they could have selected patients that were cared for by physicians whom the pharmacists knew (Zillich et al., 2006). The study demonstrates that the PPCI has excellent validity but did not meet the expectations of criterion-related validity.

**Reliability.** Internal consistency was evaluated using Cronbach  $\alpha$  coefficient. Internal consistency for the reduced PPCI model ranged from 0.86 to 0.96 (trustworthiness  $\alpha = 0.96$ ; role specification  $\alpha = 0.91$ ; relationship initiation  $\alpha = 0.86$ ) (Zillich et al., 2005). The PPCI demonstrates excellent internal validity based on these results.

## Case Management and Collaborative Practice

As discussed earlier, collaboration among health care providers has the potential to improve provider satisfaction, quality of care, and organizational performance, to name a few. Collaboration is also a vital component for providing patient-centered care among a clinical and non-clinical dyad such as a bi-disciplinary team composed of a case manager and a physician. The scope of collaborative practice between case managers and physicians is not discussed extensively in the literature. Nonetheless, this is not reflective of the importance of collaboration within this dyad. Case managers are a critical part of a patient's care team, especially when the patient is dually diagnosed with psychosocial and medical issues (Mizrahi & Abramson, 2000). The joint work and specific expertise of the case manager-physician dyad can help each provider achieve his or her own goals for patient care ("Case manager-physician," 2008). For instance, the case manager may have knowledge of a patient that is not captured on the patient's chart such as a patient's literacy level and substance abuse problems. The physician, on the other hand, has clinical expertise that can help tailor medical interventions to suit the physical needs of the patient.

The "synergy" of collaboration occurs when both the case manager and physician use their expertise to plan together. One illustration of this is when the physician would like to switch the dosing of a patient's medication regimen. The case manager may have crucial information that could impact successful medication adherence to this new dosing prescription; the case manager may be aware of obstacles in the patient's life (e.g., the patient is unstably housed) (S. Wayne, personal communication, December 11, 2008). The case manager then would discuss the patient's likelihood of successful medication adherence and suggest that the physician think of an alternative medication. The physician and case manager would plan

treatment goals and share in the decision-making to decide the next step in the patient's care plan. Case managers and physicians work together on a range of activities including discharge planning, inpatient admissions, treatment adherence, behavioral issues (e.g., mental health problems), care coordination, and alleviating social stressors (e.g., homelessness) ("Case manager-physician," 2008; Moreo, 2003a; NYC DOHMH, 2008a). The case manager and the physician both contribute to making the decision regarding the patient's care plan (Mizrahi & Abramson, 2000). The Certified Case Manager Center notes that "Case management services are optimized best if offered in a climate that allows direct communication among the case manager, the client, the payer, the primary care provider, and other service delivery professionals" (2009).

**The case manager-health provider relationship.** Case managers are a valuable asset to a patient's care team because they have specific expertise in navigating the health care system and oftentimes have close interactions with the patient. Birmingham and Colon (2005) examined the different stages of case management with a case study and stressed that the case manager's holistic view of the care continuum renders him or her a valuable resource for guiding the development and monitoring of the care plan (Birmingham & Colon, 2005). A participant at the Case Management Society of America (CMSA) and Professional Resources Education Inc. 2003 summit on collaboration between physicians and case managers stressed that case managers are an asset to physicians because they take a "lead in the patient's continuum of care" (Moreo, 2003a, p. 63).

Several discussions of case manager-physician relationships in scholarly literature and among physicians and case managers in outpatient and inpatient care settings convey a strong belief that the case managers work collaboratively with

physicians and highlight positive experiences of collaboration (Abramson & Mizrahi, 1996; Birmingham & Colon, 2005; "Case manager-physician," 2008; Moreo, 2003a; Netting & Williams, 1996; Snyder et al., 1996). The CMSA illustrates this perception on their website, where they note that "Case managers are at the center of care delivery for patients. They serve as a patient advocate and resource as well as providing critical information and recommendations to the rest of the care team: physicians, surgeons, nurses, administrators, benefits coordinators, employers and family caregivers" (2009a, para. 1). Case managers who participated in the CMSA & Professional Resources in Management Inc. 2003 summit emphasized their value to physicians. One participant stated, "They [the physicians] couldn't imagine being without a case manager that they can consult with and coordinate the patient's care across the continuum" (Moreo, 2003a, p. 63). Birmingham and Colon (2005) describe how a case manager is instrumental in implementing action plans and how they collaborate with physicians to jointly decide on the next action step in the patient's care plan. In this respect, case managers and physicians may contemplate a number of interventions to optimize treatment efficacy, which could range from transportation to housing, child care or appointment reminders (NYC DOHMH, 2008a) .

**Defining case management.** Although case management has been around for over a century, the definition of case management is subject to ongoing debate (Chernesky, 1999; Fleisher & Hendrickson, 2002; S. T. Moore, 1990; Murphy, Tobias, & Rajabiun, 2003; National Center for HIV, STD, and TB Prevention [NCHHSTP], 1997). One reason for this debate is that many fields have their own philosophy and approach to case management (Fleisher & Hendrickson, 2002; Huber, 2000; Public Health Service, Centers for Disease Control and Prevention, & The Health Resources and

Services Administration [PHS, CDC & HRSA], 2008). In that sense, no discipline “owns it”, but rather each discipline practices it within their own school’s definition, model and practice (Huber, 2000). For instance, the Case Management Society of America (CMSA) (2009b) defines case management as a “collaborative process of assessment, planning, facilitation and advocacy for options and services to meet an individual’s health needs through communication and available resources to promote quality cost-effective outcomes” (para. 1). Meanwhile, the practice of case management in social work focuses on removing environmental barriers to help individuals maximize their well-being (S. T. Moore, 1990). For a social worker, this may entail identifying an individual’s resources and support system to enable him or her to function independently (S. T. Moore, 1990). S.T. Moore (1990) asserts that case management is a mainstream practice of social workers; he emphasizes that case managers are “enablers and facilitators” (p. 445). Fleisher and Hendrickson (2002) define case management as “the coordination of care across a system of service providers to meet the needs of a particular client or client group” (p. 2). Another core characteristic of case management is that it is predominantly a long-term process, rather than a discrete service, to assist persons with mental illness or chronic disease, abused, negligent and emotionally disturbed children, and the elderly (Fleisher & Hendrickson, 2002; Huxley, 1993; NCHHSTP, 1997).

**Goals of case management.** Two opposing goals have emerged from case management models: (1) maximize and increase resources through coordination; and (2) control costs of long-term care (NCHHSTP, 1997, p. 4). With the goal of helping an individual traverse the complex and often fragmented health care system, case managers help identify and facilitate resources and connect individuals to a diverse

array of social and health services including primary care, specialty care, benefits, and mental health services in order to help them achieve optimal health and social well-being and self-sufficiency (CMSA, 2009b; NYC DOHMH, 2008a; Piette, Fleishman, Mor, & Thompson, 1992; PHS, CDC & HRSA, 2008).

**Functions of case management.** While many disciplines disagree on the definition of case management, there is convergence in the literature on the main functions of a case management process (Fleisher & Hendrickson, 2002). A principal component of case management is the coordination of services to a defined population in order to provide comprehensive care and help patients navigate the health care system (Fleisher & Hendrickson, 2002; Huber, 2000; S. Moore, 1992; NCHHSTP, 1997; Piette et al., 1992; Sowell, 1995).

Though case management is geared towards a specific population's needs, there is also consensus in the literature on several intrinsic functions of case management, including: assessment of a client's needs (whether they are social, physical or mental); development of a service plan—more or less a roadmap of goals and resources, and activities to meet the plan—facilitating or linking client with services and resources; monitoring of plan and needs; and advocacy and ongoing evaluation of client needs (Fleisher & Hendrickson, 2002; Huber, 2000; Huxley, 1993; Piette et al., 1992; PHS, CDC & HRSA, 2008). These core tasks focus on coordinating care for clients (Fleisher & Hendrickson, 2002), of which some functions are discrete and others are ongoing. Patients often actively participate in the development of a service and treatment plan by agreeing on a plan of action (Fleisher & Hendrickson, 2002; NCHHSTP, 1997; Sowell & Meadows, 1994). Piette et al. (1992) describe benefits assessments as time limited

whereas the need and assessment for psychological support may be continuous. The case manager is “responsible for carrying out a comprehensive client assessment using an approved tool, and for the provision of or coordination of a range of services by referral or preapproved protocol to a specific and limited number of individual clients” (Fleisher & Hendrickson, 2002, p. 6).

The principal departures from the intrinsic functions and paradigm of case management are evident in the dozen or so contemporary models of case management (Fleisher & Hendrickson, 2002). These models describe the goals of case management and the relationship between the case manager and the client. The different approaches range from the Broker, the Full Support, the Rehabilitation, and the Strengths model. Each discipline or agency may rely on different approaches to provide case management for clients. The models can be characterized by the target population, service setting, type of care (direct or coordination), purpose and roles of case managers. For example, the Full Support model provides case management in an integrated setting in which a full array of specialists are on site to manage different aspects of a patient’s social and health care (Fleisher & Hendrickson, 2002). Unlike the Full Support model, in the Rehabilitation model the case manager conducts an assessment of an individual’s strengths and weaknesses and works to solve the weak points such as housing or medical needs. After major “stressors” have been assuaged, the case manager subsequently ends or substantially reduces involvement with the client (Fleisher & Hendrickson, 2002, p. 3). While a comprehensive review of case management models is beyond the scope of this literature review, it is important to note that each model has a unique philosophy and has different goals and interactions with the clients.



Differences in opinions also unfold with respect to experience necessary to carry out case management activities. With this in mind, some argue that case management requires professional skills in clinical psychotherapy and community services while others contend that paraprofessionals can carry out the activities of case management (S. T. Moore, 1990; NCHHSTP, 1997; Piette et al., 1992). The social work discipline advocates for all case managers to have a bachelor's or master's degree in social work. Fleisher & Hendrickson (2002) define a case manager as "An individual with at least a bachelor's level education, and/or who has undergone specific training by a recognized case management training authority" (p. 6).

Moreover, the debate on the definition and role of case manager has also fueled a lack of consensus on the terms used to refer to the "case manager". Terms used interchangeably for a case manager include case worker, case aide, case assistant, nurse case manager, and social worker (Fleisher & Hendrickson, 2002). The Case Manager Certification Commission conducted a qualitative analysis of case manager job descriptions from the mid-1990s to the early 2000s by randomly sampling 1,028 records of their archives (Tahan & Huber, 2006). The Commission found that a large majority of case manager job descriptions indicated that they collaborate in the development of a treatment plan, communicate with health care teams, and identify gaps in care plans (Tahan & Huber, 2006). Surprisingly, the study reported that only 33.7% of the survey respondents coordinated patient care and only about 28% attended case conferences.

**Historical development of case management.** Case management originated in the mid 1800s to coordinate care for the underserved and has since been used in social work, chronic care, mental health, and HIV care to coordinate services across the

continuum of care. Case management developed at this time as urbanization increased in the United States and England. At the same time, social programs took root and employed caseworkers to meet the needs of the underprivileged in an effort to improve their economic and social well-being (Fleisher & Hendrickson, 2002). The discipline of case management, as an approach to coordinating care in the community, was applied in public health, nursing and social work disciplines in the early 1900s (Huber, 2000; Sowell & Meadows, 1994). Across diverse settings, case management has been advocated as an intervention to control costs, reduce duplication of services, increase access to care and coordinate care across service providers (Fleisher & Hendrickson, 2002; Huber, 2000; NCHHSTP, 1997; Sowell, 1995). Later, case management was used by the insurance industry to manage the utilization of individuals with chronic diseases (Huber, 2000). In the 1970s, case management was applied to the management of treatment for psychiatric patients who were deinstitutionalized in the 1960s. In the 1980s, case management was utilized by health maintenance organizations and acute care hospitals. In the following decade, case management emerged as a cost containment strategy (Fleisher & Hendrickson, 2002; Huber, 2000). Though different disciplines have used their own application of case management, the main commonality is that the patients or clients who are managed face persistent and significant barriers in navigating the system of care to obtain needed services (NCHHSTP, 1997).

**HIV case management.** Case management plays a crucial role in the lives of persons living with HIV/AIDS (PLWHA) because of the multiple social and health challenges that they confront (Fleisher & Hendrickson, 2002). Federal support for AIDS case management was endorsed with the Ryan White Care Act of 1990 (See Appendix

A) which mandated HIV case management for grantees and gave rise to unique state and metropolitan models of case management (Murphy et al., 2003). The Ryan White Care Act is the major payer of AIDS case management (NCHHSTP, 1997). HIV case management is tailored to meet the diverse and complex needs of PLWHA, which may include assisting PLWHA with housing, food, substance abuse and transportation difficulties (Sowell, 1995). Case managers also have to balance other intrinsic needs of this population ranging from access to care to emotional support (Sowell, 1995). The tension between cost control and improving access to services is also apparent in AIDS case management —“Many programs also try to balance these two goals” (NCHHSTP, 1997, p. 15). Regardless of the training level, an HIV/AIDS case manager requires a thorough comprehension of the multiple needs of PLWHA (Sowell, 1995).

Fleisher & Hendrickson (2002) point out that an HIV case manager must negotiate a range of patient issues, which may include substance abuse, poverty, stigma, chronic illness and mental health (Piette et al., 1992; Sowell, 1995). AIDS case management can be traced to the mid-1980s (NCHHSTP, 1997). The complex nature of HIV/AIDS requires a concerted effort to address barriers to care, social aspects of the disease (e.g., stigma and discrimination) and a holistic approach to treatment adherence (NYC DOHMH, 2008a). The key elements of case management, which include assessment, service coordination and monitoring, are key ingredients to facilitate patient-centered care (Sowell, 1995). Many of the AIDS case management models focus on coordinating care to improve access to care rather than the secondary goal of cost containment (NCHHSTP, 1997). In a review of integrated HIV care, defined as treating mental health and substance abuse simultaneously rather than sequentially in the same setting, Soto, Bell, and Pillen (2004) identified case management as a key

mechanism to support management of PLWHA dually diagnosed with drug abuse and psychiatric disorders.

Moreover, many PLWHA face challenges to treatment adherence and multiple barriers to engagement in care. Maintenance in care is one way to ensure that PLWHA receive optimal HIV care and treatment and benefit from consistent monitoring of their disease progression. While HIV is not curable, it is now treated as a chronic disease with consistent retention in care and adherence to antiretroviral treatment (NYC DOHMH, Cabral et al., 2007; Indyk, Belville, Lachapelle, Gordon, & Dewart, 1993; 2008a). Case management affords an opportunity to improve care retention and treatment efficacy. Specifically, case managers, who often serve as the main coordinators of care, are in an ideal position to use their expertise in service delivery coordination and the first-hand knowledge of barriers that PLWHA encounter in care (Sowell, 1995). Indyk et al. (1993) noted that community-based organizations (CBOs) are at a good vantage point to coordinate and monitor medical and social services care for PLWHA. A review of AIDS case management described the importance of assessment, monitoring, good record keeping for promoting staff communication and evaluation, client advocacy and the use of work standardization to promote effective care delivery (NCHHSTP, 1997).

Indeed, case management is highly valued in the HIV/AIDS service delivery community. One HRSA administrator (Health Resources and Services Administration [HRSA], 2008) stressed that:

Case management is the glue that holds the many services, people, and parts of the Ryan White HIV/AIDS Program together—and rightfully so. Case managers are often the most familiar “face” of the Ryan White HIV/AIDS Program for consumers. In both

medical and nonmedical support capacities, case managers make sure that patients get from point A to point B in their care—often literally driving them there to do it. (p.2)

One HIV-infected consumer endorsed the role of the case manager, noting “I might only spend 15 minutes with the doctor every 3 months, but my case manager calls me in between to see how I’m doing, remind me of doctor’s appointments, and to see if I need anything. We have a relationship.” (HRSA, 2008, p. 1)

HRSA’s HIV/AIDS Bureau (HAB) that oversees the Ryan White program makes a distinction between medical case management and case management. Medical case management is a shift to care coordination for medical treatment and includes treatment adherence counseling, whereas case management tends to focus on supportive counseling and coordination of supportive services without an emphasis on medical care coordination. In 2006, HRSA spent \$135 million on case management alone (HRSA, 2008). HRSA (2008) defines medical case management as:

A range of client-centered services that link clients with health care, psychosocial, and other services. Coordination and follow-up of medical treatments are components of medical case management. Services ensure timely, coordinated access to medically appropriate levels of health and support services and continuity of care through ongoing assessment of clients’ and key family members’ needs and personal support systems. Medical case management includes treatment adherence counseling to ensure readiness for and adherence to complex HIV/AIDS regimens. Key activities include: (1) initial assessment of service needs; (2) development of comprehensive, individualized service plan; (3) coordination of services required to implement the plan; (4) client monitoring to assess the efficacy of the plan; and (5) periodic reevaluation and adaptation of the plan as necessary over the life of the

client. It includes all types of case management, including face-to-face meetings, phone contact, and any other forms of communication (p. 3).

HIV case management is predominantly based in community-based organizations (CBOs) and public hospitals (Indyk et al., 1993; Piette, Fleishman, Mor, & Dill, 1990). Piette and associates (1990) reported that CBO case managers are more likely to serve the lesbian, gay, bisexual, and transgender (LGBT) community. CBOs also place more emphasis on service coordination (NCHHSTP, 1997). In contrast, hospital based case managers were more likely to serve patients who needed more support with injection drug use, housing, transportation and psychological counseling (NCHHSTP, 1997). HIV case management delivered by AIDS service organizations (ASOs) integrates HIV-specific emotional support and counseling with case management.

**HIV case management and collaborative practice.** Collaboration has an essential role in HIV/AIDS care and treatment, because it allows the HIV PCPs and case managers to leverage their unique expertise and jointly plan and make decisions with the goal of providing patient-centered care. Moreover, collaboration in HIV care and treatment can potentially have a positive impact on patient outcomes, work relationships, and employee job satisfaction. In a discussion of an interdisciplinary, collaborative approach to providing HIV primary care to HIV-infected patients who are dually diagnosed with mental health and drug abuse problems in an academic medical center, Snyder et al. (1996) stress that a primary care provider's collaboration with case managers is essential for maximizing patient care decisions. Snyder and colleagues (1996) discuss two noteworthy reasons for collaboration. First, an HIV primary care provider maintains legal responsibility for all patient care and third-party reimbursement.

They contend this is sufficient motive for PCPs to work closely with case managers to actively review the case management plan. Second, if there is a discrepancy between the case management plan and the treatment plan, the quality of patient care could be undermined or suffer (Snyder et al., 1996). Snyder and associates believe in the physician-case management collaboration with such passion that they state that providers “who place a low priority on making their expertise available to ancillary staff (including medical residents, fellows, house staff) and outside agencies providing care, have a questionable role in HIV primary care case management” (Snyder et al., 1996, p. 80).

Examples of opportunities for HIV PCP-case manager collaboration are illustrated in Appendix B.

An observation of an interdisciplinary round at an outpatient HIV clinic revealed that the practice of collaboration is alive and well in the HIV care community (S. Wayne, personal communication, December 11, 2008). In particular, HIV PCPs and treatment adherence counselors (who use a case management strategy to guide needs assessments and service planning) worked closely to determine the next steps of care for patients who were enrolled in a treatment adherence program. Several dimensions of collaboration, as defined by Baggs (1994), were evident during the site visit.

In sum, collaboration between HIV PCPs and case managers enables each team member to leverage their unique expertise and jointly plan together to make care decisions to provide patient-centered care (“Case manager-physician,” 2008; Moreo, 2003b; Snyder et al., 1996). To this end, successful collaboration between HIV PCPs and case managers may reduce care fragmentation, improve provider satisfaction, improve organizational performance, and improve patient health outcomes.

## Gaps in the Literature

Several gaps in the research of bi-disciplinary collaboration have been identified. First, testing of McDonough & Doucette's model of the development of collaborative working relationships (CWR) has been limited to the physician-pharmacist dyad. Second, studies testing the physician-pharmacist CWR (Doucette et al., 2005; Zillich et al., 2004) have not evaluated a dyad concurrently. More importantly, no prior empirical research has investigated the determinants of HIV PCP-case manager collaboration. To this end, the instrument designed by Zillich et al. (2004) to measure the physician-pharmacist social relationship known as the PPCI and an instrument to measure collaborative practice, the CSACD, developed by Baggs (1994) have never been utilized in an HIV primary care setting to examine factors that influence HIV PCP-case manager collaboration. It is also recognized that both studies that tested McDonough & Doucette's (2001) theory of CWR (Doucette et al., 2005; Zillich et al. (2004) did not adequately examine the importance of mechanisms that are purported to foster coordination including protocols, in-person meetings, and information systems. Lastly, no studies have been conducted that link collaboration among the case manager-HIV PCP dyad to outcomes (including patient outcomes, organizational performance or provider satisfaction).

The case manager-HIV PCP working relationship is not well documented in the literature. The dearth of HIV PCP-case manager collaboration research calls for empirical research to investigate the predictors and correlates of collaboration among case managers and HIV PCPs. To address this gap in understanding, this study tested whether the CWR can sufficiently explain HIV PCP-case manager collaboration and delineated the most critical factors that facilitate collaboration. Furthermore, the study broadened the understanding of these three factors: role specification, relationship



initiation, and trustworthiness, and also extended the validation of the PPCI (Zillich et al., 2004) and the CSACD (Baggs, 1994). The investigation of collaboration is pertinent to HIV care and treatment because it can be described as an intermediary path to improved patient outcomes (Sicotte et al., 2002).

### Chapter 3: Overview of the Study

This study endeavored to examine the collaboration between a working pair (dyad)—the HIV/AIDS case manager and the HIV PCP. McDonough & Doucette's (2001) framework was used as a guide to understand the determinants of collaboration between HIV PCPs and case managers. This study was built upon a framework of a physician-pharmacist collaborative working relationship (CWR) developed by McDonough and Doucette (2001) and subsequently operationalized by Zillich et al. (2004) and Doucette et al. (2005). As indicated previously, McDonough & Doucette (2001) identified a model of collaborative practice based on participant, context and exchange factors to explain the development of an interpersonal, working relationship among physicians and pharmacists. McDonough & Doucette (2001) postulated five stages in building a collaborative working relationship. Before discussing the study in greater detail, several important clarifications and distinctions between prior work and the proposed study will be outlined.

First, the case manager and HIV PCP relationship is distinct from physician and pharmacist relationships with regard to the first stages described in McDonough and Doucette's model: relationship awareness (stage 0) and professional recognition (stage 1). In some cases, the case manager HIV PCP relationship is manifested by what Gabarro (1987) refers to as the "institutionalized role relationship" (p. 180). To this end, some case managers will not transition through stages 0 and 1 because their respective case management agency has a contract in place to work with the HIV clinic. With this in mind, HIV PCPs and case managers will skip the professional awareness stage that is

characterized by discrete, intermittent exchanges and skip the professional recognition stage because the case management agency and the HIV clinic have formed a contractual agreement to work together. In this respect, the case managers and HIV PCPs will be bound to their duties outlined in the contract or partnership.

In the case of HIV ambulatory care, three organizational scenarios affect the initial stage at which case managers and HIV PCPs begin to interact. They are where (1) case managers work for the clinic/facility; (2) the clinic contracts with an outside agency to provide case management services (the agency is co-located or off-site); and (3) case managers are affiliated with agencies with which the clinic does not legally or formally contract (no memorandum of understanding or legal contract) (NCHHSTP, 1997). The first scenario refers to a situation in which a case manager is assigned a role by his/her organization to work with HIV providers in the facility. The second scenario occurs when a clinic contracts with a specific case management program (e.g. AIDS Service Center in NYC has a dedicated case management team on-site at Beth Israel DAC (S. Duke & J. Samuels, personal communication, February 20, 2009). In this sense, case managers are not “independent” actors and are assigned to work with physicians. The third scenario is a consequence of a patient’s right to choose his/her own case manager and occurs when the case manager’s agency does not have a partnership with the clinic the patient attends (e.g., patients can choose any COBRA program); therefore, the onus would be on the case manager to approach the HIV PCP to initiate and deepen the relationship. In the event that the case manager is not obligated to work for the HIV PCP and/or clinic, the case manager may choose to terminate the development of the relationship at an early stage (e.g., not go beyond the exploration stage) (Scanzoni, 1979).

Another distinction must be drawn between a contractual partnership and collaborative practice. The earlier discussion of collaboration conveys collaborative practice as a complex phenomenon that entails joint planning, cooperation, coordination, shared decision making and concern for another's perspective. Therefore, the attributes or features of collaboration distinguish it from a partnership or an obligation to fulfill an organizational role. In other words, the commitment of two organizations to work together does not instantly translate to an effective collaborative relationship between individuals. A deep commitment to collaboration may be influenced by the progression of a task-based dyadic relationship "beyond role-specified surface encounters" between individuals in an organization (Gabarro, 1987, p. 181) and is dependent on social exchange, participant factors, and the environment in which they work (McDonough & Doucette, 2001). Additionally, a partnership entails a commitment to foster a working relationship between two organizations and to a more important extent between the individuals in the organizations.

Collaborative practice in this study was conceptualized as a working relationship between two individuals. With this in mind, a contractual commitment does not directly imply a commitment to maintain an interdependent and effective working relationship, even though the actors cannot willingly sever the relationship (Gabarro, 1987; Scanzoni, 1979). For instance, actors in the exploration and trial stage will test whether they want to continue to develop the relationship (McDonough & Doucette, 2001; Scanzoni, 1979). Thus, collaboration is a joint endeavor that is characterized by five critical attributes: joint planning, concern for other's opinion, cooperation, coordination, and shared decision making (Baggs, 1994; Doucette et al., 2005; Zillich et al., 2004). Collaboration is not synonymous with partnership or joint venture.

McDonough & Doucette's (2001) framework for the development of physician-pharmacist collaborative working relationships is relevant to understanding how a case manager-HIV PCP relationship develops. The framework is applicable to HIV care because it is bi-disciplinary and describes the progression of a working relationship between a dyad. This study is the first to examine the HIV PCP case manager dyad using an empirical study design to assess influential predictors of collaborative practice. In addition, this study built upon and extended the work of Zillich et al. (2004) and Doucette et al. (2005) in several important ways. First, the study surveyed two disciplines simultaneously. Second, the study revised and added several important determinants of the development of collaborative practice that were not included as predictors in earlier work.

## **Background of HIV Care and Treatment in NYC**

**Epidemiological profile of HIV/AIDS in NYC.** In 2006, approximately 1.1 million adults were living with HIV/AIDS in the United States (CDC, 2008a). As of December 31, 2008 there were 105,633 persons living with HIV/AIDS (PLWHA) in NYC (NYC DOHMH, 2009).<sup>8</sup> Of those, 41,177 were HIV positive and 64,456 were diagnosed with AIDS. In 2007, New York City reported 3,809 new HIV diagnoses, among which 938 were diagnosed as concurrent AIDS diagnoses (NYC DOHMH, 2009). The NYC DOHMH estimated that 4,800 new HIV infections occurred in 2006 (2008bc). In 2008,

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<sup>8</sup> Data are from the NYC DOHMH HIV Epidemiology & Field Services Semiannual Report October 2008 covering period Jan 1, 2008 – Dec. 31, 2008.

African Americans accounted for approximately 52% of AIDS cases, the largest proportion of any racial/ethnic group in New York City; followed by Hispanics who made up about 31% of the infections (NYC DOHMH, 2009).<sup>9</sup> 42.4% of new HIV diagnoses were among men who have sex with men (MSM), and males accounted for 70% of PLWHA (NYC DOHMH, 2009).

Geographic disparities in HIV prevalence persist in NYC. Neighborhoods with the largest proportion of PLWHA include the South Bronx, Central Brooklyn, Lower Manhattan (Chelsea/Clinton), and Harlem (NYC DOHMH, 2009). The percentage of the population living with HIV/AIDS is highest in New York City's poorest neighborhoods as well as in those neighborhoods with the highest concentrations of MSM and injection drug users (IDUs) (Karpati et al., 2004; NYC DOHMH, 2008c). Furthermore, AIDS-free survival rates vary by geographic neighborhoods, with survival gains less apparent in poorer neighborhoods (Laraque & Weglein, 2008).<sup>10</sup>

The NYC DOHMH reported significant delays in HIV care in 2006 (Laraque & Weglein, 2008).<sup>11</sup> A 2005 analysis of 54,616 PLWHA who received care at a hospital, clinic or private MD in NYC revealed that approximately 5,400 received intermittent care and around 4,700 were lost to follow-up (Laraque & Weglein, 2008).<sup>12,13</sup> A major

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<sup>9</sup> Data are from period Jan 1, 2008 – Dec. 31, 2008.

<sup>10</sup> Based on NYC DOHMH HIV Epidemiology and Field Services Program, unpublished data, February 2008.

<sup>11</sup> Based on NYC DOHMH HIV Epidemiology and Field Services Program, unpublished data, February 2008.

<sup>12</sup> Lost to follow-up means the individual(s) never returned for care at a facility in NYC.

concern is the phenomenon that thousands of PLWHA are not receiving HIV primary care in NYC in addition to the patterns of fragmented care. Populations at risk for discontinuity of care include those with risk factors that may pose barriers to HIV care such as mental health or substance abuse issues, homeless or unstably housed, low-income and those with logistical issues (transportation and/or childcare) (Laraque & Weglein, 2008).

**Systems of care in NYC.** The HIV/AIDS-related care system is quite complex in NYC (Laraque & Weglein, 2008). Ambulatory care and case management are funded by several large programs, as evident from **Table 3-1**.

**Table 3-1 Systems of HIV Care in NYC**

**Medical Care**

*Medicaid ambulatory care*

Annual expenditures - \$191M

Beneficiaries - 50,125

*ADAP+/ambulatory care\**

Annual expenditures - \$15.8M

Beneficiaries - 13,610

**Case Management**

*Medicaid Community Follow-up Program (COBRA)*

Annual Expenditures- \$46.1M

Enrollees- 10,909

*Ryan White Part A enrollees - 48,000*

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Note: Laraque, F., & Weglein, D. (2008). HIV Care Coordination in NYC. HIV Care Coordination Meeting. New York, NY: New York City Department of Health and Mental Hygiene, HIV Care, Treatment and Housing Program.<sup>14</sup>

<sup>13</sup> June 2008, prepared with data reported by September 30, 2007 by NYC DOHMH HIV Epidemiology and Field Services Program.

<sup>14</sup> Fiscal Year (FY) 2006 estimate; all other Medicaid statistics from FY 2007. Ryan White estimate 2005. Sources – Medicaid and ADAP statistics, personal communication I Feldman,

\*AIDS Drug Assistance Program (ADAP); Special Needs Programs (SNPs).

## **Significance**

The findings of this study can serve to enhance our understanding of factors that explain collaborative practice among HIV PCPs and case managers. According to the Principal Investigator's knowledge, this is the first study to use a theoretical model to explain and measure collaborative practice among HIV PCPs and case managers. Understanding the relationship of participant, context, and social exchange factors to collaborative practice and identifying the most influential determinants of collaboration will help providers and organizational leaders in their development of structural, hiring, and training strategies to foster effective social exchanges and to adapt organizational factors to promote collaborative working relationships. The study also critically assesses the psychometric properties of the survey instrument for HIV ambulatory PCPs and case managers, thereby building upon the foundation of rigorous validation and reliability testing of the PPCI and the CSACD. Ideally, this study would have evaluated the effect of collaboration on patient outcomes. However, the survey was anonymous and therefore could not measure this relationship.



## Study Objectives

Given the importance of collaborative practice in effective HIV/AIDS treatment, the primary aim of this study was to test an existing theoretical model of collaborative practice (McDonough & Doucette, 2001) on HIV PCPs and case managers in an ambulatory care setting. McDonough & Doucette's framework underlines the importance of participant, context, and exchange factors in explaining collaborative practice. The secondary aim of this research was to determine which factors play the most important role in facilitating collaboration. To accomplish this aim the study added key variables that are relevant to HIV care and treatment.

## Research Questions and Hypotheses

**Question 1:** Does the theoretical model developed by McDonough & Doucette (2001) explain collaborative practice among HIV PCPs and HIV case managers in managing the patient's care plan?

**Hypothesis 1:** Based on previous empirical research, the first hypothesis posits that a model consisting of participant, context, and social exchange factors explains a substantial amount of variance ( $\geq 50\%$ ) in collaborative practice among HIV PCPs and HIV case managers (Doucette et al., 2005; Zillich et al., 2004).

**Question 2:** How important is each group of relationship drivers (participant, context, exchange) in explaining collaborative practice among the case manager-HIV PCP dyad?

**Hypothesis 2:** The second hypothesis postulates that social exchange factors (relationship initiation, role specification, and trustworthiness) are the most influential

group of relationship drivers for explaining the change in the proportion of variance (Doucette et al., 2005; Zillich et al., 2004).

**Question 3:** How important is each variable in explaining collaborative practice for the case manager-HIV PCP dyad?

**Hypothesis 3:** The third hypothesis predicts that some factors are more important for explaining collaboration. **Table 3-2** presents participant factors' expected associations with collaborative practice. Younger participants (Bradshaw & Doucette, 1998; McDonough & Doucette, 2001; Ritchey & Raney, 1981), case managers with a baccalaureate degree (vs. those with a two year degree or less) (Weiss & Davis, 1985), and participants with interdisciplinary training in collaboration (Alt-White et al., 1983; Bradford, 1989; Dechairo-Marino et al., 2001; Fagin, 1992; San Martin-Rodriguez et al., 2005; Snyder et al., 1996) and substantial work experience are more likely to collaborate (Baggs & Schmitt, 1997; Gabarro, 1987; Miccolo & Spanier, 1993; Stapleton, 1998).

**Table 3-2 Alternative Hypotheses for Participant Factors**

Variable	Expected Association with Collaborative Practice
<i>Participant Factors</i>	
Position (HIV PCP or case manager)	^
Gender	^
Younger age	+
Baccalaureate degree (case managers)	+
Medical Degree (HIV PCPs)	+
Interdisciplinary training	+
Internal Medicine (primary specialty)	+
HIV Specialists	-
Greater work experience (years)	+

^ Variable will not have a significant association with collaborative practice.

+ Variable will have a positive and significant effect on collaborative practice.

- Variable will have a negative and significant effect on collaborative practice.

Additional influential factors are presented in **Table 3-3** including strong organizational leadership support (vs. weak leadership support) for interdisciplinary collaboration (Borrill et al., 2002; Prescott & Bowen, 1985; Stichler, 1995), and HIV PCPs and case managers who describe themselves as administrators (vs. clinicians) (Weiss & Davis, 1985).

**Table 3-3 Alternative Hypotheses for Context Factors**

Moreover, frequent professional interactions (Doucette et al., 2005; Lamb & Napodano, 1984; Zillich et al., 2004), lower volume of HIV patients ( $\leq 50$ ) (Baggs & Schmitt, 1997; McKay & Crippen, 2008; Moreo, 2003a, 2003b); case manager-HIV PCP experience working together ( $\geq 1$ year) (Baggs & Schmitt, 1997; Gabarro, 1987), and complexity of patient panels (vs. patient panel with fewer	Variable	Expected Association with Collaborative Practice
	<i>Context Factors</i>	
	Definite economic incentive	+
	Academic status (HIV PCPs only)	^
	Practice setting	^
	Organizational leadership support	+
	Practice time (Administrator)	+
	Frequent professional interaction	+
	Small HIV caseload ( $\leq 50$ )	+
	Dyad years worked together ( $\geq 1$ year)	+
	Complexity of patient panel	+
	Frequent interdisciplinary meeting	+
	Interdisciplinary meeting attendance	+
	Electronic systems use	+
	Interdisciplinary care protocol	+
	Case manager protocol	+
	Dyad is co-located (proximity)	+
	^ Variable will not have a significant association with collaborative practice.	
	+ Variable will have a positive and significant effect on collaborative practice.	
	- Variable will have a negative and significant effect on collaborative practice.	

behavioral and social issues) (McDonald et al., 2007; Nadler & Tushman, 1988; Sicotte et al., 1993; Thompson, 1976; Van De Ven et al., 1976; Xiao et al., 1996; Charns & Schaefer, 1993 as cited in Young et al., 1998) are hypothesized to enhance collaboration. In addition, other organizational features that are expected to explain case manager-HIV PCP collaborative practice include mutual adjustment mechanisms (vs. no mechanisms) to facilitate joint care decisions and shared goals (Alt-White et al., 1983; Bickell & Young, 2001; Henneman et al., 1995; McKay & Crippen, 2008; Young et al., 1997), information systems use (vs. no use) (McDonald et al., 2007; Pogach et al.,

2004; Sicotte et al., 2002), and co-located case management and HIV ambulatory care programs (vs. separate work locations) (Alt-White et al., 1983; Baggs et al., 1997; Dwyer et al., 1987; McDonough & Doucette, 2001; San Martin-Rodriguez et al., 2005).

**Table 3-4 Alternative Hypotheses for Social Exchange Factors**

**Table 3-4** summarizes the expected influence of the social exchange factors. These factors to be the dominant drivers of

Variable	Expected Association with Collaborative Practice
<i>Exchange Factors</i>	
Trustworthiness	+
Role Specification	+
Relationship Initiation	+
+ Variable will have a positive and significant effect on collaborative practice.	

collaboration, whereby strong working inter-professional relationships characterized by trust, helpfulness, effective conflict resolution, and bi-directional communication foster collaborative practice (vs. low case manager-HIV PCP perceptions of social exchanges) (Abramson & Mizrahi, 1996; Alt-White et al., 1983; Arcangelo et al., 1996; Baggs & Schmitt, 1997; Crosby et al., 1990; Devereux, 1981; Doucette, 1999; Doucette et al., 2005; Emerson, 1962; Keleher, 1998; McDonough & Doucette, 2001; McKay & Crippen, 2008; Miccolo & Spanier, 1993; Mohr & Nevin, 1990; R. M. Morgan & Hunt, 1994; Nichols et al., 2002; Scanzoni, 1979; Silen-Lipponen et al., 2002; Snyder et al., 1996; Stichler, 1995; Zillich et al., 2005; Zillich et al., 2004).

## Chapter 4: Methods

### Survey Methods, Participants, and Data Collection

A cross-sectional survey of HIV PCPs and case managers working in NYC measured participant, context, and exchange factors that influence collaborative practice using a self-administered, anonymous mail survey. The survey administration was sponsored by the NYC DOHMH's HIV Care, Treatment & Housing Program (CTHP). A study protocol was developed to guide study participant recruitment, data collection, database management, and statistical analysis (see Appendix C).

**Sample and setting.** A two step process was used to construct a list of eligible study participants. First, case managers were identified by contacting all program managers at agencies (including hospitals, community based organizations, and community health centers) that received Ryan White Part A (see Appendix A for an overview of Ryan White) funds for case management services from the NYC DOHMH through its sub-contractor, Public Health Solutions (PHS). Agencies funded by Ryan White Part A that conducted case management activities had at least one of the following contracts: outpatient medical care (N =22), case management (N = 25), treatment adherence (N=3), and maintenance in care (N = 12). Ryan White Part A program managers at 56 unique agencies were asked to provide names of prospective case managers that met the eligibility criteria outlined in the next section and their respective mailing addresses. Program managers did not provide case management services and thus were ineligible to participate in the study. All HIV case managers at the agencies contacted were eligible to participate, regardless of funding source,

because agencies may have provided case management services that are funded by other sources (e.g., Medicaid). The results obtained from an examination of this particular set of agencies should be generalizable because the agencies' case management services are funded by diverse funding streams.

The second process of developing the prospective sampling list involved merging a list of prospective case managers with a list of HIV PCPs. The NYC DOHMH CTHP provided a list of 362 HIV PCPs that practice HIV primary care in NYC. The list was developed by contacting HIV medical directors at HIV outpatient care settings in NYC. The list included hospital outpatient clinics, substance abuse treatment facilities, community based organizations with primary care on-site, and community health centers. This list of HIV PCPs was appropriate because the goal of the study is to understand HIV PCP-case manager collaboration.

The initial sampling frame consisted of 749 eligible participants, which included 387 case managers and 362 HIV PCPs.

**Inclusion criteria.** The study constructed a list of prospective participants after receiving IRB approval. Inclusion criteria were used to select prospective study participants from both groups.

Case managers were eligible to participate in the study if they met the following criteria:

- Aged 18 years or older
- Worked in one of the five boroughs of NYC (including Manhattan, Brooklyn, Bronx, Staten Island, and Queens); and

- Worked as a case manager, social worker, nurse, treatment adherence counselor or anyone else who is assigned to help an HIV-infected patient coordinate care and treatment (including medication) adherence (Katz et al., 2001) through case management activities. Depending on the setting, the case manager's activities may have included intake, assessment, service plan development, service plan monitoring and re-assessment, treatment adherence counseling, coordination of care, and discharge.

HIV primary care providers (PCPs) were eligible to participate in the study if they meet the following criteria:

- Aged 18 years or older
- Worked in one of the five boroughs of NYC (including Manhattan, Brooklyn, Bronx, Staten Island, and Queens); and
- Worked as an HIV PCP (physician's assistant (PA), nurse practitioner (NP), medical doctor (MD), or doctor of osteopathy (DO)).

**Recruitment.** Prospective participants were invited to participate in the study by means of a mail survey. A cover letter explained the primary aim of the survey and the intended use of the survey and clarified that participation in the survey is completely voluntary. The cover letter also included contact information for the Principal Investigator (P.I.) in case participants had questions about the research. Study participants were asked to anonymously return their completed survey in the stamped, return envelope provided. Three reminder postcards were sent to all eligible study participants. The postcard also provided contact information of the P.I. in the event that prospective participants have questions or would like to request another copy of the survey. Prospective study participants recruited for the study were from diverse

hospitals, community based organizations and community health centers. Therefore, assuming no non-response bias, it was believed that participants were representative of diverse demographic and geographic backgrounds.

**Timeline of study.** The study protocol was approved by Tulane School of Public Health & Tropical Medicine's Institutional Review Board (IRB) in May 2009 and by the NYC DOHMH Human Subjects IRB in June 2009 (see Appendix D for IRB communication). Case managers and HIV PCPs to be recruited for the study were identified in late September of 2009. Surveys were administered in early November, followed by three, bi-weekly postcard reminders (see Appendix E for postcard reminders). Data collection took place from November 5 to December 23, 2009. Data analysis was conducted from January to May 2010.

**Instrument.** The study instrument was adapted, with permission, from Zillich et al. (2004) physician/pharmacist collaboration survey and Baggs (1994) CSACD scale. The study endeavored to modify the PPCI and test it on HIV PCPs and case managers. The revised survey instrument used in this study measured the independent predictor variables for the two groups of participants and a new scale (discussed in the next section) was created to measure the dependent variable, collaborative practice.

Based on a review of literature, several influential determinants of collaborative practice were altered for this study and/or added to the framework. These included education variables, caseload complexity, and coordinating mechanisms. Zillich et al. (2004) and Doucette et al. (2005) used residency training as a proxy for education. However, the literature identified a relationship between autonomous professional



training and values attributed to interdisciplinary collaboration. Therefore the study excluded the question on residency training and replaced it with a question that asked about professional interdisciplinary training in health care. Moreover, the survey included a question on the level of education and profession for case managers and HIV PCPs respectively. Finally, the study added questions that measure the coordinating mechanisms used by the participants' organization. The literature surveyed showed an association between coordination mechanisms and coordination (a requirement for collaboration). The coordination mechanisms added included standardization, mutual adjustment and organizational support.

The survey also significantly altered the format and time frame for the Professional Interaction Scale developed by Zillich et al. (2004). The adaptation of the professional scale was necessary for several reasons. First, HIV PCPs and case managers do not interact as frequently as physicians and pharmacists. One reason for less interaction is the standard of HIV care; patients are recommended to visit their HIV PCP every three to six months (Panel on Antiretroviral Guidelines for Adults and Adolescents, 2009). Second, Zillich reported that respondents had difficulties answering the professional interaction scale (personal communication, February 25, 2009). The adapted professional interaction scale was a seven-item scale that measured the frequency of patient care activities between a case manager and HIV PCP during a three month period. Scores ranged from 7 to 28.

The study adapted work by Zillich et al. (2004) and Baggs (1994) to create a measure of collaborative practice for use in an HIV ambulatory setting. Additional determinants including patient mix, funding, standardization, mutual adjustment, monitoring mechanisms, operational support, complexity of patient care, and administrative support for collaborative practice were added to the model. Study

participants were asked to think of a case manager or HIV PCP that they work with the most and think in general about their interactions with that person over time.

Participants were asked to keep this frame of reference in mind when answering questions about their relationship with this individual.

**Measurement of variables.** Variable names and definitions are described in **Tables 4-1 to 4-4** on the subsequent pages. Dummy variables were created for the levels of categorical variables so that there were (n-1) dummy variables for the total levels of each categorical variable. For example, patient caseload had four categories, so three dummy variables were created.

See Appendix F for complete copies for the survey instruments. There were several questions that measured the same variable using different response categories for both study respondent types: 1) education/profession; 2) primary specialty; 3) board certification in a sub-specialty; 4) academic status/discipline; 5) and case management training. Data dictionaries for HIV PCP and case manager surveys are presented in Appendix G.

**Table 4-1 Definitions and Measures of Participant Characteristics**

<b>Variable Name</b>	<b>Variable Definition</b>
Position	Case manager or HIV PCP
Age	Age in years
Age group	Age categories of study participants ranging from 20-29 to 70+
Gender	M/F
Profession	Type of profession: Medical Doctor, Nurse Practitioner, Physician Assistant, Doctor of Osteopathy, or other

<b>Variable Name</b>	<b>Variable Definition</b>
Interdisciplinary Care Training	Training on interdisciplinary care (Y/N)
Years practiced	Years engaged in direct medical care
Primary specialty	Categories: Family medicine, internal medicine, pediatrics or other
HIV Specialty	HIV specialist (Y/N)
Sub-specialty	Categories: Infectious Disease, Allergy & Immunology, Hematology /Oncology, Other, or Don't Know

Note: The participant characteristics are from the HIV PCP version of the HIV PCP/Case Manager survey.

**Table 4-2 Definitions and Measures of Context Characteristics**

<b>Variable Name</b>	<b>Variable Definition</b>
Practice Setting	Environment that the HIV PCP works in: Designated AIDS Center (DAC), hospital outpatient clinic, non-DAC, or community based organization with primary care on site, community health center or substance abuse treatment facility with primary care on site
Academic status	Categories were Intern, Resident or Fellow; part-time/adjunct faculty appointment/voluntary attending; full-time faculty appointment; or no faculty affiliation
Severity Score	Reflects the severity of the subject's caseload. Scores derived by adding the proportions of cases that had: <ul style="list-style-type: none"> <li>• An active substance abuse problem (fill in percent)</li> <li>• A debilitating mental illness (fill in percent)</li> <li>• Were unstably housed, unemployed or a single parent (fill in percent)</li> </ul> Scores range from 0-300
Patient caseload	Size of HIV case load: ≤20; 21-50; 51-199; or ≥200

Variable Name	Variable Definition
Practice Time	<p>Categorical variable based on amount of time spent on direct patient care, administration, or other. Variable was constructed by classifying subjects based on their responses to items related to percent of time spent providing: direct patient care; administration; teaching; and research (fill in percent for each category, all percents should equal 100).</p> <p>If subjects spent <math>\geq 50\%</math> of time on patient care or administration they were classified as such. Otherwise, they were classified as other.</p> <p>Categories include Clinician, Administrator, and Other</p>
Economic Incentive	<p>Variable based on the type(s) of funding the subject's organization receives for case management services. Item 18 in the survey asks about the funding streams, including: (1) Ryan White Part A; (2) Medicaid Comprehensive Case Management (COBRA); (3) HIV Special Needs Plans; (4) Medicaid fee for services; (5) Medicaid HIV specialized tiered rate for DACs; (6) Other; and (7) Don't know</p> <p>Categories were constructed according to whether the HIV PCP or case manager can be reimbursed for working together (see Appendix H). The categories were Definite Incentive, Partial/Mixed Incentive, No Incentive, and Missing Information.</p>
Professional Interaction Scale	<p>Volume of interaction between case manager and PCP in the past three months. Seven items, frequency includes: <math>\leq 5</math>; 6-12; 13-24; or <math>\geq 25</math>. Scale scored from 7 to 28.</p>
<p>Executive Leadership (Administrative support)</p> <p>(Henneman et al., 1995; Stichler, 1995, San Martin-Rodriguez et al., 2005; Borrill, 2002)</p>	<p>Executive leadership's support of collaborative practice. Scored on a 7-point Likert scale where 1 = Very Strongly Disagree and 7 = Very Strongly Agree.</p>
<p>Interdisciplinary care protocol</p> <p>Standardization of work—mode of coordination (Adapted from Sicotte et al., 2002)</p>	<p>Availability of protocols or policies describing the activities and processes that facilitate interdisciplinary service delivery (Y/N/Missing)</p>

Variable Name	Variable Definition
Case manager protocol Standardization of work—mode of coordination (Adapted from Sicotte et al., 2002)	Availability of protocols or policies describing the role of the case manager (Y/N)
Frequency of interdisciplinary meetings Mutual Adjustment—mode of coordination	Frequency of case conferences/case reviews or interdisciplinary rounds to discuss performance and allow for feedback to improve performance: Never, weekly, bi-weekly, monthly, or quarterly
Interdisciplinary meeting attendance Mutual Adjustment—mode of coordination	Attend case conferences/case reviews or interdisciplinary rounds to discuss performance on a regular basis with the case manager that is evaluated (Y/N)
Shared electronic information system Information system—operational process	Electronic information data sharing tool to collect and share information (Y/N)
Dyad proximity Physical proximity—operational process	Physical proximity of case manager and HIV PCP: different building, same building, same floor, same suite, or share desk space (circle one)
Dyad work for same organization Organization—operational process	Case manager and HIV PCP work for same organization (Y/N)
Dyad work years together	Years

Note: The participant characteristics are from the HIV PCP version of the HIV PCP/Case Manager survey.

***The HIV PCP-case manager collaboration scale.*** The HIV PCP-Case Manager Collaboration Scale was a 14-item scale that elicited information on the social processes of the dyad. Three subscales made up the HIV PCP-Case Manager Collaboration Scale. All subscales were scored on a 7-point Likert scale where one equals very strongly disagree and seven equals very strongly agree. Higher scores represented a higher degree of a collaborative relationship. The Relationship Initiation Subscale was a composite of behaviors made up of three items that measure the case manager's initiating behavior. The hypothesis was that case managers would be the primary initiators of the working relationship. The Relationship Initiation Subscale scores

ranged from 3-21. The Trustworthiness Subscale was a composite of items that measure trust of other's expertise and promise; a single item that measured commitment; and two items that measured bi-directional communication. There were six items that measured trustworthiness and scores ranged from 6-42. The Role Specification Subscale assessed the dyad's ability to negotiate roles (conflict resolution) and dependency among both providers in caring for patients. Five items measured role specification with scores ranging from 5-35. Zillich et al. (2005), Doucette et al. (2006), and Zillich et al. (2006) used the subscale score to measure social exchange, but the PPCI subscales could also be summed to create an overall PPCI score (A. J. Zillich, personal communication, March 6, 2009). For the purpose of this study, the subscale scores were used. The subscale score were calculated by summing the items. Similar to work by Zillich et al. (2005) and Doucette et al. (2005), the relationship initiation subscale assumed that the case manager is the main initiator of the relationship and inquires how he/she can help the HIV PCP. Therefore, it was assumed that the case manager initiated most of the working relationship after formal introduction and contractual relationships had been arranged (K. Cieloszyk, personal communication, December 18, 2008).

**Table 4-3 Definitions and Measures of Exchange Characteristics**

Relationship Initiation Subscale	3 items. Scored on a 7-point Likert scale where 1 = Very Strongly Disagree and 7 = Very Strongly Agree. Scores range from 3 to 21.
Trustworthiness Subscale	6 items. Scored on a 7-point Likert scale where 1 = Very Strongly Disagree and 7 = Very Strongly Agree. Scores range from 6 to 42.

Role Specification Subscale	5 items. Scored on a 7-point Likert scale where 1 = Very Strongly Disagree and 7 = Very Strongly Agree. Scores range from 5 to 35.
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Note: The exchange characteristics are from the HIV PCP version of the HIV PCP/Case Manager survey.

**Collaborative practice.** The dependent variable, collaborative practice, consisted of five critical attributes of collaboration based on work by Baggs (1994) and Zillich et al. (2004): a) *shared responsibilities for planning*, b) *shared decision making*, c) *cooperation*, d) *consideration for oneself and others' interests*, and e) *coordination*. Five items on collaborative practice measured a participant's perspective of collaboration in managing patients' care plans. Collaborative practice was scored on a 7-point Likert scale (1 = strongly disagree to 7 = strongly agree) (Baggs, 1994; Zillich et al., 2004) and scores were calculated by summing the items. Scores could be as low as 5 or as high as 35. Higher scores on the CSACD represented higher perceived collaboration among case managers and HIV PCPs. In a study of physician perceptions of collaboration, mean scores were 24.2 with a standard deviation of 6.3 (Zillich et al., 2004).

**Table 4-4 Definitions and Measures of Collaborative Practice Scale**

<i>5 items make up the scale. Scored on a 7-point Likert scale where 1 = Very Strongly Disagree and 7 = Very Strong Agree. Scores range from 5 to 35.</i>							
I work with this case manager to plan the goals of the care plan for our patients.	1	2	3	4	5	6	7
Decision-making responsibilities for our patient's care plan are shared between the case manager and me.	1	2	3	4	5	6	7

There is cooperation between the case manager and me in managing the care plan of our patients.	1	2	3	4	5	6	7
In making decisions for our patients, physician and case manager opinions are considered.	1	2	3	4	5	6	7
Decision making for the patient is coordinated between this case manager and me.	1	2	3	4	5	6	7

Note: The Collaborative Practice Scale is from the HIV PCP version of the HIV PCP/Case Manager survey.

## Statistical Analysis

**Statistical packages utilized.** In the context of this study, SAS and SPSS were utilized for different purposes. Unless otherwise noted, statistical analysis was performed using SAS 9.2 (SAS Institute, Cary, NC) and SPSS (SPSS IBM 18, Chicago, IL) was used for the hierarchical multiple regression modeling. The following section provides a brief overview of SAS and SPSS and then discusses their respective strengths and weaknesses in light of statistical analysis and data management. The rationale for using SPSS for the hierarchical regression is also explained in this section.

**Historical overview.** SAS began in 1976 with the development of a software package for statistical analysis. Since then, SAS has branched out to offer business analytic software and services for data integration, risk management, and supply chain intelligence, to name a few (SAS Institute Inc., n.d.). SAS is driven by the SAS language, rather than a menu or commands, which consists of a series of instructions known as programs to request a specific analysis, produce results, or read data (Mitchell, 2005). The command structure is complex and there is a steep learning curve



for new users (Mitchell, 2005). Moreover, it is complex because it consists of a set of statements that can be enhanced by requesting different options through additional statements in the syntax (Mitchell, 2005). Oftentimes, lengthy syntax is required for a particular analysis to request options outside the scope of the regular program statements.

SPSS started in 1968 as a software package for statistical analysis. SPSS became a corporation in 1975 and has since evolved to offering data mining, web analytics, predictive analytics, and business analytics, to name a few (SPSS Inc, 2010). In July 2009 IBM acquired SPSS Inc. and has expanded its focus on business analytics (IBM, 2009). The principal way of using SPSS Inc. is through its point-and-click interface, which allows users to navigate a menu to perform statistical analyses. SPSS also the capability for users to write command syntax, but the user has to request to display the syntax window since it is not displayed by default (Mitchell, 2005).

**Features.** To note, this is not an exhaustive list of the two packages' statistical and data management features. This discussion highlights the strengths and weaknesses of the packages as they pertain to the study at hand. The decision to use SAS and SPSS was based on the study investigator's statistical analysis and data management needs. Each package has unique program capabilities. The use of both SAS and SPSS increases the researcher's toolkit and has the advantage of using the strengths of both packages (Mitchell, 2005).

The advantage of SPSS as a statistical tool is that it is well suited to a novice statistical software user in that it does not have a steep learning curve because of the point-and-click interface. SAS, on the other hand, requires that users learn to write

programs. In general, SAS has the advantage that the user can customize programs for their statistical analysis and it is easy to merge datasets (Yaffee, 1996). Meanwhile, the command syntax in SPSS is not user friendly and there is not a consistent and regular command structure like SAS (Mitchell, 2005). It is also hard to distinguish between necessary, and unnecessary syntax when a user tries to transition to using syntax by pasting the syntax generated by the point-and-click interface (Mitchell, 2005).

The newest version, SAS 9.2, offers advanced regression diagnostics and has better graphing capabilities than SPSS. SAS 9.2 offers sophisticated graphing features using the ODS GRAPHICS command including scatter plot matrices and multi-page panels (Murtha, Tao, & Walsh, 2008b). Moreover, SAS 9.2 offers new regression model diagnostics to assess whether the assumptions of OLS regression have been met with the PROC REG statement options. The combination of the diagnostic options with PROC REG statement and the sophisticated graphs that can be generated with the ODS GRAPHICS statement are attractive features that enable users to easily perform regression analysis and assumption testing in SAS (Murtha et al., 2008b).

In terms of data management, in SAS one can easily subset data using the WHERE statement (Mitchell); this can be done in most statistical procedure steps such as a regression, Chi Square or factor analysis, whereas SPSS only allows this subsetting (e.g., just for case managers) for the REGRESSION and LOGISTIC REGRESSION commands using the /SELECT option (Mitchell, 2005). It is also much harder to subset data for non-statistical procedures in SPSS (Mitchell, 2005). SAS has a feature that allows the output to be saved as an .rtf or .html file, thus making it easy to open the output in the absence of SAS (Mitchell, 2005). On the other hand, SPSS saves files as .spo file which can only be viewed by computers that have SPSS (Mitchell, 2005).

While SAS supports many regression models, it has limited support for special purpose regression models (Mitchell, 2005). This, in part, is due to the general SAS language and therefore it is difficult to specify the options for the specialized regression. On the other hand, SPSS has built-in capability for some, but not all, of the specialized regression models (Mitchell, 2005). In the case of the hierarchical multiple regression model, SAS does not support the capability to specify an F change statistic in the options statement of the regression syntax (SAS technical assistant, personal communication, April 5, 2010) for a hierarchical regression, whereas SPSS had this feature built-in and generates the F change statistic.

Because of the many advantages of SAS and the study investigator's familiarity with the package, SAS was selected for the majority of the analyses. SAS was not an appropriate software package for the hierarchical regression modeling, because it does not offer this feature, therefore SPSS was used.

**Preliminary data analysis.** Survey responses were entered and maintained in an Excel database. A series of preliminary data analyses were performed on the data. First, descriptive statistics were obtained on the independent variables and the response variable. This included mean, median, standard deviation, frequency distribution, case outliers for all continuous variables and the percentages for dichotomous or categorical variables. A correlation matrix was also constructed.

Data screening was guided by the following checklist in **Table 4-5**.

**Table 4-5 Checklist for Screening Data**

1. Inspect univariate descriptive statistics for accuracy of input
  - a. Out-of-range values
  - b. Plausible means and standard deviations
  - c. Univariate outliers
2. Evaluate amount and distribution of missing data; deal with problems
3. Check pairwise plots for nonlinearity and heteroscedasticity
4. Identify and deal with nonnormal variables
  - a. Check skewness and kurtosis, probability plots
  - b. Transform variables (if desirable)
  - c. Check results of transformations
5. Identify and deal with multivariate outliers
  - a. Variables causing multivariate outliers
  - b. Description of multivariate outliers
6. Evaluate variables for multicollinearity and singularity

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Note: B.G. Tabachnick & Fidell, 2001a, p. 85

Prior to the statistical analysis, the data was inspected to assess the accuracy of input. Out-of-range variables were identified and correctly input into the database. All miscoded values were correctly coded. All means and standard deviations were evaluated to determine whether they were plausible. Possible outliers were detected by assessing the frequencies for categorical variables. Outliers were examined among continuous variables by inspecting histograms, box plots, and stem-and-leaf plots in addition to evaluating z scores. Z-scores above 3.29 ( $p < 0.001$ , two-tailed test) were considered possible outliers. The amount and distribution of missing data were also analyzed.

**Missing data.** Summary statistics examined missing data to determine whether there was a pattern. The number of missing observations was evaluated by using the Proc Means procedure in SAS and specifying the options n and nmiss to output the number of complete and missing observations by variable. For the most part, variables

had less than 3.3% missing values. Although no guidelines exist on the proportion of acceptable missing data, less than 5% randomly missing data would not pose a serious problem to the generalizability of the data (Tabachnick & Fidell, 2001a). Variables with moderate missing observations included age (nmiss=15, 7.08%), interdisciplinary protocol (nmiss = 10, 4.72%), and dyad work years (nmiss=9, 4.25%). All five items comprising the dependent variables, collaborative practice, had less than 3.3% missing observations. Two study participants had missing values on over 90% of the variables; subsequently, these observations were not included in the univariate and multiple variable statistical analyses.

Patterns of missing data were evaluated by recoding each variable into a dummy variable so that 1 represented missing and 0 represented non-missing. Then, the PROC FREQ procedure was used in SAS to request Chi-Square tests or Fisher's exact tests to compare study participant characteristics (e.g. age, sex, and practice setting) and the new dummy variable for missing. There was no pattern evident among the missing data. Thus, missing data was completely random. In addition, there were no significant associations between missing variables and selected study characteristics. For instance, the dummy variable for missing age was not associated with gender (Fisher's exact 0.1328 (1),  $p > 1.0$ ).

As mentioned earlier, variables with a moderate level of randomly missing data included age and dyad work years. For case managers with missing data on age, the median age for case managers, 41, was substituted for the missing data since the distribution of age was moderately negatively skewed. The mean age of HIV PCPs was substituted for age among PCPs with missing age data. The median age of case managers that were aged 50 or older (54 years) was substituted for case managers that indicated their age was greater than 50 (n=1). Similarly, the mean age for PCPs above

50 years was substituted for a PCP (54.24) that indicated they were older than 50 years (n=1).

In order to reduce the number of participants with missing dyad years work experience, the median number of years the subjects indicated working with the person they evaluated (3 years for both case managers and PCPs) was substituted. In order to include as many respondents as possible in the univariate and regression analyses, the scale variables, including the HIV PCP-Case Manager Collaboration subscales, the professional interaction scale, and the collaborative practice scale, were recoded to deal with missing data. If study participants completed at least two-thirds of the scale items, the value of the missing item(s) was set to the mean of the individual's responses for that particular scale. For example, if a study respondent completed 4 out of 6 items in the trustworthiness scale, the mean of their responses for the 4 items was substituted for the missing trustworthiness items.

**Outliers.** Preliminary data analysis examined cases to determine if there were any univariate and multivariate outliers. This was important, because outliers can lead to Type I and Type II errors (Tabachnick & Fidell, 2001a). In order to detect univariate outliers the standardized z score was reviewed. A score above 3.29 ( $p < 0.001$ , two-tailed test) indicated a potential outlier (Tabachnick & Fidell, 2001a). Graphical methods were also used to detect outliers including histograms, stem-and-leaf plot, and box plots. No observations for age had extreme z scores. After inspection of z-scores for the variable years practiced, one observation, an HIV PCP, was a potential univariate outlier (z- score=3.6887  $p < 0.001$ ). This was an older study participant that reported 45 years of direct patient care. After careful inspection of the completed survey, it was

determined that the data was correctly entered and the observation was retained since it was a valid observation.

Inspection of the variable dyad work years revealed two potential outliers. One was a study participant who reported 15 years of experience working with the HIV PCP that they evaluated (z-score = 3.8193,  $p < 0.001$ ). This observation was not deleted, because it was a correct data entry. Another potential outlier for dyad years work experience was a study participant who reported 17 years of work experience with the person they evaluated (z-score = 4.51275,  $p < 0.001$ ). Likewise, this observation was retained for analysis since it was a valid finding. There were no z-scores greater than 3.29 for the variables representing severity of patient caseload and collaborative practice. None of the univariate outliers were multivariate outliers upon inspection of the assumptions of regression.

**Tests of validity and reliability.** Given that the study survey was adapted from the Physician/Pharmacist Collaboration Instrument (PPCI) to measure social exchange factors among HIV PCPs and case managers, the study examined the psychometric properties of the responses before the univariate and multiple hierarchical regression analysis was conducted to determine whether the adapted instrument had adequate reliability and satisfactory construct validity.

**Internal consistency reliability.** Internal consistency reliability was measured using Cronbach's alpha for all scales including the HIV Provider-Case Manager Collaboration Scale and collaborative practice. Cronbach's alpha looks at the consistency of the item responses and takes into account the number of items, the sum

of the variances of the items, and variance of the total score (Pedhazur & Schmelkin, 1991). Cronbach's alpha ranges from zero to one, with higher scores indicating a higher proportion of systematic variance among the items. Scores above 0.80 were deemed acceptable values for internal consistency (Brallier, Lovett, & Miller, 2002). Results of the analysis are presented in the next chapter.

**Construct validity.** This study performed confirmatory factor analysis (CFA) and exploratory factor analysis (EFA) to assess whether the psychometric properties of the HIV PCP-Case Manager Collaboration Scale changed. Recall, the scale consisted of three subscales—trustworthiness, role specification, and relationship initiation. Several steps were taken to investigate the factor structure of the scale. The first step included performing a CFA. CFA is a multivariate technique that uses structural equation modeling to test whether latent constructs can explain the relationship among a set of observed variables (Suhr, 2003; Truxillo, 2008a). If the CFA indicates a poor fit, an EFA is conducted to investigate the underlying structure of relationships among items and the latent factors that presumably make up the scale. Several model iterations of the EFA are often required until the factors extracted meet the appropriate model criteria (see discussion in the next section). It took three EFA models to reach an interpretable factor solution with simple structure (results are discussed in the next chapter). Several CFA models were run to assess whether the factor structures adequately explained the relationships among the observed variables. The CFA and EFA models used data that was transformed using a transformation suited for moderate negative skewness (log10) and was reflected back so that log10 scores were similar to original scales (low score = low score) (Tabachnick & Fidell, 2001b).



*Confirmatory Factor Analysis.* The CFA used maximum-likelihood (ML) to estimate the parameters of the 14 items that made up the scale. The structural equation model specified covariance between the three factors of the scale because the three constructs were hypothesized to be correlated. Constraints were placed on the model to ensure the errors were uncorrelated with each other and uncorrelated with the factors.

Several guidelines were used to evaluate the assumptions of CFA. An important assumption of CFA is overidentification of the model (Truxillo, 2008a, p. 6.22). This is desirable because it provides one set of parameter estimates for the model and error degrees of freedom to allow for statistical inference (Truxillo, 2008a, p. 6.23). At least three indicators per common factor are recommended to ensure that the model structure is adequate for overidentification (Truxillo, 2008a, p. 6.22). Guidelines to assess an overidentified model state that the number of parameters should be less than the number of informations<sup>15</sup> (Truxillo, 2008a). Several “rules of thumb” exist in relation to sample size requirements for a CFA. One states that there should be a minimum of five observations per parameter estimated in the model (Truxillo, 2008a, p. 6.20). Another is a minimum of 10 observations per variable (“Factor analysis: SAS annotated output,” n.d.).

Several fit indices were considered to evaluate the CFA’s model fit. Hu and Bentler (1999) and Truxillo (2008a) provide guidelines for interpreting model fit for CFA.

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<sup>15</sup>“Informations in the model is equal to the number of unique elements of the covariance matrix” (Truxillo, 2008a, p. 6.42).

The goal of model fit assessment for CFA is to support the null hypothesis that the latent variable explains the relationship among the manifest variables. The Chi-Square goodness of fit test statistic was evaluated; the null hypothesis states that the residuals are not large and the Chi-Square should be close to zero (small test statistic). It should be noted that significant p-values for the Chi-Square test imply a poor fit. In light of criticism that the Chi-Square is sensitive to small deviations from the null hypothesis (Bollen & Long, 1993 (Eds.) as cited in Truxillo, 2008a, p. 6.54), considering several fit indices to supplement the Chi-Square test statistic is best (Hu & Bentler, 1999). The Root Mean Square Error of Approximation (RMSEA) indices below 0.06 for ML-based parameter estimates (Hu & Bentler, 1999), with upper 90% confidence interval (CI) below 0.08 are indicative of an adequate fit (Truxillo, 2008a). Standardized root mean square residual (SRMR) less than 0.08 signifies a close fit. Hu & Bentler (1999) propose that Bentler and Bonnett's (1980) Non-normed Fit Index (NNFI) and Bentler's Comparative Fit Index (CFI) values greater than or close to 0.95 are assumed to denote a good fit; the indices range between 0 and 1. Comparisons of revised models can be made by assessing Bozdogan's (1987 as cited in Truxillo, 2008a, p. 6.63) CAIC index; the models with the smallest CAIC are ideal.

Model fit also included an examination of the absolute and normalized residuals to assess for any large residuals (Truxillo, 2008a, p. 6.68). Moderate or large residuals would suggest "Deviations between observed covariances and the covariances expected under the hypothesized model" (Truxillo, 2008a, p. 6.68). All posthoc model modifications compared fit statistics in order to assess the goodness of fit. (Sicotte et al., 1993)

*Exploratory Factor Analysis.* The EFAs used the maximum likelihood (ML) factor extraction technique, an iterative procedure, which is more suitable for distributions that have not met the assumption of multivariate normality (Truxillo, 2008b). The results of multivariate normality testing (SAS Institute Inc., 2009) showed that the data did not exhibit multivariate normality; however, the test is quite sensitive to small deviations from normality (Truxillo, 2008b). ML EFA also has the advantage of providing a statistical criterion (hypothesis tests) for the number of factors. The squared multiple correlations ( $R^2$ ) between the variable and all other variables were used to estimate the commonality estimates. The commonality estimates are best described as “the proportion of the variance of the variable that is both error free and shared with other variables in the matrix” (Consulting Group of the Division of Statistics and Scientific Computing at the University of Austin at Texas, 1995, screen 4). Suhr (2003) recommends a sample size of at least 100 and “5 times the number of items” (p. 2) in order to produce reliable results. Comrey and Lee (1992 as cited in Tabachnick & Fidell, 2001b, p. 588) discussed the adequacy of sample sizes for EFA and note that a sample size of 200 is fair.

All EFA models specified an oblique rotation method to account for the correlation between the factors. The first model did not specify the number of factors to retain to allow a complete evaluation of the factor model. A second model was fit based on the findings and subsequent revisions from the first EFA. The third, revised model specified a three-factor solution given that the second model resulted in a three factor solution.

The models specified a factor loading value of 0.4 for coverage detection to assess the magnitude of factor loadings. The determination of the number of factors to extract and items to retain was based on several criterion including (1) scree plot; (2)

proportion criteria; (3) residual analysis; and (4) interpretability (Consulting Group of the Division of Statistics and Scientific Computing at the University of Austin at Texas, 1995; Garson, 2010; SAS Institute Inc., 2004 ; Suhr, 2005). It is important to note that Kaiser-Guttman's (Guttman, 1954; Kaiser, 1960) criterion of retaining items with eigenvalues greater than one was not used, because it is a guideline better suited for principal component analysis (Consulting Group of the Division of Statistics and Scientific Computing at the University of Austin at Texas, 1995; Truxillo, 2008b, p. 5.41). Additional criteria are discussed below.

*Scree plot.* The scree plot of eigenvalues allows one to examine the change in the proportion of variance accounted for by each factor. One guideline is to look for the "elbow" (Consulting Group of the Division of Statistics and Scientific Computing at the University of Austin at Texas, 1995; Truxillo, 2008b, p. 5.41) to determine the appropriate number of factors to retain. The elbow is indicative of the point that the variance drops (i.e., the rate of change) (Consulting Group of the Division of Statistics and Scientific Computing at the University of Austin at Texas, 1995). Many researchers extract the factors above the elbow or some extract one less than the number of factors above the elbow for a more parsimonious model (Consulting Group of the Division of Statistics and Scientific Computing at the University of Austin at Texas, 1995; Truxillo, 2008b).

*Proportion Criteria.* Ideally, one should retain the "minimum number of factors that can explain 100% of the common variance" (Truxillo, 2008b, p. 5.41). Unless

specified otherwise (using `nfactors=` in SAS code), the default in SAS 9.2 is to retain factors that explain 100% of the variance (Truxillo, 2008b).

*Residuals.* Residuals should be small if the factors adequately explain the relationship amongst the variables. Residuals above 0.1 (Melrose p. 6) are considered large and should be taken into consideration. One method for assessing the residuals is the Chi-Square test for significance of residuals (1995). The null hypothesis states there are “no common factors to sufficiently explain the inter-correlations among the variables in the analysis” (1995, screen 6). A significant result is preferable in this instance. The ML extraction technique also produces a second Chi-Square test that tests the hypothesis that the number of factors extracted (whether specified or determined by default in SAS), based on the proportion criteria (proportion of variance explained), is sufficient for “explaining the intercorrelations among the variables” (1995, screen 6). Unlike the first Chi-Square test, the researcher would like to accept the null hypothesis. It should be noted that a major shortcoming of this statistical criterion is that it is sensitive to large sample sizes—the hypothesis is rejected with large degrees of freedom (1995; Truxillo, 2008b).

*Interpretability.* Factor loading, shown in the factor pattern and pattern matrix for oblique rotations, also plays an important role in evaluating the interpretability of the factor. Eigenvalues greater than 1 are not truly meaningful for EFA because, unlike Principle Component Analysis (PCA) in which the goal is to explain total variance (Pedhazur & Schmelkin, 1991, p. 598; Truxillo, 2008b), EFA strives to explain common

variance amongst the indicator variables (Truxillo, 2008b). Therefore, EFA uses a different algorithm to calculate the eigenvalues.

One rule of thumb offered by Comrey and Lee (1992 as cited in Tabachnick & Fidell, 2001b) is to consider loadings in excess of 0.45 (20% variance overlapping) as fair and factor loadings above 0.55 as good while loadings in excess of 0.71 are considered excellent or high (Comrey & Lee, 1992 as cited in Tabachnick & Fidell, 2001b; Garson, 2010; Zillich et al., 2005). Thus, all items with loadings greater than 0.45 were at the threshold for a meaningful interpretability and were considered for retention. This analysis retained at least three items per factor, as recommended by Suhr (2005) and Truxillo (2008b).

Another dimension of interpretability was whether the items that made up the factors shared a common conceptual meaning (Suhr, 2005; Truxillo, 2008b). To this end, there may be a theoretical reason that explains the relationship among the variables. The researcher must balance the criterion of interpretability with other recommendations for factor extraction. Moreover, each factor must measure a different construct (Suhr, 2005). Finally, simple structure is an important component of interpretability. This implies that items have meaningful/high loadings only on one factor (Garson, 2010; Truxillo, 2008b). The rotated factor pattern (or pattern matrix for oblique rotations) should exhibit simple structure (Suhr, 2005). Items with cross-loadings above 0.3 were excluded because they violated a simple factor structure. Items that did not have a meaningful loading on any factor were excluded from the analysis. The items retained yielded a high or meaningful loading on only one factor and exhibited a low factor loading on the other factors.

This study also used logical analysis to adapt the items that reflect a case manager and HIV PCP relationship in HIV ambulatory care. Logical analysis, which Pedhazur & Schmelkin (1991) explain is a process of evaluation and critical review of the construct whereby items, measurement, and theory are considered, was taken into consideration by Baggs (1994) and Zillich et al. (2004;2005) in the development of the CSACD and the PPCI.

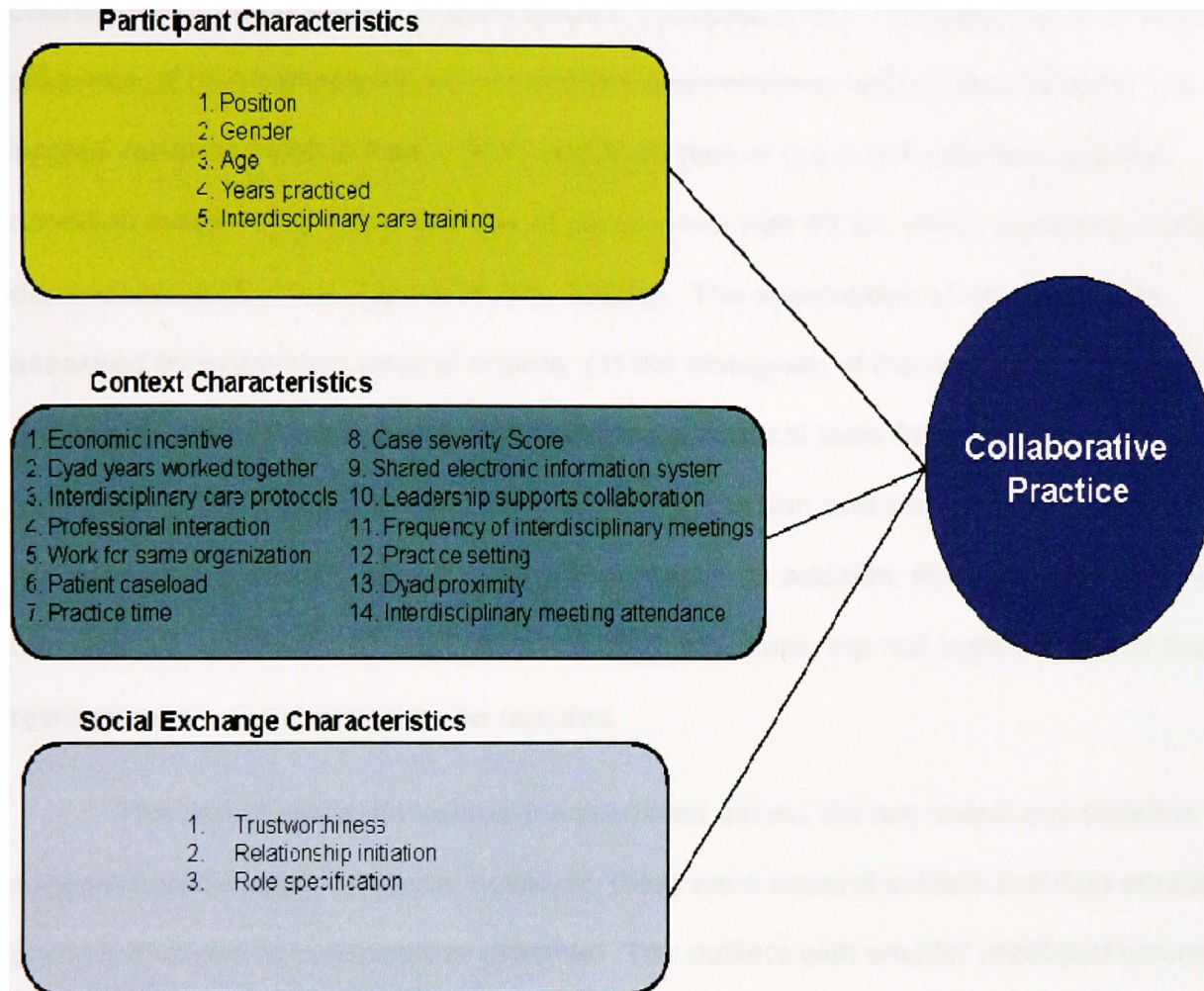
**Content validity.** Content validity is concerned with the adequacy of the items in measuring a construct (DeVellis, 2003; Shi, 1997). Experts in the field of inquiry are often used to confirm the appropriateness and sufficiency of items in the reflection of the construct (DeVellis, 2003). The dependent variable for this study, collaborative practice, was adapted from Baggs (1994) and Zillich et al. (2004). Experts in collaborative practice assessed the CSACD for content validity and found that the items were relevant and sufficient. Zillich et al. (2005) pilot tested the PPCI and also conducted principal and confirmatory factor analysis to generate a reduced PPCI. With this in mind, the adapted CSACD and the HIV PCP-Case Manager Collaboration Scale for this study have satisfactory content validity for the constructs in question.

**Univariate analysis.** Univariate associations among categorical participant and context variables and collaborative practice were investigated using one-way analysis of variance (ANOVA). Chi Square or Fisher's exact test were conducted in order to compare frequencies among characteristics of the study participants for categorical variables. All p-values are two-sided. All assumptions were met for ANOVA with the exception of the model for frequency of scheduled organizational interdisciplinary

discussion, which did not meet the homogeneity of variance assumption. Pearson correlation coefficients examined the strength of the linear relationship between collaborative practice and continuous variables; correlations range from -1 to 1. One-way ANOVAs were performed on questions that measured the same variable using different response categories for both study respondent types: 1) education/profession; 2) primary specialty; 3) board certification in a sub-specialty; 4) academic status/discipline; and 5) case management training.

**Hierarchical multiple regression analysis.** In order to test the hypotheses in the study, hierarchical multiple regression analysis was performed. An ordinary least squares (OLS) regression was conducted using SAS REG (SAS 9.2) to evaluate the model assumptions including participant, context, and social exchange variables. 41 variables were included in the hierarchical regression model. SPSS REGRESSION was used for the hierarchical regression modeling. Prior to analysis, the independent variable (IV) case manager protocol, was removed due to a lack of variance; 87.7% (n =186) of study participants indicated that they have a protocol describing the role of the case manager. 181 study participants were included in the regression analysis; this was less than the number of surveys completed because SAS and SPSS use listwise deletion of missing data. The conceptual model of variables included in the hierarchical multiple regression is portrayed in **Figure 4-1**.





**Figure 4-1 Conceptual Model of Collaborative Practice**

**Assumption testing for OLS regression.** Assumption testing for OLS regression analysis was conducted. Appendix I displays the regression assumptions that were examined to test whether the data met the requirements for linearity. With the exception of the assumption that data were drawn from a random sample of the population, all of the assumptions for OLS regression were met. To evaluate the assumption of independent errors, the Durbin-Watson statistic was used. The errors were not correlated; the Durbin-Watson was 2.035. A Durbin-Watson score close to 2 suggests that the residuals are uncorrelated (Field, 2009). There were no perfect

collinearities among the set of independent variables (IVs). The statistics to evaluate the presence of multicollinearity did not indicate any problems with multicollinearity; the largest variance inflation factor (VIF) was 6.95 (below the cutoff criterion) and the condition index value in the last row of parameters was 49.62, which indicated moderate dependencies (Murtha, Tao, & Walsh, 2008a). The assumption of normality was assessed by examining several criteria: (1) the histogram of the residuals, (2) a normal probability plot of the residuals, and (3) formal statistical tests for normality. The histogram of the residuals revealed a normal distribution and the normal quantile plot did not indicate any serious deviations from normality. In addition, the Kolmogorov-Smirnov test was not significant ( $D = 0.064$ ,  $p = 0.069$ ); therefore, the null hypothesis that the residuals are normal could not be rejected.

The plot of residuals versus the predicted values did not reveal any patterns to suggest non-constant variance; however, there were several outliers that had smaller predicted values of collaborative practice. The outliers with smaller predicted values had slightly more variability than the larger predicted values, but this variability was negligible. A Spearman rank correlation coefficient was also used (PROC CORR procedure in SAS 9.2) to assess the constant variance assumption. The Spearman correlation between the absolute values of the residual and the predicted values was  $-0.237$  ( $p = 0.001$ ), which was considered weak evidence of non-constant variance. A negative Spearman correlation coefficient indicates that the “variance decreases as the mean increases” (Murtha et al., 2008b, p. 2.7).

Model fit was assessed by examining the residual-fit spread plots. The fit-mean plot had more explanatory power compared to the residual quantile plot (Murtha et al., 2008b, p. 2.9) as evidenced by great spread of the plot. The range for the fit-mean was approximately 22-12, whereas the range for the quantile plot of the residuals was about

12-9. The overall F-test for the full model was significant ( $p < 0.001$ ) and the model explained 70% (adjusted  $R^2$ ) of collaborative practice.

Bivariate Pearson correlation coefficients were examined for collaborative practice and the continuous IVs. Correlations among continuous variables and collaborative practice are presented in **Table 4-6**. The correlation between collaborative practice and professional interaction was 0.22 ( $p = 0.003$ ). The bivariate scatterplot of professional interaction and collaborative practice showed a plot, with linear pattern beginning only after a score of approximately 20 (scores ranged from 7 – 28). The bivariate scatterplots of the social exchange factors and collaborative practice showed strong linear relationships ( $p < 0.001$ ). In contrast, the scatterplot of years practiced and collaborative practice showed a u-shaped curve ( $r = 0.10$ ,  $p = 0.170$ ). The curvilinear pattern revealed two curves; one upward curve from 0-20 years and one downward curve from 20-50 years. The scatterplots of dyad years worked together ( $r = 0.18$ ,  $p = 0.014$ ) and severity score ( $r = 0.015$ ,  $p = 0.839$ ) did not show a linear relationship with collaborative practice. The correlations between age and case severity score and collaborative practice were negative and close to zero, suggesting there may not be a linear relationship at all ( $p > 0.05$ ). The correlation matrix revealed that multicollinearity was not present.

**Table 4-6 Pearson Correlation Coefficients**

Prob > |r| under H0: Rho=0 (N = 181)

	Age	Years Practiced	Case Severity Score	Professional Interaction	Dyad years worked together	Trustworthiness	Role Specification	Relationship Initiation	Collaborative Practice
Age	1.000	0.615 <.0001	-0.145 0.051	-0.010 0.893	0.316 <.0001	-0.055 0.462	0.025 0.736	-0.011 0.883	-0.002 0.976
Years Practiced	0.615 <.0001	1.000	-0.170 0.022	0.078 0.300	0.316 <.0001	0.034 0.652	0.020 0.793	0.058 0.436	0.102 0.170
Case Severity Score	-0.145 0.051	-0.170 0.022	1.000	0.017 0.817	-0.019 0.799	-0.019 0.803	-0.051 0.498	0.013 0.864	0.015 0.839
Professional Interaction	-0.010 0.893	0.078 0.300	0.017 0.817	1.000	0.106 0.157	0.167 0.024	0.190 0.011	0.229 0.002	0.223 0.003
Dyad years worked together	0.316 <.0001	0.316 <.0001	-0.019 0.799	0.106 0.157	1.000	0.094 0.210	0.113 0.132	0.137 0.067	0.183 0.014
Trustworthiness	-0.055 0.462	0.034 0.652	-0.019 0.803	0.167 0.024	0.094 0.210	1.000	0.706 <.0001	0.627 <.0001	0.669 <.0001
Role Specification	0.025 0.736	0.020 0.793	-0.051 0.498	0.190 0.011	0.113 0.132	0.706 <.0001	1.000	0.637 <.0001	0.649 <.0001
Relationship Initiation	-0.011 0.883	0.058 0.436	0.013 0.864	0.229 0.002	0.137 0.067	0.627 <.0001	0.637 <.0001	1.000	0.731 <.0001
Collaborative Practice	-0.002 0.976	0.102 0.170	0.015 0.839	0.223 0.003	0.183 0.014	0.669 <.0001	0.649 <.0001	0.731 <.0001	1.000

*Multivariate outliers.* Several criterion were used to evaluate multivariate outliers including leverage, discrepancy, and influence statistics. (In order to evaluate leverage, “how far an observation is from the cloud of observed data points” (Murtha et al., 2008a, p. 2.14), a cutoff of 0.464088 was used; leverage values beyond 0.464088 were considered multivariate outliers. RSTUDENT residual scores greater than 2 were identified as influential observations. RSTUDENT “measures the change in the residuals when an observation is deleted from the model” (Murtha et al., 2008b, p. 2.14). Thirteen observations were detected as multivariate outliers; they had RSTUDENT scores greater than 2 or a leverage score above the cutoff criteria. These 13 observations were weighted in the hierarchical analyses so that the influential observations had a weight of 1 and all other observations had a weight of two. The

weights were applied rather than deleting the influential observations in order to maintain sample size.

*Inference testing.* An alpha of 0.05 was used for a priori inference testing. Forty-one variables were included in the hierarchical regression model. Recall from Chapter 3, the research questions of this study. First, does the theoretical model developed by McDonough & Doucette (2001) explain collaborative practice among HIV PCPs and case managers in managing the patient's service plan? In order to answer this question, the goodness of fit test statistic using the adjusted  $R^2$  of the full model was examined. Second, how important is each type of relationship driver (participant, context, exchange) in explaining collaborative practice among the case manager HIV PCP dyad? To answer this research question, the study employed the same methods as Zillich et al. (2004) and Doucette et al. (2005). A hierarchical model specifying order of inclusion into the model in terms of variables was used to examine the importance of each group of factors: participant, context, and exchange. In order to determine the importance of each group, the R square change was examined. The study used the F change statistic to assess the significance in F change with each increment in  $R^2$  relative to each group's entry into the model. Third, how important is each variable in explaining collaborative practice for the case manager HIV PCP dyad? The t statistic for each beta coefficient was used to answer this research question.

## Chapter 5: Results

### Characteristics of Study Participants

The initial sampling frame consisted of 749 eligible participants, which included 387 case managers and 362 HIV PCPs. Fourteen surveys did not reach the intended recipients because the mail was undeliverable (case managers = 12 and HIV PCPs = 2). A total of 212 surveys were returned, and of those 116 were completed by case managers and 96 were from HIV PCPs. The final response rate was 28.8% (212/749).

**Participant factors.** The characteristics of the study population are presented in **Table 5-1**. The study population was predominantly female.

**Table 5-1 Participant Characteristics**

	Participants <sup>a</sup>								
	Case Manager			HIV PCP			Total		p-value
	N	Row%	Col%	N	Row%	Col%	N	Col %	
<b>Total</b>	<b>116</b>	<b>54.7</b>	<b>100</b>	<b>96</b>	<b>45.3</b>	<b>100</b>	<b>212</b>	<b>100.00</b>	
Age Group <sup>b</sup>									*
20-29	13	81.3	11.2	3	18.8	3.1	16	7.50	
30-39	32	59.3	27.6	22	40.7	22.9	54	25.50	
40-49	41	52.6	35.3	37	47.4	38.5	78	36.80	
50-59	23	41.8	19.8	32	58.2	33.3	55	25.90	
60-69	6	85.7	5.2	1	14.3	1	7	3.30	
70-79	1	50	0.9	1	50	1	2	0.90	
Gender									
Female	84	57.1	72.4	63	42.9	65.6	147	69.30	
Male	31	50	26.7	31	50	32.3	62	29.20	
Interdisciplinary Education									**
Yes	71	67.6	61.2	34	32.4	35.4	105	49.50	
No	40	40	34.5	60	60	62.5	100	47.20	
Continuous Variables <sup>c</sup>									
Age, years	116	{41} 42.4 ± 10.6		96	{45.3} 45.4 ± 8.3		212	{44} 43.75 ± 9.69	*
Years practiced	113	{7} 8.1 ± 5.9		94	{15} 15.4 ± 8.7		207	{10} 11.48 ± 8.17	**

<sup>a</sup> Column and row totals may not equal total number of participants due to missing values.

<sup>b</sup> Fisher's Exact test used.

\* p < 0.05 for Chi-Square test for categorical variables or F test for continuous variables.

\*\* p < 0.01 for Chi-Square test for categorical variables or F test for continuous variables.

<sup>c</sup> Values in this section are given as the {median} mean ± SD.

The distribution of gender within case managers and HIV PCPs was similar to the group at large and closely approximated one another, with roughly a third of the respondents indicating that they were male and around 70% indicating that they were female. The mean age of study participants was 43.75 (Standard Deviation (SD)= 9.69). Just over a third (36.79%) of the study population was between the ages 40-49. Two-thirds of the HIV PCPs were between 40-59 years old. Case managers tended to be younger than HIV PCPs; the median age among case managers was 41 (range, 24 – 72), whereas HIV PCPs' median age was 45.3 (range, 26-70). Overall, study participants reported that they had a median of 10 years of practice experience (range, 0.5 - 45) providing either case management or direct patient care. Specifically, HIV PCPs reported a median of 15 years experience providing direct patient care. Compared to HIV PCPs, case managers were more likely to have received training in interdisciplinary care in the last five years [ $\chi^2(1) = 15.7366, p < 0.0001$ ]. 61.2% of case managers reported receiving interdisciplinary training whereas 35.4% of HIV PCPs had interdisciplinary training. Meanwhile, case managers tended to have less work experience: they indicated having a median of 7 years (mean = 8.10, SD=5.90) in case management.

About two-thirds (67.02%) of HIV PCPs reported that they were Medical Doctors (MDs) and less than a quarter (21.28%) were nurse practitioners. Among the case managers, approximately 43% held a four-year degree and 38.6% held a graduate degree. For the most part, the case manager respondents came from a social work discipline (45.69%) or had a background in case management (24.14%). The majority (89.6%) of study participants indicated that they were an HIV specialist or that they evaluated an HIV specialist.

**Contextual factors.** Contextual factors related to the study population are presented in **Table 5-2** (see next page). Approximately a third (39%) worked at Designated AIDS Center (DAC) outpatient clinics. Case managers tended to work at either DACs (30.2%) or community-based organizations (CBOs) with primary care on site (21.6%), whereas almost half of the HIV PCPs worked at DACs (47.9%). There were a limited number of participants from substance abuse treatment centers with primary care on site (n=3). HIV PCPs differed from case managers in their practice setting [ $\chi^2$  (5) 41.6502,  $p < 0.0001$ ]. A greater number of HIV PCPs reported working at DACs (n=46) compared to case managers (n=35).

**Table 5-2 Context Characteristics**

	Participants <sup>a</sup>								
	Case Manager			HIV PCP			Total		p-value
	N	Row%	Col%	N	Row%	Col%	N	Col %	
<b>Total</b>	<b>116</b>	<b>54.7</b>	<b>100</b>	<b>96</b>	<b>45.3</b>	<b>100</b>	<b>212</b>	<b>100.00</b>	
Practice Setting									**
CBO with Primary Care on Site	25	67.6	21.6	12	32.4	12.5	37	17.50	
CBO without Primary Care on Site	33	100	28.4	0	0	0	33	15.60	
Community Health Center	11	42.3	9.5	15	57.7	15.6	26	12.30	
DAC Outpatient Clinic	35	43.2	30.2	46	56.8	47.9	81	38.20	
Hospital Outpatient Clinic, non-DAC	11	40.7	9.5	16	59.3	16.7	27	12.70	
Substance Abuse Treatment Ctr with PC	0	0	0	3	100	3.1	3	1.40	
HIV Caseload									**
≤20	7	77.8	6	2	22.2	2.1	9	4.20	
21-50	62	81.6	53.4	14	18.4	14.6	76	35.80	
51-199	25	35.2	21.6	46	64.8	47.9	71	33.50	
≥200	22	44	19	28	56	29.2	50	23.60	
Principal Role of Participant									**
Clinician	88	54.7	75.9	73	45.3	76	161	75.90	
Administrator	22	71	19	9	29	9.4	31	14.60	
Other	2	16.7	1.7	10	83.3	10.4	12	5.70	
Dyad Proximity to One Another									**
Different Building	56	87.5	48.3	8	12.5	8.3	64	30.20	
Same Building	23	46.9	19.8	26	53.1	27.1	49	23.10	
Same Floor	18	32.7	15.5	37	67.3	38.5	55	25.90	
Same Suite	18	46.2	15.5	21	53.8	21.9	39	18.40	
Attend case conferences on regular basis with CM/PCP <sup>b</sup>									*
Yes	95	59.4	81.9	65	40.6	67.7	160	75.50	
No	20	42.6	17.2	27	57.4	28.1	47	22.20	
Executive Support of Collaboration									
Very Strongly Agree	48	58.5	41.4	34	41.5	35.4	82	38.70	
Strongly Agree	25	45.5	21.6	30	54.5	31.3	55	25.90	
Agree	21	51.2	18.1	20	48.8	20.8	41	19.30	
Neutral	14	70	12.1	6	30	6.3	20	9.40	
Disagree	5	71.4	4.3	2	28.6	2.1	7	3.30	
Strongly Disagree	2	100	1.7	0	0	0	2	0.90	

<sup>a</sup> Column and row totals may not equal total number of participants due to missing values.

<sup>b</sup> Fisher's Exact Test used

\*  $P < 0.05$  for Chi-Square test for categorical variables or F test for continuous variables

\*\*  $P < 0.01$  for Chi-Square test for categorical variables or F test for continuous variables.

† Values in this section are given as the (median) mean  $\pm$  SD

Note: CBO = Community Based Organization, DAC = Designated AIDS Center, PC = Primary Care, CM = Case Manager



Case managers were also more likely to have caseloads of 21-50 compared to HIV PCPs [ $\chi^2(3) = 37.3381, p < 0.0001$ ]. Case managers were more likely to be considered an administrator [ $\chi^2(2) = 10.3209, p < 0.0057$ ]. The physical proximity of the study participant and the case manager or HIV PCP they evaluated is depicted in **Table 5-2**. Case managers were more likely to evaluate an HIV PCP that works in a different building (48.3% versus 8.3%). This suggests that case management offices are not co-located with the clinics, especially given the fact that 62.9% of case managers worked for the same organization as the person they evaluated (see **Table 5-3**). None of the study participants indicated that they shared desk space with the case manager or HIV PCP that they evaluated in the survey. Case managers reported higher proportions of attendance at interdisciplinary case conferences or case reviews on a regular basis with the HIV PCP they evaluated compared to HIV PCPs [ $\chi^2 \text{ Fisher's Exact } (1) = 4.1634, p < 0.046$ ].

**Table 5-3** presents additional contextual characteristics of the study participants. HIV PCPs and case managers were similar with respect to dyad work years with the case manager or HIV PCP they evaluated; both groups reported a median of 3 years (range, 0.083 – 17). The dyad years worked together did not vary by participant type ( $p > 0.028$ ).

**Table 5-3 Context Characteristics**

	Participants <sup>a</sup>								p-value	
	Case Manager			HIV PCP			Total			
	N	Row%	Col%	N	Row%	Col%	N	Col %		
<b>Total</b>	<b>116</b>	<b>54.7</b>	<b>100</b>	<b>96</b>	<b>45.3</b>	<b>100</b>	<b>212</b>	<b>100.00</b>		
Frequency of Scheduled Interdisciplinary Discussions										
Weekly	33	49.3	28.4	34	50.7	35.4	67	31.60		
Bi-Weekly	14	56	12.1	11	44	11.5	25	11.80		
Monthly	25	52.1	21.6	23	47.9	24	48	22.60		
Quarterly	15	65.2	12.9	8	34.8	8.3	23	10.80		
Never	26	63.4	22.4	15	36.6	15.6	41	19.30		
Electronic Information System Present										
Yes	60	48	51.7	65	52	67.7	125	59.00	**	
No	56	67.5	48.3	27	32.5	28.1	83	39.20		
Dyad Works for Same Organization										
Yes	73	46.2	62.9	85	53.8	88.5	158	74.50	**	
No	42	84	36.2	8	16	8.3	50	23.60		
Continuous Variables <sup>a</sup>										
Caseload Severity Score	114	{130}	130.3 ± 72.48	92	{110}	116.6 ± 60.0	206	{120}	124.18 ± 67.38	
Professional Interaction Score	115	{12}	13.78 ± 5.46	91	{15}	16.14 ± 6.52	206	{13.5}	14.83 ± 6.05	**
Dyad years worked together	116	{3}	4.06 ± 3.08	96	{3}	4.10 ± 2.93	212	{3}	4.07 ± 3.0	

<sup>a</sup> Column and row totals may not equal total number of participants due to missing values

<sup>b</sup> P < 0.05 for Chi-Square test for categorical variables or F test for continuous variables

<sup>c</sup> P < 0.01 for Chi-Square test for categorical variables or F test for continuous variables

<sup>d</sup> Values in this section are given as the (median) mean ± SD

**Table 5-4** summarizes the contextual factors related to protocols and financial incentive to collaborate.

**Table 5-4 Additional Context Characteristics**

	Participants <sup>a</sup>								p-value
	Case Manager			HIV PCP			Total		
	N	Row%	Col%	N	Row%	Col%	N	Col %	
<b>Total</b>	<b>116</b>	<b>54.7</b>	<b>100</b>	<b>96</b>	<b>45.3</b>	<b>100</b>	<b>212</b>	<b>100.00</b>	
Interdisciplinary Protocol									
Yes	100	56.8	86.2	76	43.2	79.2	176	83.00	
No	10	38.5	8.6	16	61.5	16.7	26	12.30	
Missing	6	60	5.2	4	40	4.2	10	4.70	
Financial Incentive to Collaborate									
Definite Incentive	17	81	14.7	4	19	4.2	21	9.90	
Partial/Mixed Incentive	27	54	23.3	23	46	24	50	23.60	
No Incentive	56	52.8	48.3	50	47.2	52.1	106	50.00	
Missing Information	14	46.7	12.1	16	53.3	16.7	30	14.20	
Protocol describing role of case manager									
Yes	112	60.2	96.6	74	39.8	77.1	186	87.70	**
No	4	22.2	3.4	14	77.8	14.6	18	8.50	

<sup>a</sup> Column and row totals may not equal total number of participants due to missing values.

<sup>b</sup> P < 0.05 for Chi-Square test for categorical variables or F test for continuous variables.

<sup>c</sup> P < 0.01 for Chi-Square test for categorical variables or F test for continuous variables.

**Collaborative practice.** Recall from the methods chapter that collaborative practice scores were the sum of response to five items that were measured with 7-point Likert scales where 1 was very strongly disagree and 7 was very strongly agree. The scores could be as low as 5 or as high as 35. Higher scores indicated higher perceived collaboration among the HIV PCP-case manager dyad. The mean collaborative practice score among all study participants was 26.24 ( $n = 206$ ,  $SD = 7.019$ ). The median score was 27 (range 5 – 35).

### Univariate Analysis

**Participant factors.** The results of the one-way ANOVAs and univariate regressions, which examined the participant factors' association with collaborative practice are presented in **Table 5-5**. The type of study participant (case manager or HIV PCP) was associated with collaborative practice ( $p = 0.02$ ). HIV PCPs reported higher perceived collaborative practice scores. Compared to males, females had a higher collaborative practice score ( $p < 0.05$ ).

**Table 5-5 Associations of Collaborative Practice and Participant Factors**

<b>N = 210<sup>a</sup></b>				
	<b>n</b>	<b>Mean</b>	<b>SD</b>	<b>p-value<sup>b</sup></b>
Type of study participant	206			*
Case Manager	114	25.18	7.33	
HIV PCP	92	27.55	6.41	
Gender	205			*
Female	145	26.86	6.68	
Male	60	24.60	7.57	
Interdisciplinary Education	201			
Yes	103	26.46	7.48	
No	98	26.07	6.59	
Continuous Variables <sup>^</sup>				
Age, years	206	-0.020 (0.050)		
Years practiced	203	0.081 (0.060)		

<sup>a</sup> Column totals may not equal total number of participants due to missing values.

<sup>b</sup> p value for F test.

\*  $p < 0.05$ .

<sup>^</sup> Values in this section are given as the parameter estimate and (standard error).

**Context factors.** Table 5-6 presents results of one way ANOVAs for selected context variables and collaborative practice. The role of executive staff in promoting and/or creating opportunities for collaboration between case managers and HIV PCPs was significantly related to collaborative practice ( $p < 0.001$ ). Participants that indicated a very strong agreement with a statement describing executive staff of their organization that support/promote collaboration had a collaborative practice score that was 6.678 ( $p < 0.05$  bonferroni test for multiple comparisons) units above those that indicated they were neutral to the statement.

**Table 5-6 Association of Collaborative Practice and Context Factors**

**n = 210<sup>a</sup>**

	<b>n</b>	<b>Mean</b>	<b>SD</b>	<b>p-value<sup>b</sup></b>
Executive Support of Collaboration	203			**
Very Strongly Agree	79	28.23	6.84	
Strongly Agree	54	26.07	6.20	
Agree	41	25.51	6.44	
Neutral	20	21.55	6.39	
Disagree	7	23.00	9.57	
Strongly Disagree	2	17.50	17.68	
Protocol Describing Role of Case Manager	201			
Yes	184	26.24	7.07	
No	17	26.76	6.70	
Frequency of Scheduled Interdisciplinary Discussions	200			*
Weekly	66	27.29	5.90	
Bi-Weekly	25	26.11	6.91	
Monthly	48	26.77	6.70	
Quarterly	21	28.52	5.52	
Never	40	23.00	8.72	

<sup>a</sup> Column totals may not equal total number of participants due to missing values.

<sup>b</sup> p value for F test.

\*  $p < 0.05$ .

\*\*  $P < 0.01$ .

Additionally, more frequent organizational interdisciplinary case discussions were associated with higher mean collaborative practice. Participants that reported working for organizations that held weekly interdisciplinary case discussions, which were attended by both HIV PCPs and case managers, compared to never holding meetings, were more likely to report perceived collaboration ( $p < 0.05$  bonferroni t test for multiple comparisons). Moreover, participants that worked at organizations in which interdisciplinary case discussions are held on a quarterly basis were also more likely to report higher perceived collaboration than participants at organizations that never hold interdisciplinary discussions (28.52 vs. 23.0,  $p < 0.05$  bonferroni t test for multiple comparisons).

Another factor significantly associated with collaborative practice was the physical proximity of the study participant and the case manager/PCP they evaluated ( $p = 0.02$ ). **Table 5-7** presents association of collaborative practice and selected contextual factors.

**Table 5-7 Association of Collaborative Practice and Context Factors cont.****n = 210<sup>a</sup>**

	<b>n</b>	<b>Mean</b>	<b>SD</b>	<b>p-value<sup>b</sup></b>
Dyad Works for Same Organization	205			*
Yes	156	27.01	6.73	
No	49	24.04	7.35	
HIV Caseload	202			
<=20	8	23.75	12.27	
21-50	75	25.53	7.11	
51-199	70	27.29	5.16	
>=200	49	26.14	7.95	
Dyad Proximity to One Another	204			*
Different Building	63	24.46	7.46	
Same Building	48	25.60	6.53	
Same Floor	54	27.63	6.81	
Same Suite	39	28.21	6.38	
Attends interdisciplinary meetings on regular basis with case manager/PCP evaluated	204			
Yes	160	26.77	6.76	
No	44	24.64	7.72	
Electronic Information System Present	204			
Yes	123	26.98	6.93	
No	81	25.19	6.98	
Missing				
Continuous Variables <sup>^</sup>				
Caseload Severity Score	202	-0.0007 (0.007)		
Professional Interaction Score	203	0.2876 (0.079)		**
Dyad years worked together	206	0.433 (0.159)		*

<sup>a</sup> Column totals may not equal total number of participants due to missing values.<sup>b</sup> p value for F test.

\* p &lt; 0.05.

\*\* P &lt; 0.01.

<sup>^</sup> Values in this section are given as the parameter estimate and (standard error).

The mean collaborative practice among participants that worked in the same suite as the person they evaluated was 3.745 higher than those that worked in a different building than the person they evaluated ( $p < 0.05$  bonferroni t test). Study participants that reported working for the same organization as the person they evaluated also had significantly higher collaborative practice scores (27.04 versus 24.04). Whether the organization provided case management training to case managers was not associated with collaboration ( $p > 0.952$ ). Refer to Appendix J for a complete table of contextual factors and association with collaborative practice.

The curvilinear relationship between collaborative practice and years practiced noted in the methods section warranted further examination. Two simple regression models were performed: the first included study participants with less than 20 years of patient care or case management experience and the second included participants with greater than or equal to 20 years of experience. Collaborative practice was regressed on years practiced for each sub-group of participants. The model with participants that had less than 20 years of experience did not fit the data better than the mean model ( $F(1,160) = 2.82, p = 0.095$ ). The coefficient for years practiced was non-significant ( $b = 0.206, p = 0.095$ ) and the Pearson correlation was non-significant ( $r = 0.132, p = 0.095$ ). A second model regressed collaborative practice on years of practice and included study participants with at least 20 years of practice experience or more. The overall model was not significant ( $F(1,39) = 1.61, p = 0.212$ ). For this model, the coefficient for years practiced was non-significant ( $b = -0.233, p = 0.212$ ); the Pearson correlation was non-significant ( $r = -0.199, p = 0.21$ ). Although the curvilinear bivariate scatterplot pattern suggested there may be a relationship between collaborative practice and years practiced, this was not supported with inference testing using simple regression analyses.

In order to examine the non-linear and significant relationship between dyad years worked together and collaborative practice, the number of dyad work years was separated into three groups: (1) 0-5 years; (2) 5-10 years; and (3) 10+ years and a one-way ANOVA was performed to test for differences between groups. The one-way ANOVA was significant ( $p = 0.014$ ) indicating there was at least one group that had a different mean collaborative practice score. Post hoc analysis using a bonferroni t test found that the group with 0-5 years dyad work experience (mean = 25.31, SD= 7.35)

was different from the group that had 5-10 years of dyad work experience (mean = 28.634, SD = 5.36).

**By group.** Recall that a group of questions had different responses for HIV PCPs and case managers. These included education/profession, discipline/academic affiliation, primary specialty, and board certification in a sub-specialty. Demographic variables that were unique to HIV PCPs and case managers were examined using one way ANOVAs. **Table 5-8** presents association of participant and context factors and collaborative practice among case managers. No variables were significantly related to collaborative practice.

**Table 5-8 Association of Case Manager Participant and Organizational Characteristics with Collaborative Practice**

Variable	Case Managers (n = 116) <sup>a</sup>			
	N	Mean	SD	p-value
Highest Education Level Attained				0.836
High school/GED or below	6	26.17	8.33	
Two year degree	10	26.20	6.00	
Four year degree	48	25.31	6.54	
Graduate degree	44	24.68	8.12	
Doctorate degree	4	28.75	8.50	
Primary Specialty				0.564
Family Medicine	20	27.40	6.90	
Internal Medicine	46	24.80	7.13	
Infectious Disease	9	26.56	7.09	
Pediatrics	6	22.17	10.76	
Other	29	25.76	8.18	
Do Not Know	10	23.18	4.65	
Board Certified in Sub-Specialty				0.673
Allergy & Immunology	1	25.00	<sup>b</sup>	
Hematology/Oncology	1	29.00	<sup>b</sup>	
Infectious Disease	81	25.16	7.28	
Other	3	31.33	5.51	
None	4	22.50	4.93	
Do Not Know	23	24.34	8.08	
Discipline				0.063
Nursing	5	31.00	7.38	
Social Work	52	23.38	7.54	
Health educator/treatment adherence counselor	12	27.67	4.77	
Case management	28	26.61	7.17	
Other	16	25.44	7.14	
None	1	16.00	<sup>b</sup>	
Case Management Training Provided by Organization				0.952
Yes	74	25.16	7.71	
No	38	25.07	6.80	

<sup>a</sup> Column totals may not equal total number of participants due to missing values

<sup>b</sup> Standard deviation not computed due to limited number of participants

Note: p-value for one-way ANOVA



Education level was not related to collaborative practice for the case manager group ( $p > 0.836$ ). There were no differences among the case manager disciplines and collaborative practice ( $p > 0.063$ ). The primary specialty of the HIV PCP that the case manager evaluated was not significantly associated with collaborative practice.

The level of professional training (education) was not associated with collaborative practice among HIV PCPs ( $p > 0.672$ ). Academic affiliation and primary specialty were not significantly associated with collaborative practice among HIV PCPs (see **Table 5-9**). Almost half (48.31%) of the HIV PCPs had a full-time faculty position.

**Table 5-9 Association of HIV PCP Participant and Context Characteristics and Collaborative Practice**

Variable	HIV PCPS (n = 96) <sup>a</sup>			p-value
	n	Mean	SD	
Type of Profession				0.672
Physician Assistant	10	29.20	3.46	
Nurse Practitioner	20	27.00	6.57	
Medical Doctor	61	27.38	6.77	
Other	1	33.00	<sup>b</sup>	
Primary Specialty				0.734
Family Medicine	15	27.67	5.92	
Internal Medicine	46	27.46	6.86	
Infectious Disease	12	28.58	4.94	
Pediatrics	2	32.50	3.54	
Other	29	27.31	6.18	
Board Certified in Sub-Specialty				0.367
Allergy & Immunology	1	17.00	<sup>b</sup>	
Hematology/Oncology	0			
Infectious Disease	33	28.06	5.53	
Other	22	28.00	6.92	
None	36	27.11	6.74	
Discipline				0.501
Intern, Resident, or Fellow	1	31.00	<sup>b</sup>	
Part-time, adjunct faculty appointment/voluntary attending	13	25.08	6.66	
Full-time faculty appointment	41	27.95	6.60	
No faculty appointment	32	27.78	6.20	

<sup>a</sup> Column totals may not equal total number of participants due to missing values

<sup>b</sup> Standard deviation not computed due to limited number of participants

Note: p-value for one-way ANOVA

Because none of the by-group variables were statistically associated with collaborative practice, a full hierarchical regression model with the variables was not run. Therefore, only common variables were included in the final model.

## Factor Analytic Results

206 subjects were included in the factor analyses. Recall the model fit criterion used to guide the CFA of the three adapted subscales of the PPCI—trustworthiness, role specification, and relationship initiation. The results of the CFA models are presented in **Table 5-10**. Based on the fit indices and the residuals, the first CFA model, which examined 14 items from the adapted PPCI, indicated poor model fit.

**Table 5-10 CFA Model Summary**

Model	Chi-Square (df), p-value	RMSEA (90% CI)	SRMR	CFI/NNFI	CAIC
<i>Model 1<sup>a</sup></i>	339.46 (74), p<0.001	0.13 (0.12, 0.15)	0.06	0.89/0.87	-128.81
<i>Model 2<sup>b</sup></i>	118.23 (32), p<0.0001	0.11 (0.09, 0.14)	0.06	0.94/0.92	-84.261
<i>Model 3<sup>c</sup></i>	57.30 (24), p<0.0002	0.08 (0.06, 0.11)	0.05	0.97/0.96	-94.571
<i>Collaborative Practice<sup>d</sup></i>	17.21 (5), p<0.01	0.11 (0.06,0.17)	0.02	0.99/0.97	-14.431

<sup>a</sup> 3-factor solution with 14 items posited by Zillich et al. (2005,2006)

<sup>b</sup> 3-factor solution with 10 items (t4,t5, r4, r5 removed after Model 1 EFA).

<sup>c</sup> 3-factor solution with 9 items (t4,t5,t6,r4,r5 removed after Model 2 EFA).

<sup>d</sup> 1-factor solution with 5 items.

Contrary to Zillich's (2005) proposed factor structure, the first CFA revealed that the item structure was not suitable for the HIV PCP-case manager population. As discussed in Chapter 4, the factor structure was re-evaluated using EFA to examine the underlying construct structure. As noted in the methods section, three EFA models were required in order to achieve a satisfactory factor structure.

**Exploratory factor analyses.** Recall the criteria for dropping and retaining variables and evaluation of the model from the Methods chapter. The sample size requirement for an EFA was met; there were at least 5 times the number of subjects per

item. None of the correlations exhibited high collinearity ( $\geq 0.8$ ) (Truxillo, 2008a, p. 6.21) or low correlations ( $< 0.1$ ).

**Table 5-11** summarizes the variables that were retained and removed in each of the EFA model iterations based on the criterion discussed in Chapter 4. As noted earlier, three models were conducted before the factor structure was found to be adequate.

**Table 5-11 Summary of EFA Models**

		Retained / Removed <sup>±</sup>		
Item	Factor label/text	Model 1 <sup>a</sup>	Model 2 <sup>b</sup>	Model 3 <sup>c</sup>
<i>Trustworthiness*</i>				
t1	PCP/CM is credible	+	+	+
t2	Interactions characterized by open communication of both parties	+	+	+
t3	Subject can count on this PCP/CM to do what he/she says	+	+	+
t4	PCP/CM intends to keep working with PCP/CM	-		
t5	PCP/CM trusts subject's expertise	-		
t6	Communication between this PCP/CM and other is two-way	+	-	
<i>Role Specification*</i>				
r1	Subject needs PCP/CM as much as the other needs him/her	+	+	+
r2	PCP/CM depends on subject as much as the subject depends on him/her	+	+	+
r3	PCP/CM are mutually dependent on each other in caring for patients	+	+	+
r4	PCP/CM and subject negotiate to come to agreement on their activities in managing the plan	-		
r5	PCP/CM will work with subject to overcome disagreement on his/her role	-		
<i>Relationship Initiation*</i>				
i1	CM spent time trying to learn how he/she can help the PCP	+	+	+
i2	CM provided information to PCP about a patient	+	+	+
i3	CM showed an interest in helping improve the PCP's practice	+	+	+

<sup>±</sup> Factor loadings  $\geq 0.45$  were considered for retention. Items with cross-loadings  $\geq 0.3$  were dropped. Items that did not have factor loadings  $\geq 0.45$  were removed.

\* Original factor structure posited by Zillich et al. (2005,2006).

<sup>a</sup> 4-factor solution with 14 items for analysis.

<sup>b</sup> 3-factor solution with 10 items for analysis.

<sup>c</sup> 3-factor solution with 9 items for analysis.

+ = item retained at end of model assessment.

- = item removed at end of model assessment.

Note: Shading indicates the item was permanently dropped from the model after it was initially removed.

Note: PCP = primary care provider; CM = case manager.

To note, several items did not load correctly on their hypothesized subscale in the first EFA model. Items t1-t6 (see **Table 5-11** for item description) were intended to load on the trustworthiness factor. Yet, t4 loaded on a different factor altogether. Item t5 had a cross-loading  $\geq 0.3$ , thus it was removed. According to the rotated factor pattern, the role specification items (r1-r5) did not load on the same factor. Items r1-r3 loaded on one factor; however, item r5 had a cross-loading  $\geq 0.3$  and r4 did not achieve a factor loading at or above 0.5 on any factor. The rotated factor structure matrix also indicated high-moderate correlations ( $>.7$ ) on more than one factor for items t4 and t5.

The second EFA (see **Table 5-11 on previous page**) showed small residuals. The factor loadings more closely approximated the a priori theory put forth by Zillich et al. (2005; 2004). T6 was removed because it yielded a cross-loading above 0.3 with the factor that was associated with the relationship initiation items. The item was about two-way communication, which also was moderately correlated with factor 2 ( $r = 0.69$ ).

The final step to investigating the underlying constructs was a third EFA that analyzed nine items which had meaningful and/or high factor loadings in the second EFA. The third model specified a three-factor solution based on the second model's findings. The screeplot shown in Appendix K shows a large elbow at the second factor and a less pronounced elbow at the fourth factor, implying a three-factor solution.

Inter-correlations between the factors ranged from 0.58 to 0.67. The correlation between factor 1 (*trustworthiness*) and factor 3 (*role specification*) was moderately high at 0.67.

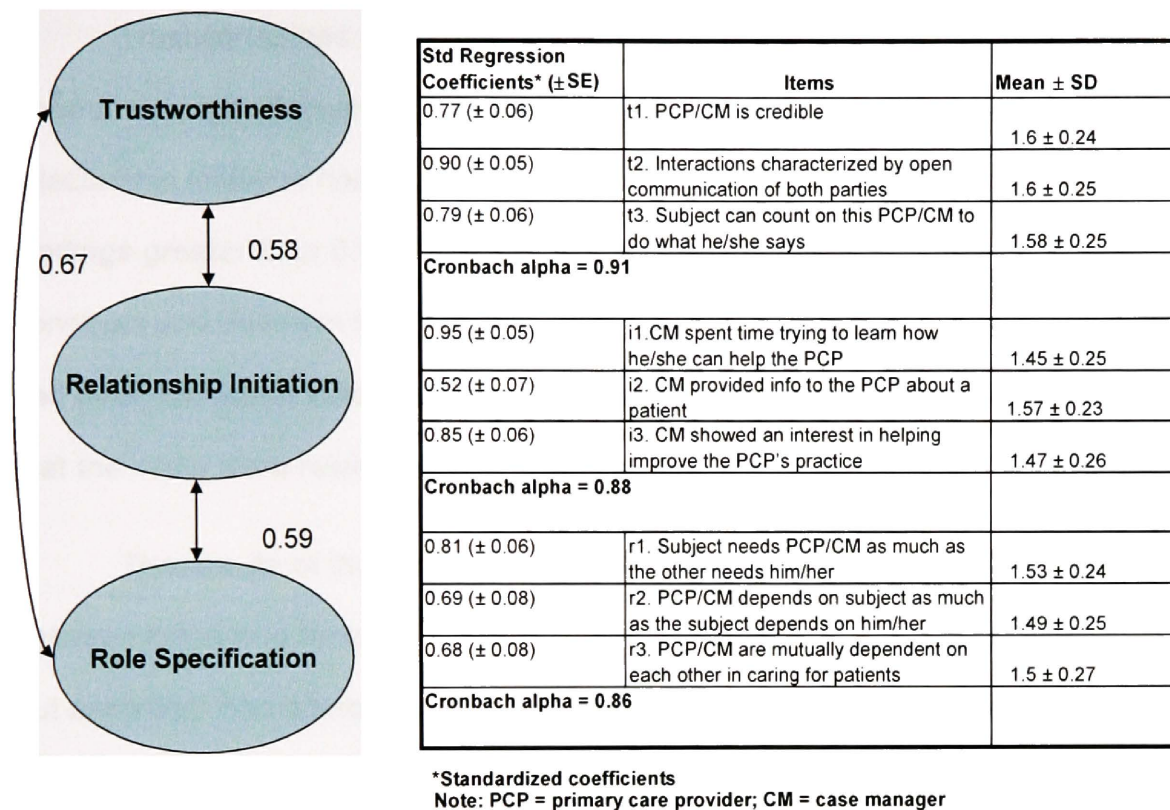
**Table 5-12** presents the Chi-Square tests for the CFA of model 3 with 9 items.

**Table 5-12 Chi Square Tests for Model 3 CFA**

<b>Significance Tests Based on 206 Observations</b>			
<b>Test</b>	<b>DF</b>	<b>Chi-Square</b>	<b>Pr &gt; ChiSq</b>
H0: No common factors	36	1309.6197	<.0001
HA: At least one common factor			
H0: 3 Factors are sufficient	12	24.7141	0.0162
HA: More factors are needed			

The hypotheses for the two Chi-Square tests were both rejected, implying that at least one common factor is explained by the items, but suggesting that three factors are not sufficient. As mentioned in Chapter 3, the second hypothesis to examine the sufficiency of three factors to explain the shared variance is sensitive to sample size. Moreover, the computation used by SAS often results in rejection of the second hypothesis test (A. Shankar, personal communication, March 25, 2010). The root mean squared off-diagonal residual was 0.017 suggesting that the factors sufficiently explained the correlations among the variables. Inspection of the off-diagonal elements showed values close to zero, which was indicative of an adequate factor solution. The root mean squared partial correlation was also quite small (0.058).

**Figure 5-1** presents the standardized regression coefficients, items retained, Cronbach's alpha, and each items' mean and standard deviation.



**Figure 5-1 Factor Structure**

As shown in **Figure 5-1**, the rotated pattern matrix, also referred to as the pattern of loadings, had adequate simple factor structure and internal consistency ("Factor analysis: SAS annotated output," n.d.; Garson, 2010). Each of the items loaded on their hypothesized factors according to the theoretical model set forth by Zillich et al. (2005) and McDonough & Doucette (2001). Each subscale consisted of three items thereby meeting the criterion of at least three items per factor (Suhr, 2003; Truxillo, 2008b). Appendix L presents the rotated factor pattern with 95% confidence intervals, standard errors, and the coverage display. The results of the rotated factor pattern converge with the CFA results reported by Zillich et al. (2005).

Trustworthiness (Zillich et al., 2005) yielded loadings above 0.7, which is considered high (Garson, 2010). Meanwhile, the factor best described by the construct relationship initiation had loadings greater than 0.52, with two items that yielded factor loadings greater than 0.84. The third factor consisted of items from the role specification construct and had item loadings greater than 0.68. With the exception of i2, most items had quite low factor loadings on the factors that described a different construct, implying that the items were related to one factor only.

The results of the factor structure, which reports correlations (see Appendix M) between items and factors, revealed moderate correlations among all items and factors, but each item had a stronger correlation with their hypothesized factor. There were moderate correlations among the items because the HIV PCP-Case Manager Collaboration Scale measures one concept with three factors. After the oblique rotation, the items (t1,t2, t3) associated with the construct trustworthiness were closely correlated with Factor 1 axis and the items related to relationship initiation loaded highly on factor 2's axis. Moreover, the variables associated with the third factor, role specification, were placed close to the third factor axis (see Appendix N). The final commonality estimates after the oblique rotation are summarized in the Appendix O.

In sum, the third EFA model with five items removed (t4-t6, r4-r5) was the most interpretable model. This model was drastically improved compared to the first EFA model which had the 14 original variables. The interpretability of the model was guided by an a priori theoretical model which validated a three factor model consisting of 14 items to describe a scale to measure the "nature of social exchange" (Zillich et al., 2005, p. 60) among physicians and pharmacists. Zillich et al. (2005) found that the three-factor model had adequate construct validity (see discussion in literature review section of

methods). This study made slight modifications to the PPCI and successfully adapted the measures of social exchanges among the HIV PCP-case manager dyad.

**Confirmatory factor analysis.** The third CFA model included 9 endogenous (indicator) variables that had shared conceptual meaning and moderate to high loadings on factors in the third EFA and 12 exogenous variables (three factors and 9 error terms). Nine iterations were required for the model to reach convergence. The results of the fit indices are summarized in **Table 5-10** in the beginning of the factor analysis results section. Examination of the parameters (21) and unique elements of the variance matrix (informations) (45) revealed that the model was overidentified and there were at least three indicator variables per factor. The convergence criterion was also satisfied. Correlations between the three factors ranged from 0.657 to 0.781. The results of the fit indices showed that the model without items r4-r5 and the revised trustworthiness scale (with t4-t6 removed) fit the data well.

The Chi-Square test statistic (57.23) was still statistically significant, suggestive of an inadequate model fit. Similarly, the RMSEA (0.0823) suggested a poor model fit. However, the RMSEA was closer to the cutoff threshold of 0.06 than the previous competing models. The SRMR (0.0473) was below 0.08, which suggested an acceptable model fit. The results of the Bentler and Bonnett's (1980) NNFI (0.9615) and Bentler's CFI (0.9714) were both above 0.95 indicating a good fit (Hu & Bentler, 1999). An examination of the CAIC (-94.5705) revealed that it was slightly larger than model two's CAIC, but quite a bit smaller than the first CFA.

The residuals in the third CFA model were slightly less than in model two. The average absolute residual was 0.0018 and the average normalized residual was 0.3975



(compared to Model 2 standardized average residual of 0.514). The final CFA revised model did not have any normalized residuals above 3, but there were several that were above 1. Item i2, *provide information*, had normalized residuals greater than 1 with variables t1-t3 and r2. None of the residuals in model three were large enough to cause concern. The third CFA model demonstrated the best model fit.

After examining the modified HIV PCP-Case Manager Collaboration Scale, the final CFA results indicated that the model was adequate for explaining the relationship among the three factors (trustworthiness, role specification, and relationship initiation) and their associated items. The three remaining items (**see Figure 5-1**) in the trustworthiness scale were still theoretically related to trustworthiness. The remaining three role specification items were related to dependence symmetry. After careful theoretical consideration of the role specification items, it was determined that the construct meaning did not change, because dependence symmetry is related to role expectations and conflict resolution. Therefore, the factor 'role specification' was not renamed.

The final HIV PCP-Case Manager Collaboration Scale closely mirrored the PPCI developed by Zillich et al. (2005; 2004). To conclude, the factor analytic steps verified that the PPCI can be adapted, with minor modifications, to the HIV PCP and case manager population.

**Collaborative practice CFA.** A CFA was conducted on the five items of the adapted collaborative practice scale in order to confirm that it had adequate psychometric properties. This scale has been used extensively to measure collaborative practice among nurses and physicians (Baggs, 1994) and physicians and pharmacists.

The results reported in **Table 5-10** demonstrated that the items fit the data well. The collaborative factor scale is a one factor solution and it had good fit. The residuals were also small; the average absolute residual was 0.0288.

**Internal consistency of scales.** The three HIV PCP-Case Manager Collaboration subscales had satisfactory internal consistency (see **Figure 5-1**). The raw Cronbach's  $\alpha$  ranged from 0.91 for *trustworthiness*, 0.86 for *role specification*, and 0.88 for *relationship initiation*. Cronbach's  $\alpha$  scores above 0.8 were considered acceptable according to a criterion set forth by Brallier, Lovett & Miller (2002 as cited in Truxillo, 2008b). The reliability analyses suggested that no variable contributed more to the  $\alpha$  compared to the rest, which was apparent when looking at how each item's individual Cronbach's  $\alpha$  for the scale would change if a particular variable would be deleted. Therefore, no variable should be dropped from the scales based on the internal consistency results. In addition, Cronbach's  $\alpha$  for the collaborative practice scale, the dependent variable, was also satisfactory: it was 0.940 (raw  $\alpha$ ).

**Social exchange variables.** Recall from the final EFA model the social exchange factors each consisted of three items with values that ranged from 3 to 21. The trustworthiness subscale had a mean of 17.64 ( $n = 208$ ,  $SD = 3.72$ ). The role specification subscale had a mean of 16.21 ( $n=208$ ,  $SD = 3.82$ ). The mean for relationship initiation was slightly lower than the other two social exchange subscales: it was 16.12 ( $n=206$ ,  $SD = 3.82$ ). Case managers reported lower mean relationship initiation scores compared to HIV PCPs (15.6 vs. 16.8). Otherwise, HIV PCP and case manager mean scores for trustworthiness and role specification were similar. Univariate

regression models with the social exchange variables found that they were all significant predictors of collaborative practice ( $p < 0.0001$ ).

### Hierarchical Regression Results

181 participants were included in the hierarchical regression model. **Table 5-13** presents the results of the hierarchical regression.

**Table 5-13 Hierarchical Multiple Regression Model Summary**

N=181

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.260 <sup>a</sup>	.068	.041	6.645	.068	2.540	5	174	.030
2	.567 <sup>b</sup>	.321	.140	6.295	.254	1.610	33	141	.030
3	.877 <sup>c</sup>	.768	.700	3.717	.447	89.331	3	138	.000

a. Predictors: (Constant), years practiced, interdisciplinary care training (Yes), gender (Female), position (Case Manager), age

b. Predictors: (Constant), age, interdisciplinary care training (Yes), gender (Female), position (Case Manager), years practiced, practice time (Patient Care), interdisciplinary care protocols (Missing), leadership supports collaboration (Disagree), leadership supports collaboration (Strongly Disagree), dyad proximity (work in same building), frequency of interdisciplinary meetings (Weekly), economic incentive (Partial/Mixed Incentive), leadership supports collaboration (Neutral), case severity score, frequency of interdisciplinary meetings (Quarterly), practice setting (Hospital Outpatient Clinic / non-DAC), economic incentive (Missing), patient caseload ( $\leq 20$ ), practice setting (Substance Abuse Treatment Center with primary care), patient caseload (51-199), shared electronic information system (Yes), practice setting (Community Health Center), leadership supports collaboration (Strongly Agree), economic incentive (Definite Incentive), dyad proximity (work in same suite), frequency of interdisciplinary meetings (Bi-Weekly), practice setting (CBO with primary care on site), dyad years worked together, interdisciplinary care protocols (Yes), professional interaction scale, interdisciplinary meeting attendance (Yes), practice time (Other), work for same organization (Yes), leadership supports collaboration (Very Strongly Agree), patient caseload (21-50), frequency of interdisciplinary meetings (Monthly), dyad proximity (work on same floor), practice setting (DAC Outpatient Clinic)

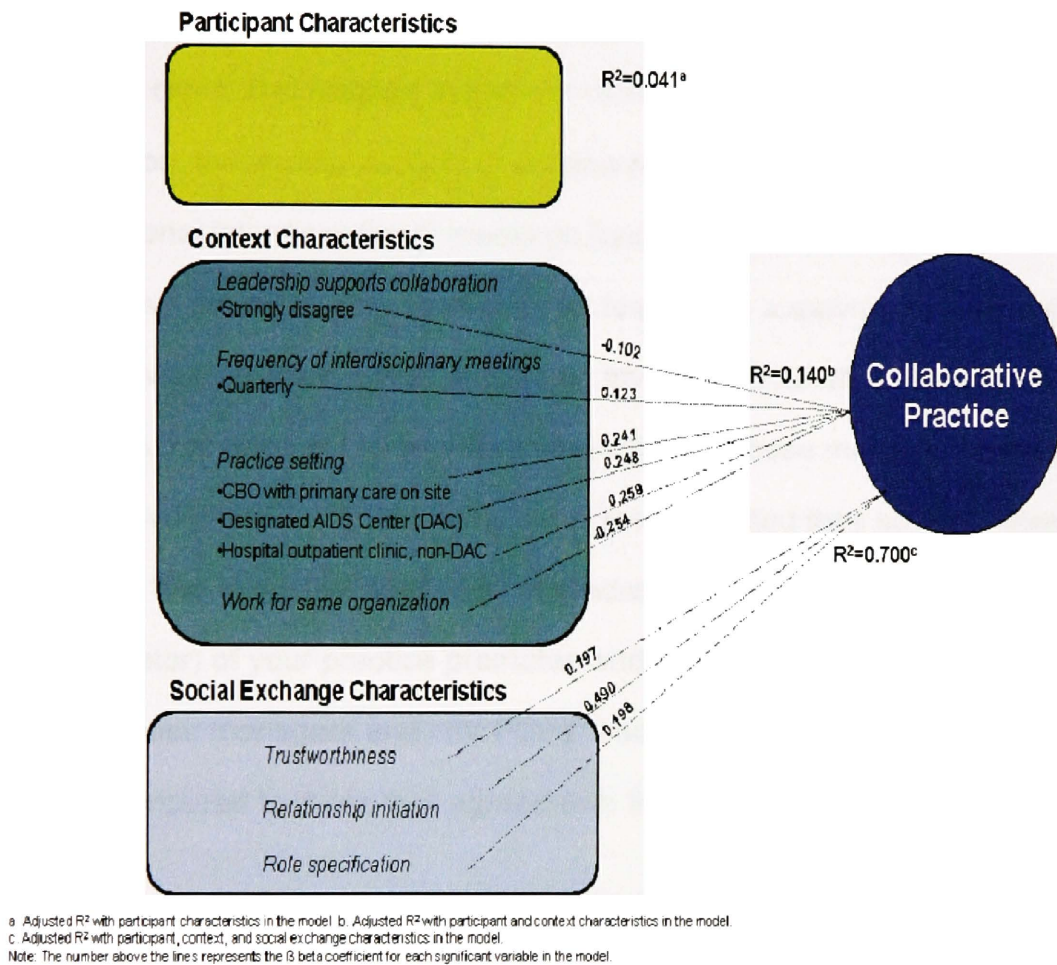
c. Predictors: (Constant), age, interdisciplinary care training (Yes), gender (Female), position (Case Manager), years practiced, practice time (Patient Care), interdisciplinary care protocols (Missing), leadership supports collaboration (Disagree), leadership supports collaboration (Strongly Disagree), dyad proximity (work in same building), frequency of interdisciplinary meetings (Weekly), economic incentive (Partial/Mixed Incentive), leadership supports collaboration (Neutral), case severity score, frequency of interdisciplinary meetings (Quarterly), practice setting (Hospital Outpatient Clinic / non-DAC), economic incentive (Missing), patient caseload ( $\leq 20$ ), practice setting (Substance Abuse Treatment Center with primary care), patient caseload (51-199), shared electronic information system (Yes), practice setting (Community Health Center), leadership supports collaboration (Strongly Agree), economic incentive (Definite Incentive), dyad proximity (work in same suite), frequency of interdisciplinary meetings (Bi-Weekly), practice setting (CBO with primary care on site), dyad years worked together, interdisciplinary care protocols (Yes), professional interaction scale, interdisciplinary meeting attendance (Yes), practice time (Other), work for same organization (Yes), leadership supports collaboration (Very Strongly Agree), patient caseload (21-50), frequency of interdisciplinary meetings (Monthly), dyad proximity (work on same floor), practice setting (DAC Outpatient Clinic), trustworthiness scale, relationship initiation scale, role specification scale

e. Dependent Variable: COLLAB

The participant variables were entered into the first OLS regression model. The first model accounted for 4.1% (adjusted  $R^2$ ) of the variability of the scores of collaborative practice. The participant characteristics, as a group, were significant predictors of collaborative practice ( $F(5, 174) = 2.540, p = 0.030$ ). **Table 5-14** displays the model parameters including unstandardized coefficients (B), the standardized

regression coefficients ( $\beta$  beta), the t statistic, p-value, and the 95% confidence interval for the B. Among the participant variables, gender (female) was the only significant predictor of collaborative practice ( $t(175) = 2.7, p = 0.008$ ). Next, the context characteristics were entered into the model after controlling for the participant characteristics. The addition of context variables resulted in a significant increment in  $R^2$  (F change (33,141) = 1.610,  $p = 0.030$ ). The increment (R square change) in variance explained due to the block of context variables was 0.254, or 25.4%. The second model accounted for 14% of the total variability of the scores of collaborative practice. Gender (female) remained significant, but only a few context variables in the second model were significant predictors of collaborative practice. These included dyad years worked together ( $t(142) = 2.168, p = 0.032$ ) and leadership support of collaboration (very strongly agree) ( $t(142) = 2.567, p = 0.011$ ). The professional interaction scale also contributed significantly to the prediction of collaborative practice scores ( $t(142) = 2.001, p = 0.047$ ). Dyad proximity (work in same suite) ( $t(142) = 2.112, p = 0.036$ ) was also a significant predictor of collaborative practice.

The most significant change in R square occurred when the social exchange variables entered into the model. The complete model was significant ( $F = 11.240$  (41,139),  $p < 0.000$ ) and explained 70% (adjusted  $R^2$ ) of the variability in collaborative practice. **Figure 5-2** portrays the significant predictors of collaborative practice.



**Figure 5-2 Significant Predictors of Collaborative Practice**

The increment in variance accounted for when the set of social exchange variables were entered was .0447, or 44.7%. After trustworthiness, relationship initiation, and dependency were added, gender (female) was no longer significant ( $t(139) = 1.393$ ,  $p = 0.166$ ). No participant variables were significant in the final model. Additionally, all of the context variables that were significant predictors in the second model became insignificant when the social exchange variables were entered into the model. In contrast to models one and two, leadership support of collaboration (strongly disagree) contributed significantly to collaborative practice ( $t(139) = -2.285$ ,  $p = 0.024$ ) in the third model (comparator was agree). The professional interaction scale did not remain a significant predictor of collaborative practice in the final model.

Of the context variables, practice setting (CBO with primary care on site; DAC outpatient clinic; and hospital outpatient clinic/non-DAC); dyad works for same organization; leadership support of collaboration (strongly disagree); and frequency of organizational interdisciplinary meetings (quarterly) became significant predictors of collaborative practice. The coefficient for leadership support of collaboration (strongly disagree) was negative, which implies an inverse relationship between executive leadership that does not support/promote HIV PCP-case manager collaboration and collaborative practice. Study participants that indicated they strongly disagree with the statement “the executive staff (e.g., immediate supervisor, Medical Director or Clinic Administrator) of your practice promotes and/or creates opportunities for collaboration between case managers and HIV PCPs” had lower predicted collaborative practice scores compared to those that agreed with the statement.

Frequency of organizational interdisciplinary meetings (quarterly) became a significant predictor of collaborative practice ( $t(139) = 2.233, p = 0.027$ ), suggesting that HIV PCPs and case managers that work at organizations that hold interdisciplinary case discussions on a quarterly basis are more likely to collaborate compared to those that work at organizations that never hold interdisciplinary case discussions. The coefficient for dyad works for the same organization (yes) indicated a negative relationship with collaborative practice ( $\beta = -0.254, p = 0.006$ ) and suggests that working for the same organization decreases collaborative practice.<sup>16</sup> For instance, those who work for the

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<sup>16</sup> Reference group is work for a different organization as person he/she evaluated

same organization had lower predicted collaborative practice scores compared to those who do not work for the same organization ( $t(139) = -2.795, p = 0.006$ ).

The social exchange subscales were also highly significant predictors of collaborative practice ( $p < 0.010$ ). The beta coefficient for the relationship initiation scale was the largest of the three HIV PCP/Case Manager Collaboration subscales ( $\beta = 0.490, t(139) = 7.269, p = 0.000$ ), which suggests this had almost double the impact of the three subscales on collaborative practice. In contrast to the other significant coefficients in the final model, relationship initiation had the largest coefficient.

Order of entry is important when examining the incremental partitioning of variance (Pedhazur & Schmelkin, 1991, p. 424). Because the proportion of variance may depend on the order of entry into the model (Pedhazur & Schmelkin, 1991, p. 423), another hierarchical regression model was performed so that the block of social exchange variables was entered first, followed by the context variables and the participant variables. The exchange variables were entered first because they were believed to be the most important of the CWR relationship drivers and the most mutable. The results of the hierarchical regression with the social exchange variables entered first are presented in **Table 5-15**.

This analysis revealed different results in the partitioning of variance when social exchange variables were entered in the first stage. Entering social exchange variables first accounted for 66.1% of the variance in collaborative practice (adjusted  $R^2$ ). The block of context variables accounted for an additional 0.090, or 9%, of the variance of collaborative practice and was a significant change in  $R^2$  ( $F_{\text{change}}(33,143) = 1.622, p = .028$ ). The increment in variance explained by the participant variables was 0.011, or 1.1%, of collaborative practice and this was not a significant increment in  $R^2$  ( $F(5,138) =$



1.36,  $p = 0.261$ ). When the social exchange variables were entered first, the context variables added 0.090 to the variance accounted for, which was less than in the hierarchical regression when the participant variables were entered first. Upon examination of the independent variables in the second model (when context was entered after social exchange), leadership support of collaboration (strongly disagree), frequency of interdisciplinary meeting (quarterly), practice setting (CBO with primary care on site; community health center (CHC); outpatient clinic-DAC; outpatient clinic-non-DAC; dyad work for the same organization; and proximity (same building) were all significant predictors of collaborative practice. However, when participant variables were entered in the final model, the predictors of collaborative practice changed.

In contrast to model two, practice setting (CHC) and dyad proximity (same building) became insignificant. **Table 5-16** presents the regression coefficients when social exchange factors are entered into the model first. Similar to the final model when the social exchange variables were entered last, the final model with participant variables entered last resulted in the same significant predictors of collaborative practice. The significant predictors of collaborative practice included practice setting (CBO with primary care on site; DAC outpatient clinic; and hospital outpatient clinic/non-DAC); dyad works for same organization, leadership support of collaboration (strongly disagree), and frequency of interdisciplinary meetings (quarterly), and social exchange variables.

Table 5-14 Multiple Hierarchical Regression Coefficients

Model <sup>a</sup>	Unstandardized Coefficients		Standardized Coefficients			95 % Confidence Interval for B	
	B	Std. Error	β Beta	t	Sig.	Lower Bound	Upper Bound
1 (Constant)	25.885	2.769		9.348	0	20.42	31.35
Years practiced	0.098	0.086	0.12	1.14	0.256	-0.072	0.269
Interdisciplinary care training (Yes) <sup>b</sup>	0.596	1.046	0.044	0.57	0.569	-1.468	2.661
Gender (female) <sup>c</sup>	3.04	1.126	0.204	2.7	<b>0.008</b>	0.817	5.262
Position (case manager) <sup>d</sup>	-1.592	1.169	-0.117	-1.361	0.175	-3.899	0.716
Age	-0.051	0.066	-0.073	-0.765	0.445	-0.181	0.08
2 (Constant)	16.706	4.275		3.908	0	8.255	25.156
Years practiced	0.038	0.091	0.046	0.419	0.676	-0.141	0.217
Interdisciplinary care training (Yes) <sup>b</sup>	-0.477	1.106	-0.035	-0.431	0.667	-2.664	1.71
Gender (female) <sup>c</sup>	2.667	1.181	0.179	2.258	<b>0.025</b>	0.332	5.001
Position (case manager) <sup>d</sup>	-0.805	1.436	-0.059	-0.561	0.576	-3.643	2.034
Age	-0.058	0.07	-0.084	-0.832	0.407	-0.197	0.08
Economic Incentive <sup>e</sup>							
Definite	0.23	1.916	0.011	0.12	0.905	-3.558	4.018
Partial or mixed	-0.176	1.314	-0.011	-0.134	0.894	-2.773	2.422
Missing	-1.311	1.633	-0.066	-0.802	0.424	-4.539	1.918
Dyad years worked together	0.402	0.186	0.184	2.168	<b>0.032</b>	0.035	0.769
Interdisciplinary care protocols <sup>f</sup>							
Yes	-1.457	1.71	-0.077	-0.852	0.396	-4.839	1.924
missing	-2.194	4.209	-0.042	-0.521	0.603	-10.514	6.127
Practice Time <sup>g</sup>							
Patient Care	0.636	1.663	0.037	0.383	0.703	-2.652	3.925
Other	2.174	2.645	0.078	0.822	0.412	-3.055	7.404
Case severity score	-0.002	0.008	-0.019	-0.227	0.821	-0.018	0.014
Interdisciplinary meeting attendance (Yes)	1.614	1.765	0.099	0.914	0.362	-1.875	5.104
Patient Caseload <sup>h</sup>							
≤20	0.845	3.047	0.024	0.277	0.782	-5.178	6.868
21-50	2.901	1.656	0.204	1.752	0.082	-0.372	6.175
51-199	1.421	1.376	0.102	1.033	0.303	-1.298	4.141
Shared electronic information system (Yes) <sup>b</sup>	-0.381	1.258	-0.028	-0.303	0.762	-2.868	2.106
Leadership Supports Collaboration							
Very Strongly Agree	3.792	1.477	0.273	2.567	<b>0.011</b>	0.872	6.713
Strongly Agree	-0.224	1.591	-0.015	-0.141	0.888	-3.369	2.921
Neutral	-2.499	1.935	-0.112	-1.291	0.199	-6.326	1.327
Disagree	-2.198	3.262	-0.057	-0.674	0.502	-8.645	4.25
Strongly Disagree	-5.558	6.698	-0.062	-0.83	0.408	-18.798	7.683
Professional interaction scale	0.204	0.102	0.18	2.001	<b>0.047</b>	0.002	0.405
Frequency of interdisciplinary meetings <sup>k</sup>							
Weekly	0.394	1.944	0.027	0.203	0.84	-3.45	4.237
Bi-weekly	0.563	2.239	0.027	0.251	0.802	-3.863	4.988
Monthly	1.805	1.947	0.116	0.927	0.355	-2.044	5.654
Quarterly	3.261	1.994	0.152	1.636	0.104	-0.68	7.203

Model <sup>a</sup>	Unstandardized Coefficients		Standardized Coefficients			95 % Confidence Interval for B	
	<i>B</i>	<i>Std. Error</i>	<i>Beta</i>	<i>t</i>	<i>Sig.</i>	<i>Lower Bound</i>	<i>Upper Bound</i>
Practice setting <sup>l</sup>							
CBO with primary care on site	3.434	2.359	0.198	1.456	0.148	-1.229	8.097
Community Health Center	4.737	2.758	0.225	1.717	0.088	-0.715	10.188
DAC Outpatient Clinic	1.733	2.577	0.125	0.673	0.502	-3.361	6.826
Hospital Outpatient Clinic / non-DAC	4.307	2.762	0.211	1.559	0.121	-1.153	9.767
Substance Abuse Treatment Center with primary care	1.225	4.999	0.022	0.245	0.807	-8.658	11.108
Dyad Proximity <sup>m</sup>							
Work in same building	2.14	1.972	0.136	1.085	0.28	-1.758	6.037
Work on same floor	3.493	2.177	0.229	1.605	0.111	-0.81	7.797
Work in same suite	4.785	2.266	0.277	2.112	<b>0.036</b>	0.306	9.264
Work for same organization (Yes) <sup>b</sup>	-3.276	2.452	-0.205	-1.336	0.184	-8.123	1.57
3 (Constant)	-1.927	2.864		-0.673	0.502	-7.591	3.736
Years practiced	0.067	0.054	0.082	1.255	0.212	-0.039	0.174
Interdisciplinary care training (Yes) <sup>b</sup>	0.294	0.657	0.022	0.448	0.655	-1.005	1.594
Gender (female) <sup>c</sup>	0.989	0.71	0.066	1.393	0.166	-0.415	2.393
Position (case manager) <sup>d</sup>	-0.891	0.86	-0.066	-1.037	0.302	-2.591	0.809
Age	-0.045	0.042	-0.065	-1.083	0.281	-0.128	0.037
Economic incentive <sup>e</sup>							
Definite	-0.828	1.158	-0.038	-0.715	0.476	-3.117	1.462
Partial or mixed	-0.463	0.791	-0.03	-0.585	0.559	-2.026	1.101
Missing	-1.668	0.983	-0.083	-1.697	0.092	-3.613	0.276
Dyad years worked together	0.043	0.113	0.02	0.386	0.7	-0.179	0.266
Interdisciplinary care protocols <sup>f</sup>							
Yes	0.847	1.026	0.045	0.826	0.41	-1.181	2.875
Missing	1.163	2.496	0.022	0.466	0.642	-3.771	6.098
Practice Time <sup>g</sup>							
Patient care	-0.938	0.988	-0.054	-0.95	0.344	-2.892	1.015
Other	0.988	1.564	0.035	0.632	0.529	-2.105	4.082
Case severity score	0.005	0.005	0.047	0.95	0.344	-0.005	0.014
Interdisciplinary meeting attendance (Yes) <sup>b</sup>	0.23	1.049	0.014	0.219	0.827	-1.844	2.303
Patient Caseload <sup>h</sup>							
≤20	2.369	1.82	0.066	1.301	0.195	-1.23	5.968
21-50	0.663	1.001	0.047	0.663	0.509	-1.315	2.641
51-199	-0.128	0.822	-0.009	-0.156	0.877	-1.753	1.497
Shared electronic information system (Yes) <sup>b</sup>	-0.547	0.748	-0.04	-0.731	0.466	-2.026	0.932

Model	Unstandardized Coefficients		Standardized Coefficients		95 % Confidence Interval for B		
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
Leadership supports collaboration <sup>f</sup>							
Very Strongly Agree	0.187	0.9	0.013	0.208	0.835	-1.593	1.968
Strongly Agree	-1.744	0.948	-0.114	-1.84	0.068	-3.619	0.13
Neutral	-1.477	1.146	-0.066	-1.29	0.199	-3.743	0.788
Disagree	-0.183	1.974	-0.005	-0.093	0.926	-4.087	3.72
Strongly Disagree	-9.158	4.008	-0.102	-2.285	0.024	-17.083	-1.234
Professional interaction scale	0.104	0.061	0.092	1.722	0.087	-0.015	0.224
Frequency of interdisciplinary meetings <sup>l</sup>							
Weekly	0.163	1.151	0.011	0.141	0.888	-2.114	2.439
Bi-Weekly	-0.720	1.34	-0.035	-0.537	0.592	-3.368	1.929
Monthly	0.402	1.155	0.026	0.348	0.729	-1.882	2.685
Quarterly	2.632	1.179	0.123	2.233	0.027	0.301	4.963
Practice setting <sup>k</sup>							
CBO with primary care on site	4.186	1.399	0.241	2.993	0.003	1.421	6.951
Community Health Center	2.649	1.638	0.126	1.617	0.108	-0.59	5.889
DAC Outpatient Clinic	3.429	1.528	0.248	2.244	0.026	0.408	6.45
Hospital Outpatient Clinic / non-DAC	5.289	1.649	0.259	3.208	0.002	2.029	8.55
Substance Abuse Treatment Center with primary care	-2.497	3.081	-0.044	-0.81	0.419	-8.589	3.596
Dyad Proximity <sup>l</sup>							
Work in same building	1.833	1.191	0.116	1.539	0.126	-0.521	4.188
Work on same floor	1.428	1.332	0.094	1.072	0.285	-1.205	4.062
Work in same suite	1.286	1.362	0.074	0.944	0.347	-1.407	3.98
Work for same organization (Yes) <sup>b</sup>	-4.052	1.45	-0.254	-2.795	<b>0.006</b>	-6.918	-1.186
Trustworthiness <sup>m</sup>	0.371	0.136	0.197	2.722	<b>0.007</b>	0.102	0.641
Relationship initiation <sup>m</sup>	0.858	0.118	0.490	7.269	<b>0.000</b>	0.625	1.091
Role specification <sup>m</sup>	0.360	0.136	0.198	2.65	<b>0.009</b>	0.091	0.628

<sup>a</sup> Dependent Variable: Collaborative Practice

- a Dependent Variable: Collaborative Practice scored on a 7-point Likert scale for agreement with each statement, where 1 = very strongly disagree and 7 = very strongly agree.
- b Comparator is no.
- c Comparator is male.
- d Comparator is HIV PCP.
- e Comparator is no economic incentive.
- f Comparator is no protocol.
- g Comparator is administrator.
- h Comparator is  $\geq 200$ .
- i Comparator is agree.
- j Comparator is never.
- k Comparator is community-based organization (CBO) without primary care on site.
- l Comparator is different building.
- m Scored on a 7-point Likert scale for agreement with each statement, where 1 = very strongly disagree and 7 = very strongly agree.

**Table 5-15 Hierarchical Multiple Regression with Social Exchange Factors Entered First**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.817 <sup>a</sup>	.667	.661	3.948	.667	118.216	3	176	.000
2	.870 <sup>b</sup>	.757	.697	3.737	.090	1.622	33	143	.028
3	.877 <sup>c</sup>	.768	.700	3.717	.011	1.316	5	138	.261

a. Predictors: (Constant), role specification scale, relationship initiation scale, trustworthiness scale

b. Predictors: (Constant), role specification scale, relationship initiation scale, trustworthiness scale, practice time (Other), frequency of interdisciplinary meetings (Quarterly), case severity score, leadership supports collaboration (Strongly Agree), patient caseload (51-199), economic incentive (Partial/Mixed Incentive), dyad years worked together, leadership supports collaboration (Strongly Disagree), patient caseload ( $\leq 20$ ), interdisciplinary care protocols (Missing), frequency of interdisciplinary meetings (Bi-Weekly), interdisciplinary meeting attendance (Yes), practice setting (Community Health Center), dyad proximity (Same Floor), leadership supports collaboration (Neutral), economic incentive (Missing), dyad proximity (Same Suite), practice setting (Hospital Outpatient Clinic / non-DAC), leadership supports collaboration (Disagree), frequency of interdisciplinary meetings (Monthly), practice setting (Substance Abuse Treatment Center with primary care), practice setting (CBO with primary care on site), shared electronic information system (Yes), economic incentive (Definite Incentive), professional interaction scale, interdisciplinary care protocols (Yes), practice time (Patient Care), dyad proximity (Same Building), leadership supports collaboration (Very Strongly Agree), patient caseload (21-50), frequency of interdisciplinary meetings (Weekly), work for same organization (Yes), practice setting (DAC Outpatient Clinic)

c. Predictors: (Constant), role specification scale, relationship initiation scale, trustworthiness scale, practice time ( Other), frequency of interdisciplinary meetings (Quarterly), case severity score, leadership supports collaboration ( Strongly Agree), patient caseload (51-199), economic incentive (Partial/Mixed Incentive), dyad years worked together, leadership supports collaboration (Strongly Disagree), patient caseload ( $\leq 20$ ), interdisciplinary care protocols (Missing), frequency of interdisciplinary meetings (Bi-Weekly), interdisciplinary meeting attendance (Yes), practice setting (Community Health Center), dyad proximity (Same Floor), leadership supports collaboration (Neutral), economic incentive (Missing), dyad proximity (Same Suite), practice setting (Hospital Outpatient Clinic / non-DAC), leadership supports collaboration (Disagree), frequency of interdisciplinary meetings (Monthly), practice setting (Substance Abuse Treatment Center with primary care), practice setting (CBO with primary care on site), shared electronic information system (Yes), economic incentive (Definite Incentive), professional interaction scale, interdisciplinary care protocols (Yes), practice time (Patient Care), dyad proximity (Same Building), leadership supports collaboration (Very Strongly Agree), patient caseload (21-50), frequency of interdisciplinary meetings (Weekly), work for same organization (Yes), practice setting (DAC Outpatient Clinic), gender (Female), interdisciplinary care training (Yes), age, position (Case Manager), years practiced

**Table 5-16 Multiple Hierarchical Regression Coefficients with Social Exchange Factors****Entered First**

Model <sup>a</sup>		Unstandardized Coefficients		Standardized Coefficients <sup>a</sup>			95.0% Confidence Interval for B	
		B	Std. Error	$\beta$ Beta	t	Sig.	Lower Bound	Upper Bound
1	(Constant)	-0.63	1.539		-0.409	0.683	-3.667	2.407
	Trustworthiness	0.337	0.126	0.179	2.664	<b>0.008</b>	0.087	0.587
	Relationship initiation	0.86	0.107	0.492	8.005	<b>0.000</b>	0.648	1.073
	Role specification	0.44	0.121	0.242	3.634	<b>0.000</b>	0.201	0.679
2	(Constant)	-3.411	2.311		-1.476	0.142	-7.979	1.157
	Trustworthiness	0.348	0.134	0.185	2.593	<b>0.010</b>	0.083	0.614
	Relationship initiation	0.878	0.117	0.502	7.493	<b>0.000</b>	0.647	1.11
	Role specification	0.374	0.135	0.206	2.775	<b>0.006</b>	0.108	0.641
	Economic incentive <sup>b</sup>							
	Definite	-0.336	1.144	-0.015	-0.293	0.770	-2.597	1.926
	Partial/Mixed	-0.245	0.781	-0.016	-0.314	0.754	-1.788	1.299
	Missing	-1.402	0.969	-0.07	-1.447	0.150	-3.317	0.513
	Dyad years worked together	0.055	0.107	0.025	0.516	0.606	-0.156	0.266
	Interdisciplinary care protocols <sup>c</sup>							
	Yes	0.669	1.022	0.035	0.655	0.514	-1.35	2.689
	Missing	1.033	2.495	0.02	0.414	0.680	-3.899	5.965
	Practice timed							
	Clinician	-1.102	0.988	-0.064	-1.115	0.267	-3.054	0.851
	Other	1.165	1.513	0.042	0.77	0.442	-1.825	4.156
	Case severity score	0.005	0.005	0.049	1.002	0.318	-0.005	0.014
	Interdisciplinary meeting attendance <sup>c</sup> (Yes)	-0.088	1.008	-0.005	-0.088	0.930	-2.081	1.905
	Patient caseload <sup>n</sup>							
	$\leq 20$	2.229	1.764	0.062	1.264	0.208	-1.257	5.715
	21-50	0.474	0.979	0.033	0.484	0.629	-1.462	2.41
	51-199	0.002	0.812	0	0.002	0.998	-1.603	1.607
	Shared electronic information system <sup>c</sup> (Yes)	-0.576	0.751	-0.042	-0.767	0.444	-2.06	0.908
	Leadership supports collaboration <sup>e</sup>							
	Very Strongly Agree	0.411	0.877	0.03	0.468	0.640	-1.323	2.144
	Strongly Agree	-1.497	0.94	-0.097	-1.592	0.114	-3.356	0.362
	Neutral	-1.6	1.145	-0.072	-1.397	0.165	-3.864	0.664
	Disagree	-0.384	1.928	-0.01	-0.199	0.843	-4.195	3.428
Strongly Disagree	-9.679	3.984	-0.108	-2.429	<b>0.016</b>	-17.554	-1.804	
Professional interaction scale	0.116	0.059	0.102	1.952	0.053	-0.001	0.233	
Frequency of interdisciplinary meetings <sup>f</sup>								
Weekly	0.46	1.13	0.031	0.407	0.685	-1.774	2.694	
Bi-Weekly	-0.716	1.333	-0.034	-0.537	0.592	-3.351	1.919	
Monthly	0.739	1.133	0.047	0.652	0.516	-1.501	2.978	
Quarterly	2.753	1.178	0.128	2.337	0.021	0.425	5.081	

Model		Unstandardized Coefficients		Standardized Coefficients <sup>a</sup>		95.0% Confidence Interval for B		
		B	Std. Error	$\beta$ Beta	t	Sig.	Lower Bound	Upper Bound
2	Practice setting <sup>a</sup>							
	CBO with primary care on site	4.079	1.376	0.235	2.965	<b>0.004</b>	1.36	6.798
	Community Health Center	3.212	1.576	0.153	2.038	<b>0.043</b>	0.097	6.327
	DAC Outpatient Clinic	3.747	1.488	0.271	2.518	<b>0.013</b>	0.806	6.689
	Hospital Outpatient Clinic / non-DAC	5.582	1.637	0.274	3.409	<b>0.001</b>	2.346	8.819
	Substance Abuse Treatment Center with primary care	-1.637	2.949	-0.029	-0.555	0.58	-7.466	4.192
	Dyad proximity <sup>i</sup>							
	Work in same building	2.324	1.163	0.147	1.998	<b>0.048</b>	0.025	4.624
	Work on same floor	2.035	1.279	0.133	1.591	0.114	-0.493	4.562
	Work in same suite	1.763	1.336	0.102	1.32	0.189	-0.877	4.403
	Work for same organization <sup>c</sup> (Yes)	-4.369	1.429	-0.274	-3.056	<b>0.003</b>	-7.194	-1.543
3	(Constant)	-1.927	2.864		-0.673	0.502	-7.591	3.736
	Trustworthiness	0.371	0.136	0.197	2.722	<b>0.007</b>	0.102	0.641
	Relationship initiation	0.858	0.118	0.49	7.269	<b>0</b>	0.625	1.091
	Role specification	0.36	0.136	0.198	2.65	<b>0.009</b>	0.091	0.628
	Economic incentive <sup>b</sup>							
	Definite	-0.828	1.158	-0.038	-0.715	0.476	-3.117	1.462
	Partial/Mixed	-0.463	0.791	-0.03	-0.585	0.559	-2.026	1.101
	Missing	-1.668	0.983	-0.083	-1.697	0.092	-3.613	0.276
	Dyad years worked together	0.043	0.113	0.02	0.386	0.7	-0.179	0.266
	Interdisciplinary care protocols <sup>c</sup>							
	Yes	0.847	1.026	0.045	0.826	0.41	-1.181	2.875
	Missing	1.163	2.496	0.022	0.466	0.642	-3.771	6.098
	Practice time <sup>d</sup>							
	Clinician	-0.938	0.988	-0.054	-0.95	0.344	-2.892	1.015
	Other	0.988	1.564	0.035	0.632	0.529	-2.105	4.082
	Case severity score	0.005	0.005	0.047	0.95	0.344	-0.005	0.014
	Interdisciplinary meeting attendance <sup>c</sup> (Yes)	0.23	1.049	0.014	0.219	0.827	-1.844	2.303
	Patient caseload <sup>h</sup>							
	≤20	2.369	1.82	0.066	1.301	0.195	-1.23	5.968
	21-50	0.663	1.001	0.047	0.663	0.509	-1.315	2.641
	51-199	-0.128	0.822	-0.009	-0.156	0.877	-1.753	1.497
	Shared electronic information system <sup>c</sup> (Yes)	-0.547	0.748	-0.04	-0.731	0.466	-2.026	0.932
Leadership supports collaboration <sup>e</sup>								
Very Strongly Agree	0.187	0.9	0.013	0.208	0.835	-1.593	1.968	
Strongly Agree	-1.744	0.948	-0.114	-1.84	0.068	-3.619	0.13	
Neutral	-1.477	1.146	-0.066	-1.29	0.199	-3.743	0.788	
Disagree	-0.183	1.974	-0.005	-0.093	0.926	-4.087	3.72	
Strongly Disagree	-9.158	4.008	-0.102	-2.285	<b>0.024</b>	-17.083	-1.234	
Professional interaction scale	0.104	0.061	0.092	1.722	0.087	-0.015	0.224	



Model	Unstandardized Coefficients	Standardized Coefficients <sup>a</sup>			95.0% Confidence Interval for B			
		B	Std. Error	$\beta$ Beta	t	Sig.	Lower Bound	Upper Bound
3	Frequency of interdisciplinary meetings <sup>f</sup>							
	Weekly	0.163	1.151	0.011	0.141	0.888	-2.114	2.439
	Bi-Weekly	-0.720	1.34	-0.035	-0.537	0.592	-3.368	1.929
	Monthly	0.402	1.155	0.026	0.348	0.729	-1.882	2.685
	Quarterly	2.632	1.179	0.123	2.233	<b>0.027</b>	0.301	4.963
	Practice setting <sup>g</sup>							
	CBO with primary care on site	4.186	1.399	0.241	2.993	<b>0.003</b>	1.421	6.951
	Community Health Center	2.649	1.638	0.126	1.617	0.108	-0.59	5.889
	DAC Outpatient Clinic	3.429	1.528	0.248	2.244	<b>0.026</b>	0.408	6.45
	Hospital Outpatient Clinic / non-DAC	5.289	1.649	0.259	3.208	<b>0.002</b>	2.029	8.55
	Substance Abuse Treatment Center with primary care	-2.497	3.081	-0.044	-0.81	0.419	-8.589	3.596
	Dyad proximity <sup>h</sup>							
	Work in same building	1.833	1.191	0.116	1.539	0.126	-0.521	4.188
	Work on same floor	1.428	1.332	0.094	1.072	0.285	-1.205	4.062
	Work in same suite	1.286	1.362	0.074	0.944	0.347	-1.407	3.98
	Work for same organization <sup>c</sup> (Yes)	-4.052	1.45	-0.254	-2.795	<b>0.006</b>	-6.918	-1.186
	Years practiced	0.067	0.054	0.082	1.255	0.212	-0.039	0.174
	Interdisciplinary care training <sup>c</sup> (Yes)	0.294	0.657	0.022	0.448	0.655	-1.005	1.594
	Gender (Female)	0.989	0.71	0.066	1.393	0.166	-0.415	2.393
	Position (Case Manager)	-0.891	0.86	-0.066	-1.037	0.302	-2.591	0.809
	Age	-0.045	0.042	-0.065	-1.083	0.281	-0.128	0.037

a. Dependent Variable: Collaborative practice.

b. Comparator is no incentive

c. Comparator is no

d. Comparator is administrator

e. Comparator is agree

f. Comparator is never

g. Comparator is community based organization (CBO) without primary care on site

h. Comparator is <200

i. Comparator is different building.

## Chapter 6: Discussion

### Summary of the Study

The aim of this study was to test an existing theoretical model of collaborative practice (McDonough & Doucette, 2001) among a working pair (dyad) of health professionals—the HIV/AIDS case manager and the HIV primary care provider (PCP). Furthermore, the study sought to identify those factors that play the most important role in facilitating collaboration. The sampling frame consisted of HIV PCPs in NYC drawn from a list of the NYC Department of Health & Mental Hygiene's HIV Care, Treatment and Housing Program providers and a list of case managers who work for agencies that received Ryan White Part A funding for case management services in 2009. Out of the 749 identified subjects, 116 HIV PCPs and 96 case managers in outpatient settings in New York City completed an anonymous 51-item questionnaire by mail.

The study instrument was adapted from a physician/pharmacist collaboration survey from Zillich et al. (Zillich et al., 2005; Zillich et al., 2004), and a Collaboration and Satisfaction About Care Decisions (CSACD) scale from Baggs (1994). Based on the theory that collaboration depends on participant characteristics, context characteristics, and the relationship or social exchange, the questionnaire included participant demographic questions such as age, gender, and years practiced case management or HIV primary care and organizational characteristics related to the study participant's organization such as patient caseload level, economic incentive, frequency of

organizational case discussions, professional interaction, and dyad physical proximity to one another. Social exchange factors investigated in the survey included trustworthiness, relationship initiation, and role specification subscales. The dependent variable, collaborative practice, was constructed from five items that measured attributes of collaboration, including shared responsibilities for planning, shared decision making, cooperation, consideration for oneself and others' interests, and coordination. The social exchange factors and collaborative practice measures were scored on a 7-point Likert scale where 1 = very strongly disagree and 7 = very strongly agree. Higher social exchange scores represented a higher degree of a collaborative relationship. Likewise, higher collaborative practice scores represented greater perceived collaboration among case managers and HIV PCPs.

Exploratory factor and confirmatory factor analyses evaluated the factor structure of the HIV PCP-Case Manager Collaboration subscales and collaborative practice. Based on the results of the factor analyses, the HIV PCP-Case Manager Collaboration Scale had to be slightly modified. Three items were removed from the trustworthiness scale and two items were removed from the role specification scale because they did not adequately describe these constructs among this study population. The final exploratory and confirmatory factor analysis confirmed Zillich and colleagues' (2005) three factor collaboration structure with three items for each subscale.

Univariate analyses were used to describe the study population and examine differences associated with the categorical variables and with collaboration. A hierarchical linear regression was performed to test whether the three groups of factors explained collaborative practice among HIV PCPs and case managers and to determine which group (participant, context or social exchange) of relationship drivers was most important in explaining collaboration. Last, the full regression model was examined to

assess the importance of each variable in explaining collaboration. The significant predictors of collaborative practice included practice setting (CBO with primary care on site; DAC outpatient clinic; and hospital outpatient clinic/non-DAC); dyad works for same organization, leadership support of collaboration (strongly disagree), frequency of interdisciplinary meetings (quarterly), and the social exchange variables. In the context of the HIV PCP-case manager dyad, social exchange factors were the dominant drivers of collaboration and relationship initiation was the key predictor of collaboration. Of note, participant characteristics did not play a role in predicting collaborative practice.

### **Interpretation of Findings**

Findings from the hierarchical regression analysis supported the hypothesis that participant, context, and social exchange factors can explain a substantial amount of variance ( $\geq 50\%$ ) in perceived collaborative practice occurring between the HIV PCPs and case managers. The complete model explained 70% (adjusted  $R^2$ ) of the variance in collaborative practice scale.

The findings also supported the second study hypothesis which postulated that social exchange factors (trustworthiness, relationship initiation, and role specification) would be the most influential group in contributing to variance in collaborative practice. As a group and individually, the participant factors were not important in explaining collaborative practice. The context factors accounted for more variance in the model than the participant factors but were not as influential as the social exchange factors. The largest increment in variance explained by the model occurred when the social exchange factors were entered indicating that this was the most influential group of relationship drivers of variation in collaborative practice.

The third hypothesis, which predicted that specific variables would be particularly important for explaining collaboration, was partially supported. In sum, only nine variables were associated with collaborative practice. The study confirmed several hypotheses about the importance of particular variables but refuted many hypotheses as well. The participant variables did not contribute significantly to the prediction of collaborative practice. Young age, interdisciplinary training in collaboration, and substantial work experience were not significantly associated with collaboration after controlling for other variables in the model. As hypothesized, administrative support of collaboration was a significant predictor of collaboration. Study participants, that “strongly disagreed” with a statement that their executive leaders’ support/promote collaboration, predicted less collaboration compared to those that agreed with the statement. The study also showed that frequent professional interaction did not play a role in fostering collaboration among HIV PCPs and case managers. Furthermore, the position of the HIV PCP or case manager (clinician or other compared to administrator) was not a determinant of collaborative practice. Dyad work years together, economic incentive, complexity of patient panels (severity scores), patient caseload volume, interdisciplinary protocol, information system use, and co-located programs did not have an influence on collaborative practice.

One mutual adjustment mechanism, the frequency of organizational case conferences/case reviews, was an influential driver of collaboration. To that end, quarterly case discussions that were attended by HIV PCPs and case managers were a positive and significant (comparator was the organization never held case discussions) predictor of collaborative practice. The work environment in which the HIV PCPs or case managers were employed also influenced collaborative practice. Community based organizations with primary care on site, designated AIDS center (DAC) outpatient

clinics, and hospital outpatient clinics (non-DAC) predicted greater levels of collaboration compared to community based organizations without primary care on site. The variable “dyad works for the same organization” had a negative and significant relationship with collaborative practice. As hypothesized, social exchange variables were dominant drivers of collaboration; they were positively and significantly related to collaborative practice.

**Participant characteristics.** An important finding from this study was that individual attributes of collaborators were not influential. Despite a large body of previous descriptive research, including scholarly discussions, that focused on the importance of individual characteristics such as education, interdisciplinary training, and age (Alt-White et al., 1983; Baggs & Schmitt, 1997; Bradford, 1989; Bradshaw & Doucette, 1998; Dechairo-Marino et al., 2001; Fagin, 1992; McDonough & Doucette, 2001; Ritchey & Raney, 1981; San Martin-Rodriguez et al., 2005; Stapleton, 1998; Weiss & Davis, 1985), this study found that these were not significant drivers of a collaborative working relationship (CWR). Zillich et al. (2004) and Doucette et al. (2005) showed that gender, age, and residency training were not important for collaboration among physicians and pharmacists. Similar to the current study, Doucette et al. (2005) did not find any participant characteristics to be significant predictors of collaborative practice. On the other hand, Zillich et al. (2004) found internal medicine was an important factor for collaboration ( $p = 0.001$ ) but noted that the explanation for this was unclear and could have possibly been attributed to other variables in the model. With the exception of Zillich’s finding that internal medicine was significantly related to collaboration, the current study’s results are consistent with work by Zillich et al. (2004) and Doucette et al. (2005).

The current study also challenged prior research that suggested younger age was related to or influential for collaboration. Two descriptive studies, one by Bradshaw and Doucette (1998) and the other by Ritchey and Raney (1981) evaluated physician age and perceptions of expanding pharmacists' roles and found a relationship between positive attitudes toward expanding pharmacist roles and age.

In this study neither gender nor participant type (CM or HIV PCP) predicted collaborative practice. Although gender had a univariate association with collaborative practice in this study, it was not significant in the final multiple hierarchical regression model. This finding was similar to studies of collaboration by Doucette et al. (2005) and Zillich et al. (2004). One previous study (Weiss & Davis, 1985) found that gender (female) was a significant predictor of collaboration, but the study population consisted of physicians only. Perhaps gender is not related to collaboration for HIV PCPs and case managers that work in ambulatory care settings. Even though univariate analysis showed that the type of study participant (case manager/HIV PCP) was significantly associated with collaborative practice, its importance was diminished when other variables were taken into account. Participant type lost significance in the hierarchical model. This suggests that the role of being a case manager or HIV PCP is not necessary for collaboration.

Another interesting finding of this study was that the mean collaborative practice score was somewhat higher than a study of physician/pharmacist collaboration. A cross-sectional study (Zillich et al., 2004) of primary care physicians in Iowa had a mean collaborative score of 24.2 ( $n = 340$ ,  $SD = 6.3$ ). A one-sample t-test at the 5% alpha level indicated that the mean collaborative practice score reported in Zillich et al. (2004) study was significantly different than the current study's mean collaborative practice score ( $t = -5.85$ ,  $p < 0.0001$ ). The higher mean collaborative practice score in the HIV

PCP/case manager population was unexpected since the study population consisted of two distinct groups with unique education and training backgrounds. For the most part, the HIV PCPs were Medical Doctors and a large proportion of the case managers had either a social work background or a case management background. The scores may have been high because of response bias considering the fact that study participants were asked to select a CM or HIV PCP whom they worked with the most. Perhaps the reference point motivated participants to select people with whom they already had a strong CWR. On another note, this study found no association between primary specialty, board certification in sub-specialty, HIV PCP discipline (e.g., intern, full-time faculty), and case manager discipline (e.g., nursing, social work, case management) and collaboration.

Although education differences between collaborators have been cited as a barrier to collaboration, this study did not support this conjecture. Univariate analysis indicated that case managers with baccalaureate degrees were no more likely to collaborate as compared to those with a two year degree or less. The empirical evidence of education's influence on collaboration is mixed, however. Alt-White et al. (1983) demonstrated that education level was not associated with collaboration. However, Weiss & Davis (1985) showed that nurses with higher degrees of education had higher collaboration scores. The rationale for education's role in collaborative practice is based upon the notion that separate trainings may have distinct socialization and professionalization processes. One implication of separate training is a "profession-centric" attitude and approach to working with other professionals. Specifically, interdisciplinary care training did not play a role in collaboration in this study. In the full model, interdisciplinary training in collaboration had no impact on collaborative practice, although prior literature suggested this was important for a CWR (Alt-White, 1983;



Bradford, 1989; Dechairo-Marino et al., 2001; Fagin, 1992; San-Martin Rodriguez et al., 2005; Snyder et al., 1996). In this study, profession type among HIV PCPs was also used as an indicator of education. This study found that there was no association between collaborative practice and profession type (PA, NP, MD, DO, Other), which is related to degree of a person's education, and training. Education and interdisciplinary training may not play an integral role in promoting collaborative practice among HIV PCPs and case managers. Further research should focus on the role of education and interdisciplinary training. With respect to education, the lack of significance in this study may be attributed to the fact that a large proportion of the population was highly educated. Recall that approximately 80% of case managers had a four year degree or higher and almost two-thirds of HIV PCPs were Medical Doctors. This finding suggests that education may not be critical to collaborative practice among highly educated individuals.

One question this research raised is why the number of years practiced did not influence collaborative practice. Scholarly discussions have underscored the importance of professional competence in facilitating collaborative practice (Baggs & Schmitt, 1997; Miccolo & Spanier, 1993; Stapleton, 1998). Theoretically, a greater number of years of work experience should increase task competence. According to Gabarro (1987), task competence has a paramount influence on the development of a work relationship. Although prior studies (Alt-White et al., 1983; Wells et al., 1998) did not find a relationship between years of work experience and collaboration, these studies cited limitations that may have affected their results. A scatterplot of collaborative practice and years practiced in this study showed a curvilinear relationship. The u-shaped curve suggested that having 0-20 years of experience has a positive influence on collaboration, whereas having 20 or more years of experience has a negative influence

on collaboration. These relationships were not statistically significant, however. The non-significant finding is most likely due to the small sample size (A. Shankar, personal communication, June 16, 2010).

**Context characteristics.** This study demonstrated that several contextual factors were influential in the development of collaboration. Executive leadership (strongly disagree) may have the ability to weaken collaborative practice. This study provides further evidence for the importance of the influence of administrative support. One such study by D'Amour, Goulet, Labadie, and Martin-Rodriguez (2008) using qualitative methods found that leadership can play a pivotal role in the development of a CWR and can remove barriers to collaboration. Leaders can play a strategic role in facilitating collaboration among health care teams. This finding was similar to studies that have found that leadership significantly affects nurse-physician relationships (Prescott & Bowen, 1985) and team effectiveness (Borrill et al., 2002). Within HIV primary care, several leaders have echoed this belief that executive leaders are influential in promoting collaboration among case management and HIV PCP teams (S. Duke & J. Samuels, personal communication, February 20, 2009). After all, the dyad is a working relationship, and organizational leadership plays a vital role in encouraging or discouraging collaboration. In the context of HIV primary care program implementation, the role of leadership is appreciated. When the NYC Department of Health & Mental Hygiene issued a request for proposal to rebid the care coordination program, DOHMH required a memorandum of understanding (MOU) from agencies to ensure that leadership was on board with the program. The care coordination program requires collaboration among HIV PCPs and case managers. The MOU was thought to be an indicator of leadership support (F. Laraque, personal communication, April 5, 2010) and

was requested because of the belief in the ability of leadership to influence effective collaboration.

Dyads working for the same organization had a negative and significant influence on collaborative practice. This finding is in contrast to research by Doucette et al. (2005) which reported a non-significant influence of dyad working in the same practice. From the theoretical standpoint of coordination, this result was not anticipated. The hypothesis was that dyads working for same organization would have a positive influence on collaborative practice. Intuitively, working for the same organization should improve one's relationship. Indeed, univariate analysis showed that when a dyad works for same organization they had higher mean collaborative practice scores compared to a dyad that worked for different organizations. However, after the context and social exchange variables entered the hierarchical regression model, working for the same organization became a deterrent to collaboration. Interaction is most likely at work if in the univariate analysis there is a positive and significant relationship with collaboration and in the multivariate analysis there is an inverse and significant relationship (A. Shankar, Personal communication, June 16, 2010). Future research should examine this phenomenon further and test whether interaction is present.

Another important finding of this study was that the frequency of interdisciplinary case discussions influenced collaboration. The only factor related to coordination that was positive and significantly related to collaborative practice was quarterly case conference/case discussions. The relationship between quarterly interdisciplinary case discussions (compared to never) and collaborative practice proved to be important for HIV PCP-case manager collaboration. This finding does not come as a surprise because previous research has shown that this mutual adjustment, a mode of coordination, has a positive influence on collaborative practice. Alt-White et al. (1983),

Bickell & Young (2001), Henneman et al. (1995), McKay & Crippen (2008), and insert name (1997) found that adjustment mechanisms enhanced collaborative practice. The lack of significance for weekly, bi-weekly, and monthly meetings was surprising. It is unclear why a quarterly interdisciplinary meeting was significant and why weekly, bi-weekly, and monthly were not. The literature discussed care coordination and explained that the focal point of coordination is information exchange. In turn, this information exchange is purported to help transcend institutional boundaries, thus improving collaboration. In the context of HIV primary care, protocols, regular meetings, and electronic information systems were not relevant when controlling for other factors in the model. Electronic information exchange systems and attending meetings on a regular basis (Yes/No) with case manager and HIV PCP were anticipated to be influential because of previous empirical work and concepts of coordination (Alt-White et al., 1983; Pogach et al., 2004; Sicotte et al., 2002).

Nadler and Tushman (1988) proposed that operational processes such as interdisciplinary care discussions would allow participants to give feedback and adjust roles. They refer to this as mutual adjustment. Previous studies have demonstrated the importance of frequent opportunities (e.g., weekly meetings) to enable mutual adjustment for care coordination (Alt-White et al., 1983; Bickell & Young, 2001; McKay & Crippen, 2008; Wrobel et al., 2003; Young et al., 1997). Zillich et al. (2006) also point out that repeated exchanges (perhaps meetings in this case) allowed for the study's intervention group to "establish a collaborative role in their working relationships" (p. 456). The fact that weekly, bi-weekly, and monthly interdisciplinary meetings were not significant (comparator = never) was unanticipated. This finding was contrary to the theoretical role of mutual adjustment and also was not logical. If quarterly meetings were significantly associated with collaborative practice, then why would weekly, bi-

weekly and monthly not have an association when compared to never meeting? We would expect to see more frequent interdisciplinary case discussions as predictors of collaborative practice. Nonetheless, quarterly meetings can make a difference in collaboration. HIV PCPs and case managers can benefit from meeting at least quarterly to discuss patient care.

No relationship was found between collaboration and interdisciplinary protocols, HIV PCP attendance at case conference with the related HIV PCP/case manager, electronic information system, and physical proximity. Recall that 83% of study participants indicated that their organization had protocols or policies that described interdisciplinary service delivery process. The expectation was that an interdisciplinary protocol, an operational process of standardization (McDonald et al., 2007), would have a positive influence on collaboration because it clarifies roles and work policies. Although the evidence is mixed about the relationship between formalized roles and protocols, the belief was that protocols would enhance collaboration among this dyad. Doucette et al. (2005), Sicotte et al. (2002) & Young et al. (1998) did not find a relationship between standardization and collaboration and health outcomes. Yet, a recent qualitative study looking at indicators of active collaboration concluded that formal documents outlining roles and responsibilities of care teams are important for collaboration (D'Amour et al., 2008). One explanation for the finding that interdisciplinary protocols were not significant predictors may be that the participants really do not have protocols. A qualitative study by the NYC DOHMH revealed that many case managers surveyed said they had a protocol but failed to provide an example when asked, or the example they provided was not a protocol in the true sense (F. Laraque, personal communication, April 5, 2010).

Patient complexity did not play an important role in predicting collaboration. The complexity of patient care has been shown to be significantly related to the amount of collaboration among nurses and residents in an ICU (Baggs et al., 1992). According to the organizational theorist Thompson (1976), patient complexity should have a positive influence on collaborative practice. Task complexity in a trauma center posed challenges to team functioning suggesting that more collaboration is necessary to meet the challenges of complex tasks (Xiao et al., 1996). Complexity of patient care may not be as important under conditions that are non-urgent such as HIV primary care settings.

Another question raised by this research is why time available, as indicated by caseload and position (administrator, clinician, other), was not significantly related to collaborative practice. The scholarly literature stressed the importance of time available for building a collaborative relationship (Baggs & Schmitt, 1997; Fewster-Thuente & Velsor-Friedrich, 2008; McKay & Crippen, 2008; Moreo, 2003a, 2003b; Stapleton, 1998). One such study by Baggs & Schmitt (1997) suggested that lighter caseloads gave way to more opportunities for nurses and physicians to collaborate. Participants in a qualitative study that examined perceptions of nurse, physician, and pharmacist teams in inpatient care settings (Makowsky et al., 2009) considered workload as a major challenge to collaboration. One possible explanation for this study's finding is that provider to patient ratio does not influence collaboration for this dyad. Or, perhaps the study did not include a sufficient number of participants that worked at organizations with less than 20 patients. Recall, a quarter of study participants worked at organizations with greater than or equal to 200 patients and about a third worked at organizations with either 21-50 or 51-199 patients.

Interestingly, dyad years of work experience together were not significantly associated with collaboration. This finding was unexpected because the literature

suggests that developing a collaborative working relationship takes time (Baggs & Schmitt, 1997; Gabarro, 1987). People with a greater number of years of working with the same HIV PCP or case manager were anticipated to have higher collaborative practice scores. The Pearson correlation between dyad work years together and collaborative practice was low and significant 0.187. The hierarchical regression model showed that dyad work years together became insignificant after the social exchange factors entered the model. Future research should investigate whether there is an interaction effect between dyad years working together and the social exchange variables.

The questionnaires also collected data about funding sources that reimbursed HIV PCPs and case managers for case management services. This made testing whether economic incentives were predictors of collaborative practice possible and led to the finding that incentives did not significantly contribute to collaboration. Collaboration seems to be more greatly motivated by social exchanges than by financial incentives to collaborate. The findings of this study suggest that economic incentives are not closely linked to perceived collaborative practice, but this finding deserves further research.

This study found that professional interaction, or frequent interactions characterized by bi-directional communication and different modes of communication, was not significantly related to collaboration. This finding represented a departure from studies by Zillich et al. (2004) and Doucette et al. (2005) who studied pharmacist and physician collaboration. The professional interaction scale measured interactions that were initiated by the case manager and the HIV PCP. The professional interaction scale, which measured these attributes, was not statistically significant in explaining collaborative practice. In other words, frequency and mode (e.g., referrals) of

communication were not influential in forming a CWR after the social exchange variables entered the model. Doucette et al. (2005) measured pharmacists' professional interaction with physicians, from the pharmacists' perspective, and reported a mean score of 5.3 (SD = 1.9, 8 items). The moderate professional interaction score reported in this study is somewhat higher than the pharmacists evaluated in a study by Doucette et al. (2005). Of note, Zillich et al. (2004) and Doucette et al. (2005) found that the professional interaction scale was positive and significantly related to collaborative practice. Perhaps for HIV PCPs and case managers, the quality of social exchange supersedes frequent bi-directional communication and different modes of communication.

Interestingly, physical proximity (co-location) was also not a dominant driver of collaborative practice. This is in contrast to prior studies and scholarly discussions (Alt-White et al., 1983; Baggs & Schmitt, 1997; Dwyer et al., 1987; McDonough & Doucette, 2001; San Martin-Rodriguez et al., 2005). Perhaps physical proximity is not strongly related to collaboration for this dyad. Alt-White et al. (1983) attributed collaboration among nurses and physicians in critical care units to the small work space. Baggs & Schmitt (1997) conducted a study using grounded theory and found that working in spaces in close proximity was a necessary antecedent to collaboration for nurses and medical resident physicians working in ICUs. Another explanation may be that practice setting (CBO, DAC) may be more important than physical proximity for HIV primary care even though providers may not work in close proximity. Moreover, the HIV PCPs and case managers are still able to attend interdisciplinary meetings. Perhaps the institution is more important than physical proximity.

Several practice settings were strong predictors of collaborative practice which was not found in two prior studies (Doucette et al., 2005; Zillich et al., 2004) that showed



that practice setting was not important for collaboration. This finding suggests an important relationship between organizational setting and collaboration in the context of HIV ambulatory care. The findings suggest that CBOs with primary care on site, DAC outpatient clinics, and hospital outpatient clinic (non-DAC) predicted greater levels of collaboration as compared to CBOs without primary care on site. This implies that the lack of primary care on site may somehow inhibit collaborative practice. Perhaps practice settings with primary care on site such as CBOs may have well established collaborative habits because they have multidisciplinary clinics. DACs in NYC are required to have case management on site and have standards of care (New York State Department of Health AIDS Institute, 2006). The mode of practice within a DAC may be more collaborative and interdisciplinary in nature. Also the lack of primary care on site in some CBOs may inhibit collaborative practice compared to DACs, outpatient non-DACs, and CBOs with primary care on site. Why CHCs were not significant since they have primary care onsite remains an open question.

**Social exchange factors.** Factor structure analysis confirmed that three constructs make up the adapted HIV PCP-Case Manager Collaboration Scale—trustworthiness, role specification, and relationship initiation. These results were similar to Zillich et al.'s (2005) validation of the PPCI. It should be noted that minor modifications were made to the role specification and trustworthiness scales. The three trustworthiness items that were removed pertained to two-way communication, trust expertise of case manager or HIV PCP, and commitment. The two role specification items that were removed were related to conflict resolution. It could be that social desirability contributed to the differences in factor structure. The results of Zillich and colleagues (2005) factor structure were not replicated exactly, perhaps because of

participants' desire to report they had strong social interactions. In turn, this may have affected the scores on items that measured conflict resolution, trust in the other's expertise, and commitment. The three subscales had moderate to high correlations with each other. Zillich et al. (2005) also found correlations of this magnitude. The correlation among factors was anticipated because they are three dimensions that make up one larger construct. The HIV PCP-Case Manager Collaboration Scale is a suitable instrument to measure the nature of social exchange among HIV PCPs and case managers in an ambulatory setting.

Results of the study indicated that social exchange variables were the dominant drivers of collaborative practice. This research extended the understanding of social exchange factors by testing the CWR theoretical model (McDonough & Doucette, 2001) on an HIV PCP-case manager dyad. The importance of social exchange factors is consistent with the CWR. Developing a CWR is highly dependent on trust, relationship initiation, and interdependency as demonstrated by the drastic change in variance when social exchange variables entered the hierarchical linear model. This finding was not a surprise since it has been well documented in two previous studies (Doucette et al., 2005; Zillich et al., 2004) and purported in McDonough and Doucette's (2001) theoretical framework. When introducing social exchange factors into the hierarchical regression model, it weakened the influence of gender, dyad work years, leadership support collaboration (strongly agree), professional interaction, and dyad work in same suite, and caused them to become non-significant.

In this analysis, one particular predictor stood out—relationship initiation. Relationship initiation had the largest beta coefficient out of all the predictors in the final model. Relationship initiation by the case manager clearly plays a crucial role in developing a CWR for the HIV PCP-case manager dyad. As noted earlier, the study

findings lend support to previous work on the CWR. The theory suggests that pharmacists need to initiate the relationship with a physician in order to demonstrate their competency and begin communication. Zillich et al. (2004) found that role specification was the most important factor for predicting collaboration among primary care physicians and pharmacists, from the physician perspective. On the other hand, Doucette et al. (2005) found no significant association between collaboration and relationship initiation using an analysis in which participant, context and social exchange factors were entered into a hierarchical regression model sequentially.

With respect to the relationship initiation, an implicit assumption was that the case manager should be the initiator of the relationship<sup>17</sup> (McDonough & Doucette, 2001). In the context of HIV primary care, the initiating behavior on part of the case manager was the most critical in predicting collaboration among HIV PCPs and case managers. Case managers unilaterally identify the needs of the HIV PCPs and determine how they can advance the relationship. This unilateral initiation is thought to occur in Stage 1 (professional recognition) of CWR development. The finding of this study confirmed that case managers who showed an interest in helping HIV PCPs improve their practice and provided information about a patient were instrumental in advancing the CWR. Relationship initiation may be strongly related to collaborative practice because it allows the HIV PCP to assess the value and rewards of working with the case manager. In turn, the HIV PCP may begin to recognize the potential advantages of developing a CWR with the case manager. Case managers that initiate

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<sup>17</sup> Both versions of survey ask respondent to rate agreement with statements about the case manager's initiating behavior.

relationships with HIV PCPs have the opportunity to showcase the attractiveness of relationship expansion. Throughout the early stages of a CWR, the HIV PCP is not aware of the mutual benefits of working together and power is unbalanced (McDonough & Doucette, 2001; Scanzoni, 1979). In part, the effort of the case managers to show an interest in helping the HIV PCP is essential for attempting to equalize the power dynamics of the dyad. Zillich et al. (2006) showed that pharmacists that made written and oral recommendations allowed for physicians to assess their clinical expertise; hence, relationship initiation helps build trust, open communication, and mutual expectations.

Another key finding of this study was that role specification enhances collaboration. This finding corroborates McDonough & Doucette's (2001) theory that the development of CWR is fostered by dependence symmetry. Role specification is about mutual agreement of roles; an unilateral role expectation will not harbor/develop role specification. Role specification is a construct that encompasses the mutual dependence of the HIV PCP and case manager to manage patient care plans. Role specification has been shown to be a positive and significant predictor of collaborative practice (Zillich et al. 2006; Doucette et al., 2005). Equitable dependency is an overt process, meaning both actors must allow a balance of power (Emerson, 1962; McDonough & Doucette, 2001; Scanzoni, 1979). Social exchanges that reach this equilibrium, in which both actors contribute equal amounts of work and receive equal payout (e.g., input and output are balanced), serve as a catalyst for HIV PCP-case manager collaboration. Dependence symmetry is a conscious (purposive) action and is motivated by several other purposive actions such as trust, bilateral communication, expectation assessment, and mutual agreement on roles (Gabarro, 1987; McDonough & Doucette, 2001; Scanzoni, 1979).

Underlying the overt process of dependency symmetry is mutual expectation and agreement on respective roles. As dependency becomes more intense, the relationship will more likely culminate in collaborative practice. This takes place when the dyad recognizes their "complimentary roles" (Doucette et al., 2005, p. 571). The dyad must agree on roles in order to come to rely on each other (Doucette et al., 2005; McDonough & Doucette, 2001; Zillich et al., 2004). In order for the CWR to progress, one party must relinquish duties/roles to the other party and vice versa. For instance, the HIV PCP would allow the case manager to assist with HIV treatment (medication) adherence. When the relationship first forms, the power is tipped in favor of the HIV PCP. In the beginning stages of a CWR mutual trust and two-way communication have not become well established. As the relationship progresses, the case manager initiates interactions with the HIV PCP and in this process the case manager communicates his or her potential role in caring for patients.

When actors transition from early to more advanced stages of a CWR, they come to realize their potential roles and the competency of the actors (expertise), and they make judgments about trust (Gabarro, 1987; McDonough & Doucette, 2001; Scanzoni, 1979). One way case managers can exert influence and enhance their power (in an effort to balance power) is to demonstrate their expertise in an area that can help the HIV PCP complete his/her goal (e.g., patient care). Eventually, the HIV PCP and case manager will use maximum joint profit (a form of purposive action), meaning that they work together for the mutual benefit of the dyad (Scanzoni, 1979). Until there is reciprocal power sharing, the dyad will experience some shifting of power until it balances near the final stages of an advanced collaborative working relationship. Consistent patterns of dominance will not culminate in a symmetrical distribution of

power (Scanzoni, 1979). As trust is gained, the HIV PCP relinquishes some responsibilities, thereby shifting power to the case manager.

Dependence symmetry does not happen overnight. In a recent qualitative study of collaborative working relationships of nurses, physicians, and pharmacists, the pharmacists noted that time was a factor in physicians' ability to "relinquish patient care responsibilities" (Makowsky et al., 2009, p. 176). Hence, it took time to balance the power. As the dependence on one another becomes more symmetrical, the more equitable distribution of power becomes more evident. An inherent part of reaching dependence symmetry is the process of negotiation (McDonough & Doucette, 2001; Scanzoni, 1979). In light of this, Scanzoni suggests that power is also related to actors' negotiations; he asserts that "Power is inseparable from negotiation" (p. 74).

Power balance is the main focus of role specification, but underlying the notion of power is mutual expectation development, which often involves negotiations (Gabarro, 1987). Since task competency is critical for work relationships, dyad members can form expectations and determine whether they will strike a power balance once they are aware of each other's roles and expertise (Gabarro, 1987). In order for mutual expectations to form, the dyad makes expectation assessments (McDonough & Doucette, 2001). This assessment is a critique of the others' skills and competencies. Through this process, the other forms expectations about what to expect and how roles should be defined. Once the roles and expectations are defined, the case manager and HIV PCP can rely on each other. Until the HIV PCP and case manager feel the other is as "equally valuable" (Scanzoni, 1979), the dependence will not be symmetrical. Zillich et al. (2005) suggest that the more "balanced" roles are, the more likely the dyad will be dependent on each other. Role expectation is an inherent part of power assessment because it is the dyad's way of assessing how the other can add value to their agendas

or practice. When exchanges are characterized as reciprocal, the assumption is that each member of the dyad has skills and performs tasks that complement the other.

This study also confirmed that trustworthiness is essential for HIV PCP-case manager collaboration. Prior conceptual work and empirical studies support this finding (Arcangelo et al., 1996; Crosby et al., 1990; Doucette et al., 2005; Gabarro, 1987; Henneman et al., 1995; McDonough & Doucette, 2001; McKay & Crippen, 2008; R. M. Morgan & Hunt, 1994; Scanzoni, 1979; Stapleton, 1998; Zillich et al., 2004). As discussed earlier, trustworthiness was comprised of items that measured bi-directional communication and trust. The current study demonstrated that the ability to trust one another and two-way communication play a fundamental role in the dyad's ability to progress through the stages of a CWR. Zillich et al. (2004) and Doucette et al. (2005) also showed that trustworthiness was a significant and positive predictor of collaborative practice. Crosby and colleagues (1990) showed that trust influenced future interactions among salespersons and their customers. Furthermore, recent research supports the current study's finding that trust and effective, mutual communication influence collaboration. D'Amour and colleagues (2008) conducted a multiple-case study of perinatal health care facilities in Canada to validate indicators of a model of collaboration. The study used semi-structured interviews to elicit indicators of collaboration and concluded that trust had a substantial impact on stabilizing active collaboration. D'Amour et al.'s study also noted that trust is built through assessing one another's competencies and evaluating whether the other can assume responsibilities.

A qualitative study using semi-structured interviews of 60 Canadian health professionals and administrators examined perceptions of factors that enhanced collaboration (Suter et al., 2009). One core competency for collaborative practice that emerged from the interviews was communication. Study participants stressed that

communication was an important competency in order to build trust, share concerns, and define/clarify roles to coordinate care, thereby fostering collaborative practice (Suter et al., 2009). Summarizing their findings of interviews of core competencies for collaborative practice, Suter et al. (2009) noted that "Being able to build trusting and respectful relationships and having a desire for continuous learning and reflection were considered essential to moving practice forward." (p. 49). Another recent qualitative study of pharmacist, physician, and nurse teams working in inpatient units in Alberta, Canada used reflective journaling and key informant interviews to elicit feedback on barriers and facilitators of a team approach to inpatient care (Makowsky et al., 2009). One finding that emerged in Makowsky et al.'s (2009) study was the emphasis on mutual respect and trust as an important building block for successful collaboration. Even though trustworthiness was influential in predicting collaboration, relationship initiation was far more important.

The results of this study stress the importance of social exchange characteristics. Working relationships have a substantial effect on collaborative practice when managing a patient's plan in HIV primary care. If collaborative practice is indeed related or affects health outcomes, then this could have a significant impact on the health and well-being of the patient. It may also impact workers' satisfaction. This research implies that work relationships are fundamental to collaborative practice. In this respect, both the HIV PCP and case manager need to build trust, use effective communication, and establish dependence symmetry.

Furthermore, the findings of this study suggest that McDonough & Doucette's (2001) theoretical model of CWRs should be adapted for this dyad. As discussed earlier, the study confirmed the hypothesis that the complete model can explain a substantial amount of variance. Nonetheless, participant characteristics as a group did



not explain a large proportion of variance in collaborative practice and they were not significant drivers of collaboration. Another problem with the theoretical model was that it did not account for possible interactions between two context variables and the social exchange variables. It was very likely that interaction affected the results for the variables dyad years of work experience together and dyads working for the same organization. The theoretical model of HIV PCP-case manager CWR should exclude participant characteristics and address the possible interaction between social exchange variables and dyad years of work experience and dyads working for the same organization.

## Chapter 7: Conclusions and Recommendations

### Potential Implications of Findings

In summary, this study of HIV PCPs and case managers working in NYC in ambulatory care settings examined predictors, correlates, and measures of collaborative practice. Relationship initiation emerged as the dominant driver of collaborative practice. The results of this research show the importance of social exchange factors for building a collaborative working relationship (CWR). Trustworthiness, role specification, and relationship initiation can enhance a CWR. Based on these findings, several recommendations can be made to help providers and organizations in their structure, hiring, and training strategies to foster effective social exchanges and adapt organization factors to promote collaborative working relationships. Social interaction is especially important in fostering CWR among this dyad. To this end, providers and organizations could implement interventions to enhance trustworthiness, role specification, and relationship initiation. Interventions to improve social exchange may include trainings, workshops, clearly defining roles, promoting joint projects and responsibilities, and hiring competent staff.

These findings have several implications for public health practice. The HIV PCP-Case Manager Collaboration Scale can be used as a research tool to examine the strength of the CWR between HIV PCPs and case managers (Zillich et al., 2005). Moreover, the HIV PCP-Case Manager Collaboration Scale could potentially be used as

a practice assessment tool for case managers and HIV PCPs to evaluate the strength of their collaborative relationship (Zillich et al., 2005). Improvements in HIV PCP-Case Manager subscale scores over time would reveal that the relationship is evolving into a more collaborative relationship. Moreover, the HIV PCP-Case Manager Collaboration Scale could be used to ascertain a colleague's "view" of the relationship, which could be used to measure change as the working relationship progresses (Zillich et al., 2005). Similarly, an organization's administrative staff may also use the HIV PCP-Case Manager Collaboration Scale to measure the degree of collaborative social exchanges between case managers and providers (Zillich et al., 2005). Administrators or directors could employ the adapted HIV PCP-Case Manager Collaboration Scale as a performance assessment tool (Zillich et al., 2005) and to examine the likelihood of collaborative partnerships with other providers.

Organizations could employ the adapted collaborative practice scale to assess perceived collaborative practice among HIV PCPs and case managers. For instance, the survey instrument can be used to assess medical case management programs that contract with the New York City Department of Health & Mental Hygiene (NYC DOHMH). One goal of the program is to build collaborative partnerships between HIV PCPs and case managers in the interest of improving patient care and health outcomes. In the context of HIV program implementation, the DOHMH's HIV Care, Treatment and Housing Program technical assistance (TA) team could use the HIV PCP-Case Manager Collaboration Scale and collaborative practice scale to assess the status of HIV PCP-case managers' social exchanges and collaborative practice in order to determine what level of TA the medical case management program might need. Very low social exchange and/or collaborative practice scores would raise red flags and the TA team could tailor their support to meet the needs of the dyad.

In addition, organizations could use the adapted HIV PCP-Case Manager Collaboration Scale and collaborative practice scale to evaluate interventions aimed at improving social exchange and collaborative practice. Higher HIV PCP-Case Manager Collaboration and collaborative practice scores would reveal improvements in working relationships and collaborative practice.

## **Recommendations**

Overall, the results of the study can be used to make recommendations to improve collaborative practice among case managers and HIV PCPs in NYC. It is important to note that the collaborative practice scale measured the subjective experiences of the HIV PCP-case manager dyad and does not predict outcomes (e.g., patient outcomes, cost-effectiveness, employee satisfaction). Therefore, the following recommendations should not be used in making policy or funding decisions. Ultimately, HIV case management and HIV primary care programs may develop strategies to strengthen collaboration based on the findings from this study. Since social exchange factors were highly influential in determining collaborative practice, trainings and performance improvement should focus on communication, role expectations, role agreement, trust, and dependence symmetry. Furthermore, managers of health care organizations should play a greater role in supporting collaboration. Organizations may also benefit from regularly scheduled meetings between case managers and HIV PCPs, at least on a quarterly basis.

**Programmatic recommendations for organizations.** HIV case management and HIV primary care programs may employ several strategies to foster collaboration

among the HIV PCP-case manager dyad. The pursuit of collaboration should be an organization priority (Makowsky et al., 2009). Based on this study's findings, organizations may benefit from creating roles for case managers and HIV PCPs that complement each other well. Organizations may also create opportunities for each party to meet (formally and informally) to allow the dyad an opportunity to build social exchanges characterized by trust, effective communication, and mutual expectations. According to McDonough & Doucette (2001), organizations should try to change normative behavior in order to develop a culture and norms that are in favor of collaborative practice. Organizations can attempt to change their culture to one of joint partnership and focus on enhancing open communication. Trainings and organizational initiatives should emphasize the importance of the case manager's role in initiating the working relationship.

**Training.** One suggestion is that organizations develop training strategies to promote collaboration. Trainings should emphasize the importance of nurturing effective social exchanges to give HIV PCPs and case managers the tools they need to enhance their social interactions. These trainings and/or workshops could include role playing to demonstrate the interconnectedness of the HIV PCP-case manager dyad. Moreover, joint trainings should stress the critical roles that trust and regular, bi-directional communication play in building a CWR. The training curriculum should emphasize skills that build effective, two-way communication and place a focus on recognizing the value and expertise of other professions (Henneman et al., 1995; Suter et al., 2009) and on strategies to build trust. Another suggestion is that trainings should explain the stages of a CWR and how social exchange factors play a crucial role in moving from one stage to another. Focusing on role expectation, building trust, and open communication in joint

trainings is also important because power is partly shaped by each actor's assessment of what they can add to the relationship (Emerson, 1962; Scanzoni, 1979). Trainings and performance improvement should focus on communication, trust, interdependency and relationship initiation. Trainings should also focus on creating a culture of openness and joint partnerships. D'Amour et al. (2008) stressed that there is a need for the dyad to "internalize the fact that the dyad is a team" (p. 188 screen 188). There is consensus in the literature that training and strong leadership are essential to development of CWR (D'Amour et al., 2008; Makowsky et al., 2009). As Makowsky and colleagues noted, "Teamwork is a skill that can be developed." (2009, p. 177).

***Leadership support of collaboration.*** This study demonstrated that executive staff who are not supportive of collaboration can negatively impact collaboration. Organizational leaders can play a pivotal role in promoting collaboration. One suggestion for leaders to assist in this process is by creating opportunities for case managers and HIV PCPs to work together. Additionally, leaders should emphasize that each interaction between providers is an opportunity to enhance trust and build communication. Leaders should strongly support collaboration among this working dyad.

***Hiring practices.*** In addition to traditional strengths, administrators should look for expertise and social exchange qualities including communication, interpersonal skills and trustworthiness. Years of work experience may not play an important role in predicting a strong collaborator. Hiring competent staff will likely help promote trust because competency plays a role in building trust. Hiring staff that have expertise and

strong interpersonal skills will also likely enhance dependency symmetry between the HIV PCPs and case managers.

***Improving role specification.*** One way to foster role specification is to assign complementary roles. Additionally, organizations should clearly delineate roles and responsibilities of case managers and HIV PCPs in an effort to improve collaboration. A fair division of work may also foster dependence symmetry (Zillich et al., 2005). Clearly outlined roles and expectations (formal and informal) may prevent role blurring (Suter et al., 2009) and allow the dyad to understand the interdependence of each other's roles. The HIV PCP and case manager need to know the other's roles in order to form role expectations. The dyad will not be able to form expectations if the roles are blurry, and subsequently dependence symmetry will be difficult.

Competency also plays a role in this case because one person will know what to expect from the other. If the HIV PCPs can anticipate that the case managers can perform these roles, they will be more likely to depend on the case manager for assistance. Roles should be clearly drawn so that each player can know what to expect from one another. This expectation development is contingent upon knowledge of the other's competency and role (McDonough & Doucette, 2001). Complementary skills and expertise may help promote dependence symmetry. If the dyad can mutually agree on roles and depend on each other to perform their duties, the CWR will strengthen (McDonough & Doucette, 2001). Role specification can be facilitated by showing the dyad that both case manager and HIV PCP roles are valuable. Dyads that understand each other's values and roles will be able to explore the relationship, foster communication, develop expectations, test out the relationship, and move forward.

**Structure.** Organizations may take steps to structure their modes of coordination to influence collaborative practice. This includes adjusting the frequency of interdisciplinary case discussions. Another implication for public health practice is that organizations could design work procedures to influence dependency of the case manager and HIV PCP such as structuring the work environment to encourage collaboration. One suggestion to enhance collaborative practice is for organizations to hold quarterly meetings in which the HIV PCP and case manager can have interdisciplinary case discussions. As the dyad continues to interact, the HIV PCP and case manager will explore whether the partnership is worthwhile. Interactions are opportunities for the dyad to measure each other's competence and expertise.

**Case manager initiations.** One recommendation to promote collaboration is for case managers to understand how important it is for them to initiate the relationship with the HIV PCP. Case managers should also be aware of how important communication is for a CWR. Overt processes such as communication and showing an interest in helping the HIV PCP can also help advance the CWR (Gabarro, 1987; McDonough & Doucette, 2001; Scanzoni, 1979). If not, the relationship may stabilize at a "relatively superficial level" (Gabarro, 1987, p. 184). Another suggestion is that case managers provide recommendations (written and/or oral) to HIV PCPs to show the PCPs that they are competent and have expertise in social services, housing placement, etc. Organizations should encourage case managers to initiate work relationships with HIV PCPs because this will help develop trust, communication, and dependence symmetry. If relationship initiation is coupled with open communication and trust, the relationship will then likely



move to the second stage of development -- the exploration and trial stage.

Subsequently, the HIV PCP will assess the benefit of expanding a relationship with the case manager.

### **Study Limitations and Strengths**

**Limitations.** The study faced several limitations. First, the response rate was not particularly high. Second, causality could not be ascertained due to the cross-sectional nature of the study design. The cross-sectional design also prohibited the examination of temporal trends in collaborative practice. Another limitation was the non-random nature of the sampling design. Drawing a random sample from the entire population of all the case managers in NYC was not possible. Therefore, the results of the study were not generalizable to all HIV PCP-case manager dyads in the city.

In addition, the research was conducted in one geographic area of the U.S. In the future, research could include a national, random sample of case managers and HIV PCPs. The reference point of the survey may have also contributed to response bias because study participants were asked to think of a case manager/HIV PCP that they work with the most. Response bias was a concern because the study participant may have worked with the HIV PCP/case manager most often because they have a good relationship with him/her (McDonough & Doucette, 2001; Zillich et al., 2005; Zillich et al., 2004). Most participants chose case managers or HIV PCPs that worked at the same organization. Moreover, due to the anonymity of survey participants, there was no way to ascertain which case managers and PCPs served as the referent point. To this end, the study was not able to match case manager and HIV PCP responses and therefore

was unable to determine if there is alignment in the perception of collaborative practice. Zillich et al. (2005) suggested that matching pairs or reference points could be instituted in the future.

Moreover, Zillich et al. (2005) explain that interpretation of the PPCI is non-existent, meaning that one cannot elucidate the HIV PCP-Case Manager Collaboration Scale score and associate it with the “stage” of the relationship development as postulated by McDonough and Doucette (2001). Another important concern was the fact that the model does not account for human nature, which was also a limitation of Gabarro's (1987) model of working relationships. Any working relationship is inherently a social relationship (Gabarro, 1987), and measuring this phenomenon is difficult. The study did not adequately address whether economic incentives (e.g., fee-for-service, salary, and capitation) may influence participants' willingness to engage in collaboration, mainly because it would have deviated from the McDonough and Doucette (2001) model. Nonetheless, investigating the role of revenue received from managed care and private insurance might have enriched this study.

**Strengths.** The study had several strengths. First, the study addressed the dearth of literature related to HIV PCP-case manager collaboration. Second, the study measured the HIV PCP and case manager characteristics and collaborative practice concurrently. This approach complemented research previously conducted by Zillich et al. (2004; 2006), Doucette et al. (2005), and Baggs (1994). Third, the study utilized validated tools to measure professional interaction, social exchange characteristics, and collaborative practice. Fourth, the measurement of coordinating mechanisms was expanded with this study to determine whether they played an influential role in

facilitating collaboration. Finally, the study introduced the role of complexity of caseload to determine whether the level of complexity of patient care explained collaborative practice.

This study offered great insight into the key predictors of collaboration and provided a strong framework for extending collaborative practice research. This research fills a great void in the areas of HIV PCP-case manager collaboration.

### **Future Research**

Additional research is called for to advance the understanding of collaboration among the HIV PCP and case manager dyad. Researchers studying collaboration among this dyad should use an adapted version of McDonough & Doucette's (2001) theoretical model of CWR, which excludes participant factors and takes into account the possible interaction between social exchange factors and dyad years work experience and dyads working for the same organization. Future research should examine collaborative practice within this dyad using a large, random sample of HIV PCPs and case managers in the U.S. Future research can utilize the adapted collaboration instrument to evaluate temporal changes in the HIV PCP-case manager collaborative relationship (trustworthiness, relationship initiation, and role specification). A longitudinal study of HIV PCP-case manager collaboration would allow an assessment of causality and temporal trends.

Future research will need to evaluate whether HIV PCP/case manager collaboration is associated with improved intermediary outcomes, better patient outcomes and/or care delivery processes (e.g., appointment adherence or medication adherence). Additionally, an elucidation of the HIV PCP-Case Manager Collaboration

Scale and stage of the CWR is also called for. In order to assess predictive validity, future research can focus on observing interactions of collaboration and comparing these observations to the collaborative practice scores. The current study did not sufficiently measure the economic drivers of collaborative practice. Future research should test whether financial reimbursement is a powerful incentive for collaboration. Future research could also test different interventions for improving collaborative practice among this dyad. Moreover, future research could match the dyad in order to determine whether the case manager and HIV PCP perceptions of collaboration agree with each other.

Future research should address the u-shaped curve of years practicing case management or direct HIV primary care. This non-linear relationship with collaborative practice could be evaluated using a spline regression (A. Shankar, personal communication, April 7, 2010). This curvilinear relationship (0-20 years and 20-40 years) would look at two curves to assess the non-linear relationship. Another research endeavor could be to test the HIV PCP-Case Manager Collaboration subscales to see if they have adequate construct validity and reliability in case manager and PCP populations separately.

## **Conclusion**

This paper drew upon the theoretical model of collaborative working relationships (CWR) (McDonough & Doucette, 2001) to answer three main research questions. First, the findings of the study showed that McDonough & Doucette's (2001) model of CWR can be used to explain collaborative practice among HIV PCPs and case managers. Second, the study found that social exchange characteristics were the most

influential group of relationship drivers. Third, the study shed light on the importance of specific variables in predicting collaboration. The significant predictors of collaborative practice included practice setting (CBO with primary care on site; DAC outpatient clinic; and hospital outpatient clinic/non-DAC), dyad works for same organization, leadership support of collaboration (strongly disagree), frequency of interdisciplinary meetings (quarterly), and social exchange variables. This study is noteworthy because it attempts to show the influential predictors of collaborative practice among HIV PCPs and case managers using a theoretical approach. In particular, the results of the study suggest that relationship initiation plays a key role in fostering collaborative practice. The study findings underscore the importance of social exchange characteristics for CWR development.

Finding ways to maximize social exchange is important. This may be accomplished by leadership that promotes joint team work; clarifying roles so that the dyad members know what their respective responsibilities are; stressing the importance of open and bi-directional communication; and building a climate of trust. Finding ways to maximize social exchange should be a priority for HIV primary care organizations. Organizations should focus their attention on interdisciplinary case discussions, trainings to enhance two-way communication and trust, role appreciation, and underscore the importance of case managers to initiate relationships. Strategies to foster work relationships could include trainings to improve dyad communication; interdependency; and relationship initiation/maintenance.

In conclusion, this was a novel study that measured collaborative practice among HIV PCPs and case managers that examined the predictors of collaborative practice using a validated instrument with strong psychometric properties. This study makes three major contributions to the field of HIV primary care. First, this study

enhances/broadens the understanding and measurement of collaborative practice among the HIV PCP-case manager dyad. This study is truly novel because this is the first empirical study of collaboration among HIV PCPs and case managers using a theoretical model (McDonough & Doucette, 2001) of CWRs. Second, this study identified several important predictors of collaborative practice. Third, this study confirmed that the revised HIV PCP-Case Manager Collaboration Scale and the adapted collaborative practice scale can be used to measure collaboration among HIV PCPs and case managers. Both the scales demonstrated strong psychometric properties and can be used as a research or assessment tool to measure social exchange and collaborative practice among this working dyad. This study was able to show that trustworthiness, role specification, and relationship initiation were critical for predicting collaborative practice. Specifically, relationship initiation by case managers was the most influential factor in predicting collaboration.

## References

- Abramson, J. S., & Mizrahi, T. (1996). When social workers and physicians collaborate: positive and negative interdisciplinary experiences. *Soc Work, 41*(3), 270-281.
- Adherence strategies. ASO's collaborate with medical providers. Services help patients improve adherence. (2008). *AIDS Alert, 23*(12), 137-139.
- Allred, C. A., Arford, P. H., Michel, Y., Veitch, J. S., Dring, R., & Carter, V. (1995). Case management: the relationship between structure & environment. *Nurs Econ, 13*(1), 32-41, 51.
- Alt-White, A. C., Charns, M., & Strayer, R. (1983). Personal, organizational and managerial factors related to nurse - physician collaboration. *Nurs Adm Q, 8*(1), 8-18.
- Andersen, R. (1968). *A behavioral model of families' use of health services* (Vol. Research Series No. 25). Chicago: Center for Health Administration Studies: University of Chicago.
- Andersen, R. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior, 36*(1), 1-10.
- Antiretroviral Therapy Cohort Collaboration. (2008). Life expectancy of individuals on combination antiretroviral therapy in high-income countries: a collaborative analysis of 14 cohort studies. *Lancet, 372*(9635), 293-299.
- Arcangelo, V., Fitzgerald, M., Carroll, D., & Plumb, J. D. (1996). Collaborative care between nurse practitioners and primary care physicians. *Prim Care, 23*(1), 103-113.
- Baggs, J. G. (1994). Development of an instrument to measure collaboration and satisfaction about care decisions. *J Adv Nurs, 20*(1), 176-182.

- Baggs, J. G., & Ryan, S. A. (1990). ICU nurse-physician collaboration & nursing satisfaction. *Nurs Econ*, 8(6), 386-392.
- Baggs, J. G., Ryan, S. A., Phelps, C. E., Richeson, J. F., & Johnson, J. E. (1992). The association between interdisciplinary collaboration and patient outcomes in a medical intensive care unit. *Heart Lung*, 21(1), 18-24.
- Baggs, J. G., & Schmitt, M. H. (1988). Collaboration between nurses and physicians. *Image J Nurs Sch*, 20(3), 145-149.
- Baggs, J. G., & Schmitt, M. H. (1995). Intensive care decisions about level of aggressiveness of care. *Res Nurs Health*, 18(4), 345-355.
- Baggs, J. G., & Schmitt, M. H. (1997). Nurses' and resident physicians' perceptions of the process of collaboration in an MICU. *Res Nurs Health*, 20(1), 71-80.
- Baggs, J. G., Schmitt, M. H., Mushlin, A. I., Eldredge, D. H., Oakes, D., & Hutson, A. D. (1997). Nurse-physician collaboration and satisfaction with the decision-making process in three critical care units. *Am J Crit Care*, 6(5), 393-399.
- Baggs, J. G., Schmitt, M. H., Mushlin, A. I., Mitchell, P. H., Eldredge, D. H., Oakes, D., et al. (1999). Association between nurse-physician collaboration and patient outcomes in three intensive care units. *Crit Care Med*, 27(9), 1991-1998.
- Bangsberg, D. R. (2008). Preventing HIV antiretroviral resistance through better monitoring of treatment adherence. *J Infect Dis*, 197 Suppl 3, S272-278.
- Bickell, N. A., & Young, G. J. (2001). Coordination of care for early-stage breast cancer patients. *J Gen Intern Med*, 16(11), 737-742.
- Bing, E. G., Burnam, M. A., Longshore, D., Fleishman, J. A., Sherbourne, C. D., London, A. S., et al. (2001). Psychiatric disorders and drug use among human immunodeficiency virus-infected adults in the United States. *Arch Gen Psychiatry*, 58(8), 721-728.



Birmingham, J., & Colon, R. (2005). Case managers implement "action" plans.

*Lippincotts Case Manag*, 10(6), 306-310.

Blake, R. R., & Mouton, J. S. (1961). Reactions intergroup competition under win-lose conditions. *Management Science*, 420-435.

Blake, R. R., Shepard, H. A., & Mouton, J. S. (1964). *Managing intergroup conflict in industry*. Houston: Gulf Publishing.

Bogart, L. M., Fremont, A. M., Young, A. S., Pantoja, P., Chinman, M., Morton, S., et al. (2006). Patterns of HIV care for patients with serious mental illness. *AIDS Patient Care STDS*, 20(3), 175-182.

Bollen, K. A., & Long, J. S. (Eds.). (1993). *Testing structural equation models* (Vol. 54). Newbury Park, CA: Sage.

Borrill, C., West, M. A., Dawson, J., Shapiro, D., Rees, A., Richards, A., et al. (2002). *Team working and effectiveness in health care. Findings from the health care team. Effectiveness project*: Aston Centre for Health Services Organization Research.

Bozdogan, H. (1987). Model selection and Akaike's Information Criterion (AIC): The general theory and its analytical extensions. *Psychometrika*, 52(3), 345-370 (Ref. pg. 346-363).

Bradford, R. (1989). Obstacles to collaborative practice. *Nurs Manage*, 20(4), 72I, 72L-72M, 72P.

Bradshaw, S. J., & Doucette, W. R. (1998). Community pharmacists as patient advocates: physician attitudes. *J Am Pharm Assoc (Wash)*, 38(5), 598-602.

Brallier, S. A., Lovett, S., & Miller, T. F. (2002). Critiquing and summarizing instruments. In G. D. Heinemann & A. M. Zeiss (Eds.), *Team performance in health care: Assessment and Development* (pp. 115-122). New York: Kluwer Academic/Plenum Publishers.

- Cabral, H. J., Tobias, C., Rajabiun, S., Sohler, N., Cunningham, C., Wong, M., et al. (2007). Outreach program contacts: do they increase the likelihood of engagement and retention in HIV primary care for hard-to-reach patients? *AIDS Patient Care STDS*, 21 Suppl 1, S59-67.
- Case Management Society of America. (2009a). About case management & CMSA. Retrieved April 9, 2009, from <http://www.cmsa.org/PolicyMaker/tabid/62/Default.aspx>
- Case Management Society of America. (2009b). What is a case manager? Retrieved April 9, 2009, from <http://www.cmsa.org/Home/CMSA/WhatisaCaseManager/tabid/224/Default.aspx>
- Case manager-physician collaboration essential for good patient care. (2008). *Hosp Case Manag*, 16(1), 1-4.
- Cebul, R. D. (1991). Randomized, controlled trials using the Metro Firm System. *Med Care*, 29(7 Suppl), JS9-18.
- Centers for Disease Control and Prevention. (2008a, October 3, 2008). HIV prevalence estimates--United States, 2006. *MMWR* 57. Retrieved December 29, 2008, from <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5739a2.htm>
- Centers for Disease Control and Prevention. (2008b). HIV/AIDS surveillance report, 2006. Retrieved December 29, 2008, from <http://www.cdc.gov/hiv/topics/surveillance/resources/reports/>
- Certified Case Manager Center. (2009). Case management practice. Retrieved January 20, 2009, from [http://www.ccmcertification.org/pages/13frame\\_set.html](http://www.ccmcertification.org/pages/13frame_set.html)
- Charns, M. P., & Schaefer, M. J. (1983). *Health care organization: A model for management*. Englewood Cliffs, NJ: Prentice-Hall.
- Chernesky, R. H. (1999). A review of HIV/AIDS case management research. *Care Manag J*, 1(2), 105-113.

- Chiquette, E., Amato, M. G., & Bussey, H. I. (1998). Comparison of an anticoagulation clinic with usual medical care: anticoagulation control, patient outcomes, and health care costs. *Arch Intern Med*, *158*(15), 1641-1647.
- Coleman, J. S. (1975). Social structure and a theory of action. In P. M. Blau (Ed.), *Approaches to the study of social structure*. New York: The Free Press.
- Comrey, A. L., & Lee, H. B. (1992). *A first course in factor analysis* (2nd ed. xii, 430 p ed.). Hillsdale, N.J.: L. Erlbaum Associates.
- Consulting Group of the Division of Statistics and Scientific Computing at the University of Austin at Texas. (1995). Factor analysis using SAS proc factor. Retrieved March 1, 2010, from [http://www.ats.ucla.edu/stat/sas/library/factor\\_ut.htm](http://www.ats.ucla.edu/stat/sas/library/factor_ut.htm).
- Corry, M. P., Williams, D., & Stapleton, S. R. (1997). Models of collaborative practice: Preparing for maternity care in the 21st century. *Womens Health Issues*, *7*(5), 279-284.
- Crosby, L. A., Evans, K. R., & Cowles, D. (1990). Relationship quality in services selling: an interpersonal influence perspective. *J Marketing*, *54*, 68-81.
- Curley, C., McEachern, J. E., & Speroff, T. (1998). A firm trial of interdisciplinary rounds on the inpatient medical wards: an intervention designed using continuous quality improvement. *Med Care*, *36*(8 Suppl), AS4-12.
- D'Amour, D., Ferrada-Videla, M., San Martin Rodriguez, L., & Beaulieu, M. D. (2005). The conceptual basis for interprofessional collaboration: core concepts and theoretical frameworks. *J Interprof Care*, *19 Suppl 1*, 116-131.
- D'Amour, D., Goulet, L., Labadie, J. F., Martin-Rodriguez, L. S., & Pineault, R. (2008). A model and typology of collaboration between professionals in healthcare organizations. *BMC Health Serv Res*, *8*, 188.

- Dechairo-Marino, A. E., Jordan-Marsh, M., Traiger, G., & Saulo, M. (2001). Nurse/physician collaboration: Action research and the lessons learned. *J Nurs Adm*, 31(5), 223-232.
- DeVellis, R. F. (2003). *Scale development: theory and application* (2nd. ed. Vol. 26). Londgon: Sage Publications.
- Devereux, P. M. (1981). Does joint practice work? *J Nurs Adm*, 11(6), 39-43.
- Doucette, W. R. (1999). The impact of relational activities on HMO organizational outcomes. *Am J Manag Care*, 5(8), 1025-1034.
- Doucette, W. R., Nevins, J., & McDonough, R. P. (2005). Factors affecting collaborative care between pharmacists and physicians. *Res Social Adm Pharm*, 1(4), 565-578.
- Dwyer, F. R., Schurr, P. H., & Oh, S. (1987). Developing buyer-seller relationships. *J Marketing*, 51, 11-27.
- Eldred, L., & Malitz, F. (2007). Introduction. *AIDS Patient Care STDS*, 21(Supplement 1), S1-S2.
- Emerson, R. (1962). Power-dependence relations. *Am Social Rev*, 27, 31-41.
- Factor analysis: SAS annotated output. (n.d.). Retrieved March 1, 2010, from UCLA: Academic Technology Services, Statistical Consulting Group  
<http://www.ats.ucla.edu/stat/sas/output/factor.htm>
- Fagin, C. M. (1992). Collaboration between nurses and physicians: no longer a choice. *Acad Med*, 67(5), 295-303.
- Feiger, S. M., & Schmitt, M. H. (1979). Collegiality in interdisciplinary health teams: its measurement and its effects. *Soc Sci Med*, 13A(2), 217-229.
- Feldman, M. D., Ong, M. K., Lee, D. L., & Perez-Stable, E. J. (2006). Realigning economic incentives for depression care at UCSF. *Adm Policy Ment Health*, 33(1), 34-38.

- Fewster-Thuente, L., & Velsor-Friedrich, B. (2008). Interdisciplinary collaboration for healthcare professionals. *Nurs Adm Q*, 32(1), 40-48.
- Field, A. P. (2009). Multiple regression using SPSS/PASW. In *Discovering statistics using SPSS: and sex and drugs and rock 'n' roll* (3rd ed.). London: Sage.
- Fleisher, P., & Hendrickson, M. (2002). Towards a typology of case management. Retrieved December 1, 2008, from <http://hab.hrsa.gov/special/socialwork.htm>
- Flood, A. B. (1994). The impact of organizational and managerial factors on the quality of care in health care organizations. *Med Care Rev*, 51(4), 381-428.
- Fox, E., & Heinemann, G. D. (2002). Review of Collaboration and Satisfaction About Care Decisions. In G. D. Heinemann & A. M. Zeiss (Eds.), *Team Performance in Health Care: Assessment and Development* (pp. 131-135). New York: Kluwer Academic/Plenum Publishers.
- Fremont, A. M., Young, A. S., Chinman, M., Pantoja, P., Morton, S., Koegel, P., et al. (2007). Differences in HIV care between patients with and without severe mental illness. *Psychiatr Serv*, 58(5), 681-688.
- Gabarro, J. J. (1987). The development of working relationships. In L. J (Ed.), *Handbook of Organizational Behavior* (pp. 172-189). Englewood Cliffs, NJ: Prentice Hall.
- Gardner, L. I., Metsch, L. R., Anderson-Mahoney, P., Loughlin, A. M., del Rio, C., Strathdee, S., et al. (2005). Efficacy of a brief case management intervention to link recently diagnosed HIV-infected persons to care. *Aids*, 19(4), 423-431.
- Garson, G. D. (2010). Factor analysis. *Statnotes: Topics in Multivariate Analysis*. Retrieved February 22, 2010, from <http://faculty.chass.ncsu.edu/garson/PA765/factor.htm>
- Gattis, W. A., Hasselblad, V., Whellan, D. J., & O'Connor, C. M. (1999). Reduction in heart failure events by the addition of a clinical pharmacist to the heart failure management team: results of the Pharmacist in Heart Failure Assessment

- Recommendation and Monitoring (PHARM) Study. *Arch Intern Med*, 159(16), 1939-1945.
- Giordano, T. P., Gifford, A. L., White, A. C., Jr., Suarez-Almazor, M. E., Rabeneck, L., Hartman, C., et al. (2007). Retention in care: a challenge to survival with HIV infection. *Clin Infect Dis*, 44(11), 1493-1499.
- Golin, C. E., Liu, H., Hays, R. D., Miller, L. G., Beck, C. K., Ickovics, J., et al. (2002). A prospective study of predictors of adherence to combination antiretroviral medication. *J Gen Intern Med*, 17(10), 756-765.
- Guttman, L. (1954). Some necessary conditions for common-factor analysis. *Psychometrika*, 19(2), 149-161.
- Hall, H. I., Byers, R. H., Ling, Q., & Espinoza, L. (2007). Racial/ethnic and age disparities in HIV prevalence and disease progression among men who have sex with men in the United States. *Am J Public Health*, 97(6), 1060-1066.
- Hall, H. I., McDavid, K., Ling, Q., & Sloggett, A. (2006). Determinants of progression to AIDS or death after HIV diagnosis, United States, 1996 to 2001. *Ann Epidemiol*, 16(11), 824-833.
- Hall, J. (1969). *Conflict management survey: A survey of one's characteristic reaction to and handling of conflicts between himself and others*. Houston: Teleometrics, Inc.
- Hammer, S. M., Eron, J. J., Jr., Reiss, P., Schooley, R. T., Thompson, M. A., Walmsley, S., et al. (2008). Antiretroviral treatment of adult HIV infection: 2008 recommendations of the International AIDS Society-USA panel. *Jama*, 300(5), 555-570.
- Health Resources and Services Administration. (2008). *Redefining case management*. Retrieved October 4, 2008. from [www.hrsa.gov](http://www.hrsa.gov).
- Henneman, E. A., Lee, J. L., & Cohen, J. I. (1995). Collaboration: a concept analysis. *J Adv Nurs*, 21(1), 103-109.

- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1 - 55.
- Huber, D. L. (2000). The diversity of case management models. *Lippincotts Case Manag*, 5(6), 248-255.
- Huxley, P. (1993). Case management and care management in community care. *Br. J. Social Wk.*, 23, 365-381.
- IBM. (2009). IBM completes acquisition of SPSS Inc. Retrieved July 1, 2010, from <http://www-03.ibm.com/press/us/en/pressrelease/28522.wss#release>
- Indyk, D., Belville, R., Lachapelle, S., Gordon, G., & Dewart, T. (1993). A community-based approach to HIV case management: systematizing the unmanageable. *Soc Work*, 38(4), 380-387.
- Jitapunkul, S., Nuchprayoon, C., Aksaranugraha, S., Chaiwanichsiri, D., Leenawat, B., Kotepong, W., et al. (1995). A controlled clinical trial of multidisciplinary team approach in the general medical wards of Chulalongkorn Hospital. *J Med Assoc Thai*, 78(11), 618-623.
- Kaiser, H. F. (1960). The application of electronic-computers to factor-analysis *Educ Psychol Meas* 20(1), 141-151.
- Karpati, A., Kerker, B., Mostashari, F., Singh, T., Hajat, A., Thorpe, L., et al. (2004). *Health disparities in New York City*. New York: New York City Department of Health and Mental Hygiene.
- Katz, M. H., Cunningham, W. E., Fleishman, J. A., Andersen, R. M., Kellogg, T., Bozzette, S. A., et al. (2001). Effect of case management on unmet needs and utilization of medical care and medications among HIV-infected persons. *Ann Intern Med*, 135(8 Pt 1), 557-565.

- Keleher, K. C. (1998). Collaborative practice. Characteristics, barriers, benefits, and implications for midwifery. *J Nurse Midwifery*, 43(1), 8-11.
- Knaus, W., Draper, E., Wagner, D., & Zimmerman, J. (1987). An evaluation of outcome from intensive care in major medical centers. *Can Crit Care Nurs J*, 4(2), 15.
- Kushel, M. B., Colfax, G., Ragland, K., Heineman, A., Palacio, H., & Bangsberg, D. R. (2006). Case management is associated with improved antiretroviral adherence and CD4+ cell counts in homeless and marginally housed individuals with HIV infection. *Clin Infect Dis*, 43(2), 234-242.
- Lamb, G. S., & Napodano, R. J. (1984). Physician-nurse practitioner interaction patterns in primary care practices. *Am J Public Health*, 74(1), 26-29.
- Laraque, F., & Weglein, D. (2008). HIV care coordination in NYC. On *HIV care coordination Meeting*. New York, NY: New York City Department of Health and Mental Hygiene, HIV Care, Treatment and Housing Program.
- Leape, L. L., Cullen, D. J., Clapp, M. D., Burdick, E., Demonaco, H. J., Erickson, J. I., et al. (1999). Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. *Jama*, 282(3), 267-270.
- Lewis, F. M. (1985, October). *Collaboration: Alternative models and consequences*. Paper presented at the American Nurses' Association Council on Continuing Education, Conference on Collaboration: Rewards, Risks, Resolution, Atlanta, GA.
- Magnus, M., Schmidt, N., Kirkhart, K., Schieffelin, C., Fuchs, N., Brown, B., et al. (2001). Association between ancillary services and clinical and behavioral outcomes among HIV-infected women. *AIDS Patient Care STDS*, 15(3), 137-145.
- Makowsky, M. J., Schindel, T. J., Rosenthal, M., Campbell, K., Tsuyuki, R. T., & Madill, H. M. (2009). Collaboration between pharmacists, physicians and nurse practitioners: a qualitative investigation of working relationships in the inpatient medical setting. *J Interprof Care*, 23(2), 169-184.



- McDonald, K. M., Sundaram, V., Bravata, D. M., Lewis, R., Lin, N., Kraft, S., et al. (2007). *Care Coordination. Vol 7 of: Shojania KG, McDonald KM, Wachter RM, Owens DK, editors. Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies. (Technical Review 9 (Prepared by the Stanford University-UCSF Evidence-based Practice Center under contract 290-02-0017 No. 04(07)-0051-7). Rockville, MD: Agency for Healthcare Research and Quality.*
- McDonough, R. P., & Doucette, W. R. (2001). Developing collaborative working relationships between pharmacists and physicians. *J Am Pharm Assoc* 41(5), 682-692.
- McKay, C. A., & Crippen, L. (2008). Collaboration through clinical integration. *Nurs Adm Q*, 32(2), 109-116.
- McMahan, E. M., Hoffman, K., & McGee, G. W. (1994). Physician-nurse relationships in clinical settings: a review and critique of the literature, 1966-1992. *Med Care Rev*, 51(1), 83-112.
- Merriam-Webster. (2009). Online Dictionary. Retrieved April 8, 2009, from <http://www.merriam-webster.com/dictionary/collaboration>
- Messeri, P. A., Abramson, D. M., Aidala, A. A., Lee, F., & Lee, G. (2002). The impact of ancillary HIV services on engagement in medical care in New York City. *AIDS Care*, 14 Suppl 1, S15-29.
- Miccolo, M. A., & Spanier, A. H. (1993). Critical care management in the 1990s. Making collaborative practice work. *Crit Care Clin*, 9(3), 443-453.
- Mitchell, M. N. (2005). *Strategically using general purpose statistics packages: A look at Stata, SAS and SPSS (No. 1, Version 1): Statistical Consulting Group: UCLA Academic Technology Services,*  
Retrieved June 28, 2010, from <http://www.ats.ucla.edu/stat/technicalreports/>.

- Mizrahi, T., & Abramson, J. S. (2000). Collaboration between social workers and physicians: perspectives on a shared case. *Soc Work Health Care, 31*(3), 1-24.
- Mohr, J., & Nevin, J. R. (1990). Communication strategies in marketing channels: A theoretical perspective. *J Marketing, 54*, 36-51.
- Moore, S. (1992). Case management and the integration of services: How service delivery systems shape case management. *Social Work, 37*(5), 418-423.
- Moore, S. T. (1990). A social work practice model of case management: the case management grid. *Soc Work, 35*(5), 444-448.
- Moreo, K. (2003a). Collaboration between physicians and case managers. *Case Manager, 14*(5), 62-64.
- Moreo, K. (2003b). Consensus paper of the 2003 Physician and Case Management Summit: exploring best practices in physician and case management collaboration to improve patient care. *Case Manager, 14*(5), 57-61.
- Morgan, B. D., & Rossi, A. P. (2007). Difficult-to-manage HIV/AIDS clients with psychiatric illness and substance abuse problems: a collaborative practice with psychiatric advanced practice nurses. *J Assoc Nurses AIDS Care, 18*(6), 77-84.
- Morgan, R. M., & Hunt, S. D. (1994). The commitment-trust theory of relationship marketing. *J Marketing, 58*, 20-38.
- Murphy, R., Tobias, C., & Rajabiun, S. (2003). HIV case management: A review of the literature. Retrieved December 5, 2008, from <http://www.hdwg.org/files/resources/DPH-lit-rev.pdf>
- Murtha, C., Tao, J., & Walsh, S. (2008a). Multiple linear regression. In *Statistics 2: ANOVA and regression course notes* (pp. 1.1-1.130). Cary, NC: SAS Institute Inc.

- Murtha, C., Tao, J., & Walsh, S. (2008b). Regression diagnostics and remedial measures. In *Statistics 2: ANOVA and regression course notes* (pp. 2.1-2.90). Cary, NC: SAS Institute Inc.
- Nadler, D., & Tushman, M. (1988). A conceptual model for thinking about design decisions. In *Strategic Organization Design* (pp. 53-63). Glenview, Illinois: Scott Foresman and Company.
- National Center for HIV STD and TB Prevention. (1997). *HIV prevention case management*. Retrieved December 5, 2008. from [http://www.cdc.gov/hiv/topics/prev\\_prog/CRCs/resources/PCMG/index.htm](http://www.cdc.gov/hiv/topics/prev_prog/CRCs/resources/PCMG/index.htm).
- Netting, F. E., & Williams, F. G. (1996). Case manager-physician collaboration: implications for professional identity, roles, and relationships. *Health Soc Work*, 21(3), 216-224.
- New York City Department of Health and Mental Hygiene. (2008a). *Care coordination protocol for HIV-Infected persons*. New York, NY: New York City Department of Health and Mental Hygiene, HIV Care Treatment and Housing Program.
- New York City Department of Health and Mental Hygiene. (2008b). Health Department Releases Estimate of Yearly HIV Infections. Retrieved November 5, 2008, from <http://www.nyc.gov/html/doh/html/pr2008/pr057-08.shtml>
- New York City Department of Health and Mental Hygiene. (2008c). *HIV Epidemiology & Field Services Semiannual Report* (No. Vol. 3, No. 2). New York, NY: New York City Department of Health and Mental Hygiene, HIV Epidemiology & Field Services Unit.
- New York City Department of Health and Mental Hygiene. (2009). *HIV Epidemiology & Field Services Semiannual Report* (No. Vol. 4, No. 2). New York, NY: New York City Department of Health and Mental Hygiene, HIV Epidemiology and Field Services Unit.

New York State Department of Health AIDS Institute. (2006). *Standards for HIV/AIDS*

*Case Management*. Retrieved April 5, 2010. from

<http://www.health.state.ny.us/diseases/aids/standards/casemanagement/docs/casemanagementstandards.pdf>.

Nichols, L. O., DeFriese, A. M., & Malone, C. C. (2002). Team process. In G. D.

Henemann & A. M. Zeiss (Eds.), *Team Performance in Health Care* (pp. 71-88).

New York: Kluwer Academic/Plenum Publishers.

Panel on Antiretroviral Guidelines for Adults and Adolescents. (2009). *Guidelines for the*

*use of antiretroviral agents in HIV-1-infected adults and adolescents*. Retrieved

May 9, 2010. from

<http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf>.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, Design, and Analysis: An*

*Integrated Approach*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Piette, J., Fleishman, J. A., Mor, V., & Dill, A. (1990). A comparison of hospital and

community case management programs for persons with AIDS. *Med Care*, 28(8), 746-755.

Piette, J., Fleishman, J. A., Mor, V., & Thompson, B. (1992). The structure and process

of AIDS case management. *Health Soc Work*, 17(1), 47-56.

Pogach, L., Charns, M. P., Wrobel, J. S., Robbins, J. M., Bonacker, K. M., Haas, L., et

al. (2004). Impact of policies and performance measurement on development of organizational coordinating strategies for chronic care delivery. *Am J Manag Care*, 10(2 Pt 2), 171-180.

Prescott, P. A., & Bowen, S. A. (1985). Physician-nurse relationships. *Ann Intern Med*,

103(1), 127-133.

Public Health Service, Centers for Disease Control and Prevention, & The Health

Resources and Services Administration. (2008). *Recommendations for case*

- management collaboration and coordination in federally funded HIV/AIDS programs*. Retrieved March 2, 2009. from <http://www.cdcnpin.org/scripts/features/CaseManagement.pdf>.
- Ritchey, F. J., & Raney, M. R. (1981). Medical role-task boundary maintenance: physicians' opinions on clinical pharmacy. *Med Care*, 19(1), 90-103.
- Rubenstein, L. Z., Josephson, K. R., Wieland, G. D., English, P. A., Sayre, J. A., & Kane, R. L. (1984). Effectiveness of a geriatric evaluation unit. A randomized clinical trial. *N Engl J Med*, 311(26), 1664-1670.
- Rumptz, M. H., Tobias, C., Rajabiun, S., Bradford, J., Cabral, H., Young, R., et al. (2007). Factors associated with engaging socially marginalized HIV-positive persons in primary care. *AIDS Patient Care STDS*, 21 Suppl 1, S30-39.
- San Martin-Rodriguez, L., Beaulieu, M. D., D'Amour, D., & Ferrada-Videla, M. (2005). The determinants of successful collaboration: a review of theoretical and empirical studies. *J Interprof Care*, 19 Suppl 1, 132-147.
- SAS Institute Inc. (2004). The FACTOR procedure. In *SAS/STAT 9.1 User's Guide* (1st ed., pp. 1289-1376). Cary, NC: SAS Institute, Inc.
- SAS Institute Inc. (2009). %MULTNORM macro: Mardia tests of multivariate normality version 1.1 [SAS program]. Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (n.d.). About SAS. Retrieved July 1, 2010, from <http://www.sas.com/company/about/index.html>
- Scanzoni, J. (1979). Social exchange and behavioral interdependence. In H. T. Burgess RL (Ed.), *Social exchange in developing relationships* (pp. 61-98). New York, NY: Academic Press.
- Schurmans, K., & McCrank, E. (1997). Benefits of a nurse-psychiatrist collaborative practice in an anxiety disorders unit. *J Psychosoc Nurs Ment Health Serv*, 35(11), 26-31.

- Shapiro, M. F., Morton, S. C., McCaffrey, D. F., Senterfitt, J. W., Fleishman, J. A., Perlman, J. F., et al. (1999). Variations in the care of HIV-infected adults in the United States: results from the HIV Cost and Services Utilization Study. *Jama*, *281*(24), 2305-2315.
- Shi, L. (1997). *Health Services Research Methods*. Albany, NY: Delmar Publishers.
- Sicotte, C., D'Amour, D., & Moreault, M. P. (2002). Interdisciplinary collaboration within Quebec Community Health Care Centres. *Soc Sci Med*, *55*(6), 991-1003.
- Sicotte, C., Pineault, R., & Lambert, J. (1993). Medical team interdependence as a determinant of use of clinical resources. *Health Serv Res*, *28*(5), 599-621.
- Silen-Lipponen, M., Turunen, H., & Tossavainen, K. (2002). Collaboration in the operating room: the nurses' perspective. *J Nurs Adm*, *32*(1), 16-19.
- Snyder, C. M., Kaempfer, S. H., & Ries, K. (1996). An interdisciplinary, interagency, primary care approach to case management of the dually diagnosed patient with HIV disease. *J Assoc Nurses AIDS Care*, *7*(5), 72-82.
- Soto, T. A., Bell, J., & Pillen, M. B. (2004). Literature on integrated HIV care: a review. *AIDS Care*, *16 Suppl 1*, S43-55.
- Sowell, R. L. (1995). Community-based HIV case management: challenges and opportunities. *J Assoc Nurses AIDS Care*, *6*(2), 33-40.
- Sowell, R. L., & Meadows, T. M. (1994). An integrated case management model: developing standards, evaluation, and outcome criteria. *Nurs Adm Q*, *18*(2), 53-64.
- SPSS Inc. (2010). About SPSS Inc. Retrieved July 1, 2010, from <http://www.spss.com/corpinfo/history.htm>
- Stapleton, S. R. (1998). Team building. Making collaborative practice work. *J Nurse Midwifery*, *43*(1), 12-18.

- Stichler, J. F. (1995). Professional interdependence: the art of collaboration. *Adv Pract Nurs Q*, 1(1), 53-61.
- Suhr, D. (2003). *Reliability, exploratory & confirmatory factor analysis for the scale of athletic priorities*. Paper presented at the SUGI 28. Retrieved March 1, 2010, from <http://www2.sas.com/proceedings/sugi28/274-28.pdf>.
- Suhr, D. (2005). *Principal component analysis vs. exploratory factor analysis*. Paper presented at the SUGI 30. Retrieved March 1, 2010, from <http://www2.sas.com/proceedings/sugi30/203-30.pdf>.
- Suter, E., Arndt, J., Arthur, N., Parboosingh, J., Taylor, E., & Deutschlander, S. (2009). Role understanding and effective communication as core competencies for collaborative practice. *J Interprof Care*, 23(1), 41-51.
- Tabachnick, B. G., & Fidell, L. S. (2001a). Cleaning up your act: Screening data prior to analysis. In *Using multivariate statistics* (2nd. Ed. ed., pp. 56-110). New York: Harper & Row.
- Tabachnick, B. G., & Fidell, L. S. (2001b). Principal components and factor analysis. In *Using multivariate statistics* (4th ed. ed., pp. 582-652). Boston, MA: Allyn and Bacon.
- Tahan, H. A., & Huber, D. L. (2006). The CCMC's national study of case manager job descriptions: an understanding of the activities, role relationships, knowledges, skills, and abilities. *Lippincotts Case Manag*, 11(3), 127-144; quiz 145-126.
- Thomas, K. (1976). Conflict and Conflict Management. In D. D. Marvin (Ed.), *Handbook of industrial and organizational psychology* (pp. 889-934). Chicago: Rand McNally College Publishing Company.
- Thompson, J. (1976). *Organizations in Action: Social Science base of administrative theory*. New York: NY: McGraw-Hill.

- Tobias, C., Cunningham, W. E., Cunningham, C. O., & Pounds, M. B. (2007). Making the connection: the importance of engagement and retention in HIV medical care. *AIDS Patient Care STDS, 21 Suppl 1*, S3-8.
- Truxillo, C. (2008a). Structural Equation Modeling Using the CALIS Procedure. In *Multivariate Statistical Methods: Practical Research Applications Course Notes* (pp. 6.1-6.150). Cary, NC: SAS Institute, Inc.
- Truxillo, C. (2008b). Variable Reduction and Extraction of Meaningful Factors. In *Multivariate Statistical Methods: Practical Research Applications Course Notes* (pp. 5.1-5.86). Cary, NC: SAS Institute, Inc.
- Van De Ven, A. H., Delbecq, A. L., & Koenig, R. (1976). Determinants of coordination modes within organizations. *American Sociological Review, 41*(April), 322-338.
- Weiss, S. J., & Davis, H. P. (1985). Validity and reliability of the collaborative practice scales. *Nurs Res, 34*(5), 299-305.
- Wells, N., Johnson, R., & Salyer, S. (1998). Interdisciplinary collaboration. *Clin Nurse Spec, 12*(4), 161-168.
- Wrobel, J. S., Charns, M. P., Diehr, P., Robbins, J. M., Reiber, G. E., Bonacker, K. M., et al. (2003). The relationship between provider coordination and diabetes-related foot outcomes. *Diabetes Care, 26*(11), 3042-3047.
- Xiao, Y., Hunter, W. A., Mackenzie, C. F., Jefferies, N. J., & Horst, R. L. (1996). Task complexity in emergency medical care and its implications for team coordination. LOTAS Group. Level One Trauma Anesthesia Simulation. *Hum Factors, 38*(4), 636-645.
- Yaffee, R. A. (1996). SAS or SPSS? Windows or Unix? [Electronic Version]. *Statistics and the Social Sciences*. Retrieved June 30, 2010 from <http://www.nyu.edu/its/pubs/connect/archives/96spring/yaffeechoice.html>.



- Young, G. J., Charns, M. P., Daley, J., Forbes, M. G., Henderson, W., & Khuri, S. F. (1997). Best practices for managing surgical services: the role of coordination. *Health Care Manage Rev, 22*(4), 72-81.
- Young, G. J., Charns, M. P., Desai, K., Khuri, S. F., Forbes, M. G., Henderson, W., et al. (1998). Patterns of coordination and clinical outcomes: a study of surgical services. *Health Serv Res, 33*(5 Pt 1), 1211-1236.
- Zillich, A. J., Doucette, W. R., Carter, B. L., & Kreiter, C. D. (2005). Development and initial validation of an instrument to measure physician-pharmacist collaboration from the physician perspective. *Value Health, 8*(1), 59-66.
- Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother, 38*(5), 764-770.
- Zillich, A. J., Milchak, J. L., Carter, B. L., & Doucette, W. R. (2006). Utility of a questionnaire to measure physician-pharmacist collaborative relationships. *J Am Pharm Assoc (2003), 46*(4), 453-458.
- Zwarenstein, M., Bryant, W., Bailie, R., & Sibthorpe, B. (2000). [Meta-analysis of the Cochrane Collaboration. Promoting collaboration between nurses and physicians]. *Assist Infirm Ric, 19*(2), 97-99.

## Appendices

### Appendix A: Ryan White Program

Although, the U.S. has been criticized for the slow development of specific programmes for persons living with HIV/AIDS (PLHWA) (Parham & Conviser, 2002), federal legislation did emerge in 1990 to address the social and health needs of PLWHA. The two major funders of HIV/AIDS care and treatment are Medicaid and the Ryan White Program. Ryan White was authorized at a time before the introduction of highly active antiretroviral treatment (HAART)—when most of the care and treatment options for PLWHA were based on palliative and supportive services such as case management, housing and transportation (Parham & Conviser, 2002). The Ryan White Program is the nation's largest discretionary funding specifically dedicated to for the care and treatment for PLWHA and their families. The Ryan White Comprehensive AIDS Resource Emergency (CARE) Act was first authorized in 1990 and has since been reauthorized in 1996, 2000, and 2006. In 2006, the Act was renamed to the Ryan White HIV/AIDS Treatment Modernization Act (HATMA) of 2006), now re-named to HATMA (Henry J. Kaiser Family Foundation, 2008). The Act is up for reauthorization again in December 2009. The program has been mandated a “payer of last resort” for individuals that have no other source of coverage or have gaps in coverage (Henry J. Kaiser Family Foundation, 2008, p. 1). Due to the nature of the “payer of the last resort”, Ryan White Care programs coordinate with other federal and local programs to fill in the gaps (HIV Health and Human Services Planning Council of New York & New York City Department of Health and Mental Hygiene, 2009; Parham & Conviser, 2002). There are five parts

(Part A – F), that each serve a specific role in caring for PLWHA—and range in their applicability for states, metropolitan areas, and public and private organizations, based on criteria established by HRSA. The Program’s integral role in caring for PLWHA and their families is undisputed—it is the third largest source of federal funding for HIV/AIDS, after Medicaid and Medicare (Henry J. Kaiser Family Foundation, 2008). Over half of Ryan White funding is appropriate to states and approximately 29% is distributed to cities (Henry J. Kaiser Family Foundation, 2008).

Specifically, Part A funds “eligible metropolitan areas” (EMAs) that have a “cumulative total of 2,000 reported AIDS cases over the last 5 years” (Henry J. Kaiser Family Foundation, 2008, p. 1) and also “transitional grant areas” (TGAs). Each EMA is mandated to establish a Planning Council that oversees the strategic plan for HIV/AIDS services and identifies areas of need and evaluate and monitors program effectiveness. 22 EMAs and 34 TGAs received Part A funding in FY 2008 (Henry J. Kaiser Family Foundation, 2008). Part A funds are used for core medical services and a range of support services. Core medical services include: medical case management, outpatient and ambulatory health care; medications; early intervention services; health insurance premiums; and home health care. All EMAs must spend 75% of their grant awards on these core medical services. Each EMA has a great deal of flexibility in designing core and non-core services and benefits that are client-centered and focus on the needs of PLWHA in their EMA. It is important to note that HRSA placed a great deal of evidence on case management by making it a core service category in 1990 (Parham & Conviser, 2002). EMAs have great flexibility in designing their programs- even including client eligibility criteria and service priorities (Henry J. Kaiser Family Foundation, 2008).

## References

Henry J. Kaiser Family Foundation. (2008). HIV/AIDS Policy Fact Sheet. June.

Retrieved December 11, 2008, 2008, from <http://www.kff.org/>

HIV Health and Human Services Planning Council of New York, & New York City

Department of Health and Mental Hygiene. (2009). Comprehensive Strategic

Plan for HIV/AIDS Services 2009-2012. New York: New York City Department of

Health and Mental Hygiene,.

Parham, D., & Conviser, R. (2002). A brief history of the Ryan White CARE Act in the

USA and its implications for other countries. *AIDS Care*, 14 Suppl 1, S3-6.

## Appendix B: Examples of HIV PCP-Case Manager Collaboration

### **Decisions to scale back, maintain or intensify services**

The clinical and care coordination team collaborate, at the point of clinical evaluation (usually a scheduled primary care visit), to make decisions regarding services. Criteria for the clinical decision include:

- Behavioral – medication and care plan adherence;
- Clinical – interval morbidity and laboratory data; and
- Social/life stressor – for example, a new episode of homelessness.

### **2. Development of the service plan (often through case conferences)**

#### **3. Brief meeting after patients' PCP visit between care coordinator and PCP to discuss next steps and updates service plan**

#### **4. Case review and case conferences**

##### *a. Initial case conference*

A face-to-face meeting between the PCP and care coordination team is held for initial hand-off.

All relevant information – social services needs, clinical status, behavioral health details such as current drug use – are shared amongst the team in a case conference.

##### *b. Ongoing case conference*

A case conference may be a structured and regularly scheduled meeting, but it need not be.

##### *Regular case review*

The Program should participate in on-going communication for reassessments and problem discussion with the HIV care team (weekly suggested). This ensures that all relevant healthcare professionals discuss the case and resolve all issues in a timely fashion. On-going communication should also include missed appointments and lost to follow-up issues. Ideally, the healthcare professionals should reserve a time (weekly suggested) to discuss patients with the care coordination team.

### **5. Regular communication between the PCP and care coordinator**

Note: From the New York City Department of Health and Mental Hygiene (2008a). Care Coordination Protocol for HIV-Infected Persons. New York: New York City Department of Health and Mental Hygiene. The care coordinator acts as a case manager and performs intake, social services and benefits assessment, service plan development and implementation, and monitoring and re-assessment.

## **Appendix C: Study Protocol**

### **Summary**

#### **Investigator**

Heather Mavronicolas, MPH, ABD

#### **Background**

The complex nature of health problems, particularly chronic illnesses, underscores the need for interdependence among health care providers to coordinate, cooperate, and jointly plan patient care. Research shows that collaboration among health professionals is linked to improved patient and organizational outcomes. McDonough & Doucette (2001) postulate that three types of determinants will allow for the collaborative working relationships to either strengthen or remain stalemate; these include participant, context, and social exchange characteristics. The evolution of HIV into a chronic illness has led to improved health outcomes and therefore a greater demand on the HIV care system. Collaboration among HIV primary care providers (PCP) and case managers may be essential for providing patient centered care.

#### **Main Questions**

(1) Does the theoretical model developed by McDonough & Doucette (2001) explain collaborative practice among HIV PCPs and HIV case managers in managing the patient's service plan?; (2) How important is each group of relationship drivers (participant, context, exchange) in explaining collaborative practice among the case manager-HIV PCP dyad?; and (3) How important is each variable in explaining collaborative practice for the case manager-HIV PCP dyad?

#### **Aims and Objectives**

The primary objective of this study is to test an existing theoretical model of collaborative practice among HIV PCP and case managers and determine which factors play the most important role in facilitating collaboration.

#### **Study Benefits**

Identifying the most influential determinants of collaboration may help providers and organizations in their structural, hiring, and training strategies to foster effective social exchanges and to adapt organizational factors to promote collaborative working relationships.

## **Methods and Design**

**Study Type:** A cross-sectional survey will measure participant, context, and exchange factors that influence collaborative practice using a self-administered, anonymous mail survey.

**Population:** An estimated 440 HIV PCPs and case managers in outpatient care settings in NYC will complete the surveys.

**Data Analysis:** A hierarchical OLS regression model specifying variable entry order will examine the relative importance of each group of factors and of individual variables.

**Expected Results:** Social exchange factors, including trustworthiness and role specification, are expected to be the dominant drivers of collaboration. Younger participants and case manager's with a baccalaureate degree or greater will be more likely to collaborate. Additional influential factors are expected to be organizational leadership, frequent professional interactions, complexity of patient caseload, and close proximity of case managers and HIV PCPs.

## **Human Subjects and Confidentiality**

There is no intervention in this study. The suggested risk level is minimal. All data will be kept strictly confidential. We request a Waiver of Informed Consent Documentation, because surveys will be collected anonymously.

**New York City Department of Health and Mental Hygiene  
Predictors, Correlates, and Measures of Collaborative Practice among  
HIV Primary Care Providers and Case Managers**

**Researcher's Name:** Heather Mavronicolas, MPH, ABD

**Division:** Disease Control

**Bureau:** HIV/AIDS Prevention and Control

**Program:** Care, Treatment and Housing Program

**1. STUDY AIM, BACKGROUND AND DESIGN**

**a. Study Aim**

The primary objective of this study is to test an existing theoretical model of collaborative practice (McDonough & Doucette, 2001) among primary care providers (PCPs) providing HIV care and case managers and determine which factors play the most important role in facilitating collaboration.

**b. Background**

The complex nature of health problems, particularly chronic illnesses, underscores the need for interdependence among health care providers to coordinate, cooperate, and jointly plan patient care (D'Amour, Ferrada-Videla, San Martin Rodriguez, & Beaulieu, 2005; Morgan & Rossi, 2007; San Martin-Rodriguez, Beaulieu, D'Amour, & Ferrada-Videla, 2005; Stichler, 1995). Collaboration is not simply the act of working together, but rather involves a high degree of interdependent decision-making that draws on the strengths of different collaborative team members to determine the most optimal course of patient care (Arcangelo, Fitzgerald, Carroll, & Plumb, 1996; Baggs & Schmitt, 1988; Fagin, 1992; Silen-Lipponen, Turunen, & Tossavainen, 2002; Weiss & Davis, 1985). Five essential attributes of collaboration between two health care professionals include: shared decision-making, shared problem-solving, cooperation, coordination, and concern for other's interests (Baggs, 1994; Baggs & Schmitt, 1988).

Research shows that collaboration among health professionals is linked to improved patient and organizational outcomes. Prior studies found that collaboration is associated with a reduction in hospital length of stay (Curley, McEachern, & Speroff, 1998; Jitapunkul et al., 1995; McKay & Crippen, 2008), lower patient mortality (Baggs et al., 1999; Rubenstein et al., 1984), increased employee job satisfaction (Baggs & Ryan, 1990; Baggs, Ryan, Phelps, Richeson, & Johnson, 1992; Baggs et al., 1997; Netting & Williams, 1996), a reduction in staff turnover (Baggs & Ryan, 1990), improved health status (Baggs et al., 1992; Gattis, Hasselblad, Whellan, & O'Connor, 1999; Rubenstein et al., 1984), a reduction in health care costs (Curley et al., 1998; Rubenstein et al., 1984), and an increase in workforce efficiency (Knaus, Draper, Wagner, & Zimmerman, 1987).



McDonough & Doucette (2001) postulate a staged model of collaborative working relationship (CWR) development between pharmacists and physicians and purport that the CWR progresses through five stages: stage 0- professional awareness; stage 1- professional recognition; stage 2-exploration and trial; stage 3- professional relationship expansion; and stage 4-commitment to the CWR. As the physician and pharmacist increasingly rely on each other for patient care, the relationship strengthens and collaboration increases. Three types of determinants will allow for the CWR to either strengthen or remain stalemate; these include participant, context, and social exchange characteristics (McDonough & Doucette, 2001). Participant factors include personal characteristics such as education, age, gender, and years of experience. Context factors are characteristics related to the practice including practice setting, patient mix, and volume of exchanges among providers. Social exchange factors include characteristics of the parties' social relationship such as expectation assessment, trust, expectation development, bi-directional communication, and conflict resolution. Research by Zillich, McDonough, Carter and Doucette (2004) and Doucette, Nevins, and McDonough (2005) tested the CWR and demonstrated that the theoretical model explained a substantial amount of physician-pharmacist collaboration and demonstrated the importance of social exchange characteristics in explaining collaborative practice.

HIV is now characterized as a chronic disease since the advent of highly active antiretroviral treatment (HAART) in 1996. In turn, life expectancy, quality of life, and patient care have improved dramatically for the 1.1 million adults living with HIV/AIDS in the United States. Nonetheless, adequate adherence to antiretroviral regimens is challenging for a large proportion of persons living with HIV/AIDS (PLWHA), particularly among those who are dually diagnosed with behavioral and social issues such as substance abuse and mental illness (Golin et al., 2002; Laraque & Weglein, 2008). New York City (NYC) is home to one of the largest and most heterogeneous HIV/AIDS epidemics in the United States. In 2007, there were 102,404 PLWHA in NYC (New York City Department of Health and Mental Hygiene, 2008). Racial/ethnic minorities, males, the homeless, and the economically disadvantaged are disproportionately affected by the HIV epidemic in NYC. Moreover, NYC has a significant number of disenfranchised PLWHA that receive intermittent, sub-optimal care. HIV-infected persons in NYC have high rates of delayed entry in care and discouraging rates of care interruption (Laraque & Weglein, 2008).<sup>18</sup> In NYC, ethnic, racial, and geographic disparities are marked in HIV incidence, prevalence, AIDS-related mortality and risk of progression to AIDS (Laraque & Weglein, 2008; New York City Department of Health and Mental Hygiene, 2008).

HIV case management services are beneficial for PLWHA, particularly for individuals with multiple health and psychosocial needs (Gardner et al., 2005; Kushel et al., 2006;

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<sup>18</sup> Based on the NYC DOHMH HIV Epidemiology and Field Services Program, unpublished data, Feb. 2008.

Magnus et al., 2001). Case managers coordinate medical and social services, help patients achieve treatment goals, identify resources for patients, and support patients in becoming self-sufficient. Collaboration between HIV primary care providers (PCPs) and case managers enables each team member to leverage their unique expertise and jointly plan together to make care decisions to provide patient-centered care ("Case manager-physician," 2008; Moreo, 2003; Snyder, Kaempfer, & Ries, 1996). To this end, successful collaboration between HIV PCPs and case managers may reduce care fragmentation, improve provider satisfaction, improve organizational performance, and improve patient health outcomes.

### **c. Design**

A cross-sectional survey will measure participant, context, and exchange factors that influence collaborative practice using a self-administered, confidential mail survey to an estimated 440 HIV PCPs and case managers in outpatient care settings in NYC. The study will be sponsored by the NYC Department of Health and Mental Hygiene (NYC DOHMH) HIV Care, Treatment and Housing Program (CTHP). An adapted survey instrument (Zillich et al., 2004) will elicit information on respondent demographic characteristics. Contextual variables include administrative support, professional interaction, and coordinating mechanisms. Social exchange factors include trustworthiness, role specification, and relationship initiation. The dependent variable, case manager/HIV PCP perceptions of collaborative practice, is adapted mainly from the Collaboration and Satisfaction About Care Decisions scale (Baggs, 1994). All analyses will be performed in SAS. A hierarchical regression model specifying variable entry order will examine the relative importance of each group of factors and of individual variables. Using hierarchical regression techniques, this study will answer three research questions: (1): Does the theoretical model developed by McDonough & Doucette (2001) explain collaborative practice among HIV PCPs and HIV case managers in managing the patient's service plan?; (2): How important is each group of relationship drivers (participant, context, exchange) in explaining collaborative practice among the case manager-HIV PCP dyad?; and (3): How important is each variable in explaining collaborative practice for the case manager-HIV PCP dyad?

### **d. Expected Results**

Social exchange factors, including trustworthiness and role specification, are expected to be the dominant drivers of collaboration (Doucette et al., 2005; Zillich et al., 2004). Younger participants (Bradshaw & Doucette, 1998; Ritchey & Raney, 1981), case manager's with a baccalaureate degree or greater (Weiss & Davis, 1985), and participants with interdisciplinary training in collaboration and substantial work experience will be more likely to collaborate (Alt-White, Charns, & Strayer, 1983; San Martin-Rodriguez et al., 2005; Snyder et al., 1996). Additional influential factors are expected to be organizational leadership (Borrill et al., 2002; Prescott & Bowen, 1985), frequent professional interactions (Doucette et al., 2005; Zillich et al., 2004), volume of HIV patients/week ( $\leq 50$ ) (Baggs & Schmitt, 1997), complexity of patient panels (Sicotte, Pineault, & Lambert, 1993; Van De Ven, Delbecq, & Koenig, 1976), mutual adjustment mechanisms (Bickell & Young, 2001; Young et al., 1997), information systems use (Sicotte, D'Amour, & Moreault, 2002), and close proximity of case managers and HIV PCPs (Alt-White et al., 1983; Baggs & Schmitt, 1997).

### **e. Significance**

Identifying the most influential determinants of collaboration may help providers and organizations in their structural, hiring, and training strategies to foster effective social exchanges and to adapt organizational factors to promote collaborative working relationships. Future research will need to focus on how HIV PCP-case manager collaboration affects intermediary process outcomes (e.g., provider satisfaction, employee turnover) and health outcomes and organizational performance.

## **2. PARTICIPANT POPULATION: INCLUSION CRITERIA AND RECRUITMENT**

### **a. Participants**

Participants will be case managers and HIV PCPs who work in NYC. The expected number of participants that may respond to recruiting efforts is 440, assuming a 40% response rate. All prospective study participants will be 18 years or older. None of the prospective study participants belong to a vulnerable population (e.g., prisoners, children, pregnant women, or cognitively impaired).

### **b. Inclusion Criteria**

The study will construct a list of prospective study participants after receiving IRB approval. Inclusion criteria will be used to select prospective study participants for this study.

Case managers will be eligible to participate in the study if they meet the following criteria:

- Age 18 years or older
- Work in one of the five boroughs of NYC (including Manhattan, Brooklyn, Bronx, Staten Island, and Queens); and
- Work as a case manager, social worker, nurse, treatment adherence counselor or anyone else who is assigned to help coordinate HIV care and treatment (including medication) adherence<sup>19</sup> through case management activities. Depending on the setting, the case manager's activities may include: intake, assessment, service plan development, service plan monitoring and re-

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<sup>19</sup> Adapted from Katz et al. (2001, p. 558).

assessment, treatment adherence counseling, coordination of care, and discharge.

HIV primary care providers (PCPs) may be eligible to participate in the study if they meet the following criteria:

- Age 18 years or older
- Work in one of the five boroughs of NYC (including Manhattan, Brooklyn, Bronx, Staten Island, and Queens); and
- Work as an HIV PCP (physician's assistant (PA), nurse practitioner (NP), medical doctor (MD), or doctor of osteopathy (DO)).

### **c. Sampling and Recruitment Process**

The prospective participants are not known to the researcher at this time. After IRB approval, the study will construct a list of eligible study participants. Two steps will be taken by Principal Investigator (P.I.) to develop a list of prospective study participants. First, case managers will be identified by contacting all program managers at agencies (including hospital, community based organizations, and community health centers) that receive Ryan White Part A<sup>20</sup> funds for case management services from the NYC DOHMH through Public Health Solutions (PHS). Agencies funded by Ryan White Part A that conduct case management activities may have the following contracts: outpatient medical care (N = 26), case management (N = 25), treatment adherence (N=21), and maintenance in care (N = 12). Ryan White Part A program managers will be asked to provide names of prospective case managers that meet the eligibility criteria outlined above and their respective mailing addresses. Program managers do not provide case management services and are not eligible to participate in the study. All HIV case managers at the agencies contacted will be eligible to participate, regardless of funding source, because agencies may provide case management services that are funded by other sources (e.g., Medicaid). This particular set of agencies will be recruited because

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<sup>20</sup> Since 1990, the federal government has provided emergency relief to areas disproportionately affected by HIV and AIDS through the Ryan White program. The Ryan White program provides HIV/AIDS care and support services to HIV-infected persons and their family members. Part A of the Ryan White HIV/AIDS Treatment Modernization Act of 2006 provides emergency relief to eligible metropolitan areas (EMAs) and transitional grant areas (TGAs). The NYC DOHMH is the grantee for Part A funds and manages over \$100 million dollars to serve the NY EMA. These funds support a comprehensive HIV care system through more than 200 contracts with over 100 agencies. Services provided include medical case management; outpatient medical care; behavioral health; outreach; and housing assistance. Public Health Solutions (PHS) is the master contractor for the Ryan White Part A contracts. PHS executes contracts, pays sub-contractors, and monitors fiscal and contract performance. Outcomes evaluations are conducted by the CTHP and performance based contracts are monitored jointly by the CTHP and PHS. (Hygiene, Control, & Care, 2009).

it is believed the agencies' case management services are funded by diverse funding streams in order to permit the generalizability of results.

The NYC DOHMH CTHP has a list of HIV PCPs that work in NYC. The list was developed by contacting HIV medical directors at HIV outpatient care settings NYC. The list includes hospital outpatient clinics, substance abuse treatment facilities, community based organizations with primary care on-site, and community health centers. This list of HIV PCPs is appropriate to use, because the goal of the study is to understand HIV PCP-case manager collaboration. The second process of developing the prospective sampling list involves merging the HIV PCP list with the list of case managers.

Prospective participants will be invited to participate in the study by means of a mail survey. A cover letter will explain the primary aim of the survey, the intended use of the survey, and clarify that the survey is completely voluntary. The cover letter will also include contact information for the P.I. in case participants have questions about the research. Study participants will be asked to anonymously return their completed survey in the stamped, return envelope provided. Two reminder postcards will be sent to all eligible study participants. The postcard will provide contact information of the P.I. in the event that prospective participants have questions or would like to request another copy of the survey. Prospective study participants recruited for the study will be from diverse hospitals, community based organizations and community health centers, therefore, it is anticipated that participants will be representative of diverse demographic and geographic backgrounds.

#### **d. Recruitment Materials**

1. *Cover letter & survey- attached*
2. *Reminder Postcard-attached*

### **3. STUDY PROCEDURES**

#### **a. Procedures and Research Details**

Information will be obtained from study participants through a mail survey. Prospective study participants will receive a cover letter, survey, and a stamped, return envelope. Seven days after the initial mailing, eligible participants will receive a reminder postcard. A second reminder postcard will be sent to prospective participants seven days after the first postcard is sent.

The procedures in which the participants will take part include the following:

- Complete the survey questionnaire (8-10 minutes)

**TOTAL TIME COMMITMENT:** Approximately 10 minutes

## **b. Data collection and analysis**

The survey will answer the research questions stated in section 1 of this protocol by measuring participant, context, and social exchange characteristics. Participant characteristics will include personal characteristics such as gender, age, education, and practice specialty. The survey will measure characteristics of the participants' work environment with questions on practice type, frequency of interaction with the case manager or HIV PCP, role of leadership in facilitating collaboration, interdisciplinary meetings, and proximity of case manager and HIV PCP. The survey also contains questions that ask about the nature of the case manager-HIV PCP provider relationship with questions that ask the participant to agree/disagree with statements about trust, dependence, communication, and helpfulness. Five items on the survey measure the level of collaborative practice by asking the participant to agree/disagree with statements related to joint planning, cooperation, coordination, and shared goals. The survey is adapted largely from Zillich et al. (2004) and Baggs (1994) in order to test McDonough and Doucette's (2001) theoretical model of the development of CWR. A hierarchical regression model specifying variable entry order will examine the relative importance of each group of factors and of individual variables.

1. *See survey instrument-attached.*

## **4. RESEARCH RISKS**

### **a. Potential risks**

- (i) *A potential risk may be loss of privacy.* The risk will be minimized by collecting data anonymously and by retaining the list of prospective study participants in a separate, secure location from the data collected. The following steps will be taken to minimize the risk of loss of privacy:
  - During the construction of the list of prospective study participants and during survey administration, the list will be retained in a locked file cabinet or a secure, electronic folder on the CTHP server at the NYC DOHMH. All NYC DOHMH computers are password protected and only authorized users are permitted to access secure folders. The file containing the list will also be password protected. Only the P.I. and the research assistants will have access to the password and file cabinet.
  - All data collected through the mail surveys will be kept in a locked file cabinet and entered into a password protected file at the NYC DOHMH. The electronic survey data will be retained in a separate, secure folder from the list of prospective study participants on the CTHP server or in separate file cabinets at the NYC DOHMH. Only the P.I. and research assistants will know the password and have keys to the file cabinets.
  - Three weeks after the survey is mailed to eligible study participants, the list of eligible HIV PCPs will be returned to the Director of the HIV CTHP. The list of HIV PCPs will subsequently be maintained separately in a secure folder on the NYC DOHMH server indefinitely. The P.I. will maintain the list of eligible case managers in a separate location from the survey data collected. The list of

case managers will be password protected and saved in a secure, electronic folder on the CTHP server. The list of prospective case managers will be maintained while publishing study results and will then be destroyed in 2013.

- (ii) *A potential risk may be breach of confidentiality.* This risk will be minimized by collecting data anonymously and by retaining the list of prospective study participants in a secure, separate location from the survey data collected. Moreover, survey data collected will not contain any identifiable information (e.g. no name, no date of birth, no zip code, no name of organization, no street address). The likelihood of a breach of confidentiality is minimal, because the study will take several steps will be protect the confidentiality of study participants identity, these include:
- During the construction of the list of prospective study participants and during survey administration, the list will be retained in a secure, electronic folder in the CTHP server or locked in a file cabinet at the NYC DOHMH. All NYC DOHMH computers are password protected and only authorized users are permitted to access secure folders. The file containing the list will also be password protected and only the P.I. and the research assistant will have access to the password.
  - Three weeks after the survey is mailed to eligible study participants, the list of eligible HIV primary care providers will be returned to the Director of the CTHP. The list of HIV primary care providers will be maintained indefinitely on a separate, secure folder on the NYC DOHMH server from the survey data collected. The P.I. will maintain the list of eligible case managers in a password protected file in separate location from the survey data collected. The P.I. and research assistants will be the only individuals that know the password to open the list of prospective case managers. The list of prospective case managers will be maintained while publishing study results and will be destroyed in 2013.
  - Follow-up postcards will be sent to all prospective study participants to remind them to return their surveys if they wish to participate. The postcards will reassure prospective study participants that the researchers have no way to delineate who returns the surveys.
  - Hard copies of the survey data collected will be kept in a secure, locked file cabinet in the P.I. or the research assistants' office space. All hard copies of the survey will be destroyed after the data is entered into an Excel spreadsheet and data cleaning is complete. It is anticipated that hard copies of the survey data will be destroyed by November 2009.
  - All mail envelopes with return addresses of study participants will be shredded immediately. The survey does not contain any open-ended questions, so this minimizes the risk that study participants would accidentally write identifiable information on the survey.
  - The survey data will be saved in a password protected, encrypted Excel file inside a secure CTHP folder at the NYC DOHMH. The survey data collected will be kept indefinitely. The survey data does not contain any identifiable information (no name, no phone number, no fax, no social security number, no address, city, no zip code, etc.).
  - All study findings will be reported in aggregate format. Only the P.I., research assistants, and authorized staff that work for the Research and Evaluation Unit of the NYC DOHMH CTHP will have access to the original survey data. Other

NYC DOHMH staff will not have access to original survey data and will only be allowed to view aggregate level data. Research and Evaluation staff members that are authorized to view the original survey data collected will not have access to the list of prospective study participants.

## **5. BENEFITS**

### **a. Direct Benefits**

There will be no direct benefits to subjects for participating in this research.

### **b. Indirect Benefits**

The knowledge gained from the study may benefit society in general. Identifying the most influential determinants of collaboration may help providers and organizations in their structural, hiring, and training strategies to foster effective social exchanges and to adapt organizational factors to promote collaborative working relationships.

## **6. RENUMERATION**

There will be no payment for participation in this study.

## **7. COSTS**

There will be no costs to the subject for participating in this study.

## **8. ALTERNATIVES**

The alternative for subjects is to not participate in the research.

## **9. CONSENT PROCESS AND DOCUMENTATION**

The researcher will request a waiver of written consent on Form F.

## **10. QUALIFICATIONS OF THE INVESTIGATOR**

Heather Mavronicolas is a graduate student in the Department of Health Systems Management at Tulane School of Public Health & Tropical Medicine. She has recently completed the required coursework in the doctoral program and is a PhD candidate. Her graduate coursework has prepared her for research design, data analysis, and project management. The PhD coursework largely focused on data analysis and research study design. Courses completed for her PhD requirements included advanced evaluation research, organizational behavior, biostatistics, epidemiology, and research methods. Ms. Mavronicolas is a Special Projects Coordinator in the HIV CTHP at the NYC DOHMH. In this role she has overseen several special projects including the finalization of a care coordination protocol. She has received several trainings through the NYC DOHMH in data confidentiality and security for HIV surveillance data protection and is authorized to analyze HIV surveillance data in the secure HIV/AIDS research corridor. Previously, Ms. Mavronicolas worked as an Assistant Professor for SUNY Downstate Medical Center Graduate Program in Public Health and was a guest lecturer



at Lehman College in NYC. She received a Master's of International Public Health from the University of Sydney in Australia.

## 11. FUNDING

The research will be funded by the NYC DOHMH CTHP. The source of funding does not pose any source of financial conflict of interest, because the survey will not be used for program evaluation. The research will be used to enhance the understanding of HIV PCP and case manager collaboration in HIV care settings.

## 12. BIBLIOGRAPHY

- Alt-White, A. C., Charns, M., & Strayer, R. (1983). Personal, organizational and managerial factors related to nurse - physician collaboration. *Nurs Adm Q*, 8(1), 8-18.
- Arcangelo, V., Fitzgerald, M., Carroll, D., & Plumb, J. D. (1996). Collaborative care between nurse practitioners and primary care physicians. *Prim Care*, 23(1), 103-113.
- Baggs, J. G. (1994). Development of an instrument to measure collaboration and satisfaction about care decisions. *J Adv Nurs*, 20(1), 176-182.
- Baggs, J. G., & Ryan, S. A. (1990). ICU nurse-physician collaboration & nursing satisfaction. *Nurs Econ*, 8(6), 386-392.
- Baggs, J. G., Ryan, S. A., Phelps, C. E., Richeson, J. F., & Johnson, J. E. (1992). The association between interdisciplinary collaboration and patient outcomes in a medical intensive care unit. *Heart Lung*, 21(1), 18-24.
- Baggs, J. G., & Schmitt, M. H. (1988). Collaboration between nurses and physicians. *Image J Nurs Sch*, 20(3), 145-149.
- Baggs, J. G., & Schmitt, M. H. (1997). Nurses' and resident physicians' perceptions of the process of collaboration in an MICU. *Res Nurs Health*, 20(1), 71-80.
- Baggs, J. G., Schmitt, M. H., Mushlin, A. I., Eldredge, D. H., Oakes, D., & Hutson, A. D. (1997). Nurse-physician collaboration and satisfaction with the decision-making process in three critical care units. *Am J Crit Care*, 6(5), 393-399.
- Baggs, J. G., Schmitt, M. H., Mushlin, A. I., Mitchell, P. H., Eldredge, D. H., Oakes, D., et al. (1999). Association between nurse-physician collaboration and patient outcomes in three intensive care units. *Crit Care Med*, 27(9), 1991-1998.
- Bickell, N. A., & Young, G. J. (2001). Coordination of care for early-stage breast cancer patients. *J Gen Intern Med*, 16(11), 737-742.

- Borrill, C., West, M. A., Dawson, J., Shapiro, D., Rees, A., Richards, A., et al. (2002). *Team working and effectiveness in health care. Findings from the health care team. Effectiveness project*: Aston Centre for Health Services Organization Research.
- Bradshaw, S. J., & Doucette, W. R. (1998). Community pharmacists as patient advocates: physician attitudes. *J Am Pharm Assoc (Wash)*, 38(5), 598-602.
- Case manager-physician collaboration essential for good patient care. (2008). *Hosp Case Manag*, 16(1), 1-4.
- Curley, C., McEachern, J. E., & Speroff, T. (1998). A firm trial of interdisciplinary rounds on the inpatient medical wards: an intervention designed using continuous quality improvement. *Med Care*, 36(8 Suppl), AS4-12.
- D'Amour, D., Ferrada-Videla, M., San Martin Rodriguez, L., & Beaulieu, M. D. (2005). The conceptual basis for interprofessional collaboration: core concepts and theoretical frameworks. *J Interprof Care*, 19 Suppl 1, 116-131.
- Doucette, W. R., Nevins, J., & McDonough, R. P. (2005). Factors affecting collaborative care between pharmacists and physicians. *Res Social Adm Pharm*, 1(4), 565-578.
- Fagin, C. M. (1992). Collaboration between nurses and physicians: no longer a choice. *Acad Med*, 67(5), 295-303.
- Gardner, L. I., Metsch, L. R., Anderson-Mahoney, P., Loughlin, A. M., del Rio, C., Strathdee, S., et al. (2005). Efficacy of a brief case management intervention to link recently diagnosed HIV-infected persons to care. *Aids*, 19(4), 423-431.
- Gattis, W. A., Hasselblad, V., Whellan, D. J., & O'Connor, C. M. (1999). Reduction in heart failure events by the addition of a clinical pharmacist to the heart failure management team: results of the Pharmacist in Heart Failure Assessment Recommendation and Monitoring (PHARM) Study. *Arch Intern Med*, 159(16), 1939-1945.
- Golin, C. E., Liu, H., Hays, R. D., Miller, L. G., Beck, C. K., Ickovics, J., et al. (2002). A prospective study of predictors of adherence to combination antiretroviral medication. *J Gen Intern Med*, 17(10), 756-765.
- Henry J. Kaiser Family Foundation. (2008). HIV/AIDS policy fact sheet. June. Retrieved December 11, 2008, 2008, from <http://www.kff.org/>
- HIV Health and Human Services Planning Council of New York, & New York City Department of Health and Mental Hygiene. (2009). *Comprehensive strategic plan for HIV/AIDS services 2009-2012*. New York: New York City Department of Health and Mental Hygiene.
- Hygiene, N. Y. C. D. o. H. a. M., Control, B. o. H. A. P. a., & Care, T. a. H. P. (2009). *Ryan white HIV/AIDS treatment modernization act, part A request for proposals*. Retrieved. from.

- Jitapunkul, S., Nuchprayoon, C., Aksaranugraha, S., Chaiwanichsiri, D., Leenawat, B., Kotepong, W., et al. (1995). A controlled clinical trial of multidisciplinary team approach in the general medical wards of Chulalongkorn Hospital. *J Med Assoc Thai*, 78(11), 618-623.
- Katz, M. H., Cunningham, W. E., Fleishman, J. A., Andersen, R. M., Kellogg, T., Bozzette, S. A., et al. (2001). Effect of case management on unmet needs and utilization of medical care and medications among HIV-infected persons. *Ann Intern Med*, 135(8 Pt 1), 557-565.
- Knaus, W., Draper, E., Wagner, D., & Zimmerman, J. (1987). An evaluation of outcome from intensive care in major medical centers. *Can Crit Care Nurs J*, 4(2), 15.
- Kushel, M. B., Colfax, G., Ragland, K., Heineman, A., Palacio, H., & Bangsberg, D. R. (2006). Case management is associated with improved antiretroviral adherence and CD4+ cell counts in homeless and marginally housed individuals with HIV infection. *Clin Infect Dis*, 43(2), 234-242.
- Laraque, F., & Weglein, D. (2008). HIV care coordination in NYC. On *HIV care coordination Meeting*. New York, NY: New York City Department of Health and Mental Hygiene, HIV Care, Treatment and Housing Program.
- Magnus, M., Schmidt, N., Kirkhart, K., Schieffelin, C., Fuchs, N., Brown, B., et al. (2001). Association between ancillary services and clinical and behavioral outcomes among HIV-infected women. *AIDS Patient Care STDS*, 15(3), 137-145.
- McDonough, R. P., & Doucette, W. R. (2001). Developing collaborative working relationships between pharmacists and physicians. *J Am Pharm Assoc* 41(5), 682-692.
- McKay, C. A., & Crippen, L. (2008). Collaboration through clinical integration. *Nurs Adm Q*, 32(2), 109-116.
- Moreo, K. (2003). Consensus paper of the 2003 Physician and Case Management Summit: exploring best practices in physician and case management collaboration to improve patient care. *Case Manager*, 14(5), 57-61.
- Morgan, B. D., & Rossi, A. P. (2007). Difficult-to-manage HIV/AIDS clients with psychiatric illness and substance abuse problems: a collaborative practice with psychiatric advanced practice nurses. *J Assoc Nurses AIDS Care*, 18(6), 77-84.
- Netting, F. E., & Williams, F. G. (1996). Case manager-physician collaboration: implications for professional identity, roles, and relationships. *Health Soc Work*, 21(3), 216-224.
- New York City Department of Health and Mental Hygiene. (2008). *HIV Epidemiology & Field Services Semiannual Report* (No. Vol. 3, No. 2). New York: New York City Department of Health and Mental Hygiene, HIV Epidemiology & Field Services Unit.
- Parham, D., & Conviser, R. (2002). A brief history of the Ryan White CARE Act in the USA and its implications for other countries. *AIDS Care*, 14 Suppl 1, S3-6.

- Prescott, P. A., & Bowen, S. A. (1985). Physician-nurse relationships. *Ann Intern Med*, 103(1), 127-133.
- Ritchey, F. J., & Raney, M. R. (1981). Medical role-task boundary maintenance: physicians' opinions on clinical pharmacy. *Med Care*, 19(1), 90-103.
- Rubenstein, L. Z., Josephson, K. R., Wieland, G. D., English, P. A., Sayre, J. A., & Kane, R. L. (1984). Effectiveness of a geriatric evaluation unit. A randomized clinical trial. *N Engl J Med*, 311(26), 1664-1670.
- San Martin-Rodriguez, L., Beaulieu, M. D., D'Amour, D., & Ferrada-Videla, M. (2005). The determinants of successful collaboration: a review of theoretical and empirical studies. *J Interprof Care*, 19 Suppl 1, 132-147.
- Sicotte, C., D'Amour, D., & Moreault, M. P. (2002). Interdisciplinary collaboration within Quebec Community Health Care Centres. *Soc Sci Med*, 55(6), 991-1003.
- Sicotte, C., Pineault, R., & Lambert, J. (1993). Medical team interdependence as a determinant of use of clinical resources. *Health Serv Res*, 28(5), 599-621.
- Silen-Lipponen, M., Turunen, H., & Tossavainen, K. (2002). Collaboration in the operating room: the nurses' perspective. *J Nurs Adm*, 32(1), 16-19.
- Snyder, C. M., Kaempfer, S. H., & Ries, K. (1996). An interdisciplinary, interagency, primary care approach to case management of the dually diagnosed patient with HIV disease. *J Assoc Nurses AIDS Care*, 7(5), 72-82.
- Stichler, J. F. (1995). Professional interdependence: the art of collaboration. *Adv Pract Nurs Q*, 1(1), 53-61.
- Van De Ven, A. H., Delbecq, A. L., & Koenig, R. (1976). Determinants of coordination modes within organizations. *American Sociological Review*, 41(April), 322-338.
- Weiss, S. J., & Davis, H. P. (1985). Validity and reliability of the collaborative practice scales. *Nurs Res*, 34(5), 299-305.
- Young, G. J., Charns, M. P., Daley, J., Forbes, M. G., Henderson, W., & Khuri, S. F. (1997). Best practices for managing surgical services: the role of coordination. *Health Care Manage Rev*, 22(4), 72-81.
- Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770.

## Appendix D: IRB Materials



*Tulane Office of Human Research Protection  
Institutional Review Boards  
Biomedical  
Social Behavioral  
FW400002053*

May 29, 2009

Heather Mavronicolas  
225 W. 106th St, Apt 7L  
New York NY 10025

Re: IRB Study # 09-00249                      At: Biomedical

Dear Heather Mavronicolas:

We have received the following study as of 5/15/2009:

**Protocol Title:**

**Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers (09-00249)**

This New Study has received expedited approval granted 05/29/2009 in accordance with 45 CFR 110(b)(1). Partial waiver of consent (signed written consent) in favor of oral consent is acceptable as the written consent may be the only source of a breach in confidentiality.

It has been recorded in our system under our internal # 16808. Please note that the study expires on 5/28/2010. It is the investigator's responsibility to submit continuing review materials in a time period that will allow the IRB to conduct a review prior to the expiration date. Please adhere to the submission dates and deadlines posted on our website at [www.irb.tulane.edu](http://www.irb.tulane.edu). Should you have any questions, please do not hesitate to contact the office at (504) 988-2665.

<b>Status Grid:</b>
Our Internal # 16808
Meeting Date: 6/11/2009
Expedited: Yes
Pre Meeting Action: Approved
Expiration Date: 5/28/2010

Mark A. James, Ph.D.  
Chair  
Committee on Use of Human Subjects



Tulane Office of Human Research Protection  
 Institutional Review Boards  
 Biomedical  
 Social Behavioral  
 FW100002055

August 3, 2009

Heather Mavronicolas  
 225 W. 106th St, Apt 7L  
 New York NY 10025

Re: IRB Study # 09-00249

At: Biomedical

Dear Dr. Mavronicolas:

We have received the Amendment on the following study as of 7/15/2009:

**Protocol Title:**

**Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers (09-00249)**

The Amendment has received Expedited approval granted 08/02/09 in accordance with 45 CFR 46.110(b)(2) for:

1. Survey Questionnaire for HIV Primary care Providers.
2. Survey Questionnaire for Case Managers.
3. Revised follow-up postcard reminder.
4. Letter from the NYC Department of Health and Mental Hygiene IRB
5. Approval Letter from NYC Department of Health and Mental Hygiene IRB

It has been recorded in our system under our internal # 17062. Please note that the study expires on 5/28/2010. It is the investigator's responsibility to submit continuing review materials in a time period that will allow the IRB to conduct a review prior to the expiration date. Please adhere to the submission dates and deadlines posted on our website at [tulane.edu/asvpr/irb](http://tulane.edu/asvpr/irb). Should you have any questions, please do not hesitate to contact the office at (504) 988-2665.

<b>Status Grid:</b>
<b>Type of Change: Amendment</b>
<b>Meeting Date: 8/13/2009</b>
<b>Expedited: Yes</b>
<b>Pre Meeting Action: Approved</b>
<b>Expiration Date: 5/28/2010</b>

Mark A. James, Ph.D.  
 Chair  
 Committee on Use of Human Subjects



*Tulane Human Research Protection Program  
Institutional Review Boards  
Biomedical  
Social Behavioral  
FWA00002055*

**DATE:** December 7, 2009

**TO:** Heather Mavronicolas  
**FROM:** Tulane University Biomedical IRB

**STUDY TITLE:** [140618-2] Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers (09-00249)

**IRB REFERENCE #:** 09-00249  
**SUBMISSION TYPE:** Amendment/Modification

**ACTION:** APPROVED  
**EFFECTIVE DATE:** December 4, 2009

Thank you for submitting the Amendment/Modification for the above referenced study. The Tulane IRB granted expedited approval 12/04/09 in accordance with 45 CFR 46.110(b)(2) for:

1. Updated postcard reminder
2. Updated Protocol

If your submission necessitated a change in your approved informed consent/assent form(s), the new IRB approved consent/assent form(s) are to be used when enrolling subjects.

If you have any questions, please contact the IRB office at (504) 988-2665 or [irbmain@tulane.edu](mailto:irbmain@tulane.edu).

Sincerely,

/s/ Electronically signed  
Mark James, PhD

Please note that actual signature by the IRB Chair(s) is not required for this document to be effective since it is generated by IRBNet pursuant to the IRB Chair's electronic signature and approval. This process is consistent with Federal regulations and Tulane standard operating policies with respect to the IRB and Human Research Protection Office, which consider electronically-generated documents as official notice to sponsors and others of approval, disapproval or other IRB decisions. Please refer to the HRPO website at <http://tulane.edu/asypr/irb> to refer to Tulane's Electronic Signatures and Records Policy.



*Tulane Human Research Protection Program  
Institutional Review Boards  
Biomedical  
Social Behavioral  
FTT:100002055*

DATE: April 8, 2010

TO: Heather Mavronicolas  
FROM: Tulane University Biomedical IRB

STUDY TITLE: [140618-3] Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers (09-00249)

IRB REFERENCE #: 09-00249  
SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED

**IRB APPROVAL DATE: April 7, 2010**

**IRB EXPIRATION DATE: April 6, 2011**

Thank you for your recent Continuing Review/Progress Report submission. The Tulane University Institutional Review Board has granted approval for the above-referenced protocol together with:

- Continuing Review/Progress Report - Study No. 09-00249 Continuing Review Application (UPDATED: 03/24/2010)
- Cover Sheet - Study No. 09-00249 Cover Sheet for Continuing Review (UPDATED: 03/24/2010)
- Training/Certification - Study No. 09-00249 M. Sende NIH Training Certificate (UPDATED: 03/24/2010)
- Training/Certification - Study No. 09-00249 H. Mavronicolas CITI Training Certificate (UPDATED: 03/24/2010)

Research considered no more than minimal risk to subjects, and expedited continuing review granted for data analysis only in accordance with Federal regulation 45 CFR 46.110(b)(1). Please note the expiration date of the protocol above.

The research study has been approved for Expedited Review.

All research must be conducted according to the protocol that was approved by the IRB. Any proposed changes to the research must be submitted to the IRB for review and approved prior to implementation, unless a change is necessary to avoid immediate harm to subjects.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of their signed consent form.



Any Unanticipated Problems involving Risk to Subjects or Others, Deviations from the approved research, Non-Compliance, and Complaints must be reported to the IRB in accordance with Tulane HRPP policies and procedures. If this study includes ongoing oversight by a Data Safety Monitoring Board (DSMB) or other such committee, reports generated by the DSMB or oversight committee must be submitted to the IRB.

Continuations must be submitted in accordance with Tulane HRPP policies and procedures. The Continuing Review Form must be received by the IRB with enough time to allow for review and approval prior to the Expiration Date above. Please consult the IRB website and access the Submission Deadlines. Failure to submit the Continuing Review Form in a timely manner may result in the termination of IRB approval. When all study activities and data analysis have been completed, please notify the IRB within 30 days by submitting a Study Closure Form.

If you have any questions regarding this approval, please contact the IRB office at (504) 988-2665 or [irbmain@tulane.edu](mailto:irbmain@tulane.edu).

Sincerely,

/s/ Electronically signed  
Mark James, PhD

Please note that actual signature by the IRB Chair(s) is not required for this document to be effective since it is generated by IRBNet pursuant to the IRB Chair's electronic signature and approval. This process is consistent with Federal regulations and Tulane standard operating policies with respect to the IRB and Human Research Protection Office, which consider electronically-generated documents as official notice to sponsors and others of approval, disapproval or other IRB decisions. Please refer to the HRPO website at <http://tulane.edu/asvpr/irb> to refer to Tulane's Electronic Signatures and Records Policy.



**NEW YORK CITY DEPARTMENT OF  
HEALTH AND MENTAL HYGIENE**  
Thomas A. Farley, MD, MPH  
*Commissioner*

Institutional Review Board  
[irbadmin@health.nyc.gov](mailto:irbadmin@health.nyc.gov)  
125 Worth Street, Room 610, CN 31A  
New York, NY 10013  
(212) 788-4483 te  
(212) 788-4498 fax

June 26, 2009

**Re: IRB# 09-030 "Predictors, Correlates, and Measures of Collaborative Practice among HIV Primary Care Providers and Case Managers"**

**Principal Investigator: Heather Mavronicolas, MPH**

**This Action: Determination Letter**

Heather Mavronicolas, MPH  
Special Projects Coordinator  
New York City Department of Health and Mental Hygiene  
40 Worth Street  
New York, NY 10013

Dear Ms. Mavronicolas:

The IRB has received your submission for the above referenced research activity. It seems that the primary objective of the study is to test a theoretical model of collaborative practices among HIV primary care providers and case management and to identify factors that may play a role in facilitating collaboration. You are requesting a waiver of documented signed consent. The IRB has the following comments:

1. Your cover letter should contain the following elements:
  - A sentence that advises participants that this is a research study.
  - Information referencing the master contractor for this study should be removed.
  - There should be separate sections about risks and benefits to participating in this research.
  - There should be a separate section addressing privacy and confidentiality.
  - The sentence beginning with, "by virtue..." can be removed.
  - Name and contact information about the IRB should be included in a sentence. The sentence should include if participants have a question about their rights in research study you can contact the IRB...
  - Some of the sentences can be simplified, without altering the content, to lower the reading level.
  
2. It is stated that reminder post cards will "re-assure" prospective study participants that the Researchers have no way to delineate who returns the survey. This text is not included on the sample post card. The post card should be revised to include this.

If you have any questions please do not hesitate to contact our office.

Sincerely,

Olivette Burton, MSW, Mbe  
Chair, Institutional Review Board

**OB/jr**



NEW YORK CITY DEPARTMENT OF  
HEALTH AND MENTAL HYGIENE  
Thomas A. Farley MD MPH  
Commissioner

Institutional Review Board  
125 Worth Street, Room 610, CN 31A  
New York, NY 10013  
(212) 788-4483 tel  
(212) 788-4498 fax

June 30, 2009

**Re: IRB# 09-030 "Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers"**  
**Principal Investigator: Heather Mavronicolas, MPH**  
**This Action: Approval, Expedited by Chair**  
**Expiration Date: June 30, 2010**

Heather Mavronicolas, MPH  
Special Projects Coordinator  
New York City Department of Health and Mental Hygiene  
40 Worth Street Room 1502, CN A1  
New York, NY 10013

Dear Ms. Mavronicolas:

Your application to conduct the study "Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers", has been approved by the Chair under **45 CFR §46.110(b)(1)(category F7)** as "research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies". The IRB has determined that the study poses minimal risk to participants.

As principal investigator, you are responsible for ensuring that the study continues to be conducted according to the protocol approved by the IRB. You may submit written requests to modify the protocol to the IRB, but you may not implement any modifications until you have received written approval from the IRB as this would constitute non-compliance and deviance of IRB reviewed and approved procedures. You must also advise the IRB immediately of changes in sponsorship, funding, key personnel, address, phone number or suspension of approval by another IRB. **Your study is subject to random or for-cause audit at any time.**

Any adverse physical or psychological event affecting a study participant, violation of your data security protocol, or breach of confidentiality, **must be reported in writing to the IRB within 5 days of occurrence.** Serious adverse events must be reported in writing within 24 hours. You are also responsible for the accurate documentation, investigation and follow-up of all study-related adverse events and unanticipated problems involving risks to participants or others. **At the conclusion of the investigation, a detailed report on the resolution of the adverse event, must be submitted to the IRB within 10 days.**

This approval expires on **June 30, 2010**. If at that time you have completed your study, please submit a final report. If you wish to continue the study, please submit a progress report. In either case, the IRB requests that these reports be received **not less than four weeks prior to expiration date.**

Sincerely,

Michelle Burton, MSW, Mbe  
Chair, Institutional Review Board

OB/jr



NEW YORK CITY DEPARTMENT OF  
HEALTH AND MENTAL HYGIENE  
Thomas Farley, M.D., M.P.H.  
Commissioner

Institutional Review Board  
Human Resources Box  
125 Worth Street, Room 610, CN 31A  
New York, NY 10013  
(212) 788-4403 tel  
(212) 709-4499 fax

December 1, 2009

**Re: IRB# 09-030 "Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers"**

**Principal Investigator: Heather Mavronicolas, MPH**

**This Action: Approval of Modifications, Expedited by Chair**

**Expiration Date: June 30, 2010**

Heather Mavronicolas, MPH  
Special Projects Coordinator  
New York City Department of Health and Mental Hygiene  
40 Worth Street Room 1502, CN A1  
New York, NY 10013

Dear Ms. Mavronicolas:

Your request to modify the study "Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers", has been approved by the Chair under *45 CFR §45.110(b)(2)*, as "minor changes in previously approved research during the period (of one year or less) for which approval is authorized". The IRB approved the following modifications:

1. Approval granted to use revised protocol for study.
2. Approval granted to use revised Follow-Up Postcard Reminder for study.

As principal investigator, you are responsible for ensuring that the study continues to be conducted according to the protocol approved by the IRB. You may submit written requests to modify the protocol to the IRB, but you may not implement any modifications until you have received written approval from the IRB as this would constitute non-compliance and violation of IRB reviewed and approved procedures. You must also advise the IRB immediately of changes in sponsorship, funding, key personnel, address, phone number or suspension of approval by another IRB. *Your study is subject to random or for-cause audit at any time.*

Any adverse physical or psychological event affecting a study participant, violation of your data security protocol, or breach of confidentiality, must be reported in writing to the IRB within 5 days of occurrence. Serious adverse events must be reported in writing within 24 hours. You are also responsible for the accurate documentation, investigation and follow-up of all study-related adverse events and unanticipated problems involving risks to participants or others. *At the conclusion of the investigation, a detailed report on the resolution of the adverse event, must be submitted to the IRB within 10 days.*

This approval expires on **June 30, 2010**. If at that time you have completed your study, please submit a final report. If you wish to continue the study, please submit a progress report. In either case, the IRB requests that these reports be received *not less than four weeks prior to expiration date*.

If you have any questions, please feel free to contact me.

Sincerely,

Olivette Burton, MSW, Mbe  
Chair, Institutional Review Board

*OB/jr*



NEW YORK CITY DEPARTMENT OF  
HEALTH AND MENTAL HYGIENE  
Thomas A. Farley, MD, MPH  
Commissioner

Institutional Review Board  
Department of Health  
125 Worth Street, Room 610, CN 31A  
New York, NY 10013  
(212) 788-4483 tel  
(212) 788-4498 fax

April 23, 2010

Re: IRB# 09-030 "Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers"

Principal Investigator: Heather Mavronicolas, MPH

This Action: Approval of Continuation, Expedited by Chair

Expiration Date: June 29, 2011

Heather Mavronicolas, MPH  
Special Projects Coordinator  
New York City Department of Health and Mental Hygiene  
40 Worth Street Room 1502, CN A 1  
New York, NY 10013

Dear Ms. Mavronicolas,

Your application to continue the study "Predictors, Correlates, and Measures of Collaborative Practice Among HIV Primary Care Providers and Case Managers", has been approved by the Chair under *45 CFR §16.110(b)(1)(category F7)* as "research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies".

As principal investigator, you are responsible for ensuring that the study continues to be conducted according to the protocol approved by the IRB. You may submit written requests to modify the protocol to the IRB, but you may not implement any modifications until you have received written approval from the IRB as this would constitute non-compliance and deviance of IRB reviewed and approved procedures. You must also advise the IRB immediately of changes in sponsorship, funding, key personnel, address, phone number or suspension of approval by another IRB. Your study is subject to random or for-cause audit at any time. *Your study is subject to random or for-cause audit at any time.*

Any adverse physical or psychological event affecting a study participant, violation of your data security protocol, or breach of confidentiality, *must be reported in writing to the IRB within 5 days of occurrence.* Serious adverse events must be reported in writing within 24 hours. You are also responsible for the accurate documentation, investigation and follow-up of all study-related adverse events and unanticipated problems involving risks to participants or others. *At the conclusion of the investigation, a detailed report on the resolution of the adverse event, must be submitted to the IRB within 10 days.*

This approval expires on **June 29, 2011**. If at that time you have completed your study, please submit a final report. If you wish to continue the study, please submit a progress report. In either case, the IRB requests that these reports be received *not less than four weeks prior to expiration date.*

Sincerely,

Olivette Burton, MSW, Mbe  
Chair, Institutional Review Board

## Appendix E: Postcard Reminder

### HIV Primary Care Provider-Case Manager Survey

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About a week ago I sent you a questionnaire about how HIV primary care providers and case managers manage their patients' care plans. Because we are asking study participants to return the survey anonymously, we have no way of knowing who returned the survey. If you have already completed the survey and returned it, please accept my thanks. If you have not mailed it back, it is not too late!

Your participation in this study is valuable and your responses will be used to recommend processes to improve interdisciplinary management of HIV. If you would like to participate in the study, please complete the questionnaire and return it.

Please contact me if you need another copy of the survey.

Thanks again.

Heather Mavronicolas, MPH  
212-788-4358/ [hmavroni@health.nyc.gov](mailto:hmavroni@health.nyc.gov)

**New York City Department of  
Health & Mental Hygiene**

HIV Care, Treatment & Housing Program  
125 Worth Street, CN-A/1  
New York, NY 10013-4089

## **Appendix F: HIV Primary Care Provider-Case Manager Survey**

### **HIV Primary Care Provider Cover Letter**

#### **Invitation to Participate in a Research Study**

You are being invited to participate in a research study about how case managers and HIV primary care providers work together to manage their patients' care plans.

#### **Research Sites**

Anonymous survey conducted by mail.

#### **Investigator**

Heather Mavronicolas, MPH

#### **Sponsor**

New York City Department of Health and Mental Hygiene and Tulane University School of Public Health and Tropical Medicine.

#### **Purpose of Study**

The purpose of this ANONYMOUS survey is to learn more about how HIV primary care providers and case managers in New York City manage their patients' care plans. The study is interested in what approaches seem to work the best in delivering services to HIV patients. The survey asks about HIV primary care providers' working relationships with case managers. The survey includes questions about the study participants' background, personal characteristics, and work setting.

#### **Disclosure of Potential Conflict of Interest**

The investigator of this study is a health researcher that is interested in learning more about the case managers and HIV primary care providers' management of their patients' care plans. You are under NO OBLIGATION to participate in this anonymous research study.

#### **Potential Risks**

We anticipate minimal risks associated with participating in this study. The possible risks arising from your involvement in this study are loss of privacy and confidentiality. We will keep private all research records that identify you.

#### **Potential Benefits to Subjects and/or Society**

You will not receive any direct benefits from participation in this study. Knowledge gained from this study may benefit you and others in the future. The study findings will

be used to recommend processes to improve HIV case management services delivered by case managers and HIV primary care providers in New York City.

### **Privacy and Confidentiality**

All information provided in this survey will be kept private and confidential. All data will be stored in a secure location accessible only to the Principal Investigator, research assistants, and a limited number of authorized staff members of the New York City Department of Health and Mental Hygiene. The list of eligible study participants will be maintained separately from the surveys collected. This survey is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

We may publish the results of this study. Your information will be combined with information with other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered.

### **Participation & Withdrawal**

Participation in this survey is completely voluntary. Participants may choose not to answer specific questions and may end the survey at any time. If you decide not to participate, your relationship with the New York City Department of Health and Mental Hygiene will not be affected.

### **Instructions**

If you wish to participate, please complete the attached survey and return the survey in the stamped return envelope. The survey should take about 8-10 minutes to complete.

Thank you in advance for your time and contribution to this important research study.

### **Questions about the study**

If you have any questions about the research, you may contact the investigator, Heather Mavronicolas, at 212-788-4358 or by email at [hmavroni@health.nyc.gov](mailto:hmavroni@health.nyc.gov). If you have any questions about your rights as a volunteer in this research, contact the New York City Department of Health and Mental Hygiene's Institutional Review Board (IRB) at 212-788-4483. An IRB is a group that watches over the rights and safety of people that are in research studies.



**Thank you for completing this survey. The survey should take about 8-10 minutes. Please return the survey in the self-addressed, stamped return envelope provided.**

1. **What is your age?** (fill in answer)  
\_\_\_\_\_ years
2. **Gender** (circle one):
  - a. Male
  - b. Female
3. **Which profession best describes you?** (circle one):
  - a. Physician Assistant (PA)
  - b. Nurse Practitioner (NP)
  - c. Medical Doctor (MD)
  - d. Doctor of Osteopathy (DO)
  - e. Other \_\_\_\_\_
4. **In the last five years, did you take a course that discussed ways in which HIV primary care providers and case managers can work together to improve patient care?** (circle one):
  - a. Yes
  - b. No
5. **How many years in total have you engaged in direct patient care?** (fill in)  
\_\_\_\_\_ years
6. **What is your primary specialty?** (circle one or fill in answer in the space)
  - a. Family medicine
  - b. Internal medicine
  - c. Pediatrics
  - d. Other \_\_\_\_\_
7. **Are you an HIV specialist?** (circle one):
  - a. Yes
  - b. No
8. **Are you board certified or board eligible in a sub-specialty?** (circle ALL that)
  - a. Infectious disease (ID)
  - b. Allergy & Immunology
  - c. Hematology/Oncology
  - d. Other \_\_\_\_\_
  - e. No

9. **How would you describe the practice setting that you work in?** (circle)
- Designated AIDS Center (DAC) Outpatient Clinic
  - Hospital Outpatient Clinic, non-DAC
  - Community based organization (CBO) with primary care on site
  - Community health center
  - Substance abuse treatment facility with primary care on site
10. **What is your academic status?** (circle one):
- Intern, Resident or Fellow
  - Part-time/adjunct faculty appointment/voluntary attending
  - Full-time faculty appointment
  - No faculty affiliation
11. **What percent of time do you spend on:** (fill in amount, all percents should
- Direct patient care: \_\_\_\_\_ %
  - Administration: \_\_\_\_\_ %
  - Teaching: \_\_\_\_\_ %
  - Research: \_\_\_\_\_ %
12. **How large is your HIV caseload?** (circle one):
- $\leq 20$
  - 21-50
  - 51-199
  - $\geq 200$
13. **The executive staff (e.g., immediate supervisor, Medical Director or Clinic Administrator) of your practice promote and/or create opportunities for collaboration between case managers and HIV primary care providers.**  
(circle the response that represents your agreement with the question)
- Very Strongly Agree
  - Strongly Agree
  - Agree
  - Neutral
  - Disagree
  - Strongly disagree
  - Very strongly disagree

- 14. Does your practice have protocols or policies describing the activities and processes that facilitate interdisciplinary service delivery?<sup>21</sup> (circle one):**
- Yes
  - No
- 15. Approximately what proportion of your caseload has an active substance abuse problem? (fill in percent):**
- \_\_\_\_\_ %
- 16. Approximately what proportion of your caseload has a debilitating mental illness? (fill in percent):**
- \_\_\_\_\_ %
- 17. Approximately what proportion of your caseload is unstably housed, unemployed or is a single parent? (fill in percent):**
- \_\_\_\_\_ %
- 18. Which of the following funding sources reimburses your organization for case management services provided to HIV-infected clients? (circle ALL that apply):**
- Ryan White Part A
  - Comprehensive Medicaid Case Management / Community Follow-up
  - HIV Special Needs Plans—Medicaid Managed Care
  - Medicaid fee for service
  - Medicaid HIV specialized tiered rate structure—Designated AIDS Centers
  - Other \_\_\_\_\_
  - Don't know
- 19. In the past three months, how many times have you consulted with this case manager to change a patient's plan of care?<sup>22</sup> (circle one):**
- ≤5
  - 6-12
  - 13-24
- \_\_\_\_\_

<sup>21</sup> Adapted from Sicotte, C., D'Amour, D., & Moreault, M. P. (2002). Interdisciplinary collaboration within Quebec Community Health Care Centres. *Soc Sci Med*, 55(6), 991-1003. P. 997.

<sup>22</sup> Adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770.

d.  $\geq 25$

20. **In the past three months, how many times have *you contacted* this case manager to discuss any patient-related issue?<sup>3</sup> (circle one):**

- a.  $\leq 5$
- b. 6-12
- c. 13-24
- d.  $\geq 25$

21. **In the past three months, how many times have you asked this case manager for patient information?<sup>3</sup> (circle one):**

- a.  $\leq 5$
- b. 6-12
- c. 13-24
- d.  $\geq 25$

22. **In the past three months, how many times have you sent patient information to this case manager?<sup>3</sup> (circle one):**

- a.  $\leq 5$
- b. 6-12
- c. 13-24
- d.  $\geq 25$

23. **In the past three months, how many times have you referred a new patient to this case manager?<sup>3</sup> (circle one):**

- a.  $\leq 5$
- b. 6-12
- c. 13-24
- d.  $\geq 25$

24. **In the past three months, how many times have you received a referral from this case manager?<sup>3</sup> (circle one):**

- a.  $\leq 5$
- b. 6-12
- c. 13-24
- d.  $\geq 25$

25. **In the past three months, how many times have *you been contacted* by this case manager to discuss any patient-related issue?<sup>3</sup> (circle one):**

- a.  $\leq 5$
- b. 6-12
- c. 13-24
- d.  $\geq 25$

26. **How long have you worked with the case manager you evaluated?**  
\_\_\_\_\_ years
27. **Does your practice have protocols or policies describing the role of the case manager?**<sup>23</sup> (circle one):
- a. Yes
  - b. No
28. **Do you attend case conferences, case reviews or interdisciplinary rounds or team meetings on a regular basis with the case manager you evaluated?**<sup>5</sup> (circle one):
- a. Yes
  - b. No
29. **How often are regularly scheduled interdisciplinary case discussions that are attended by HIV providers and case managers held?**<sup>24</sup> (circle one):
- a. Never
  - b. Weekly
  - c. Bi-weekly (every two weeks)
  - d. Monthly
  - e. Quarterly
30. **Does your practice setting have an electronic information system that allows you to share information with the case manager you evaluated?** (circle one):
- a. Yes
  - b. No
31. **Do you work for the same organization as the case manager?** (circle one)
- a. Yes
  - b. No
- 

<sup>3</sup> Adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships.

*Ann Pharmacother*, 38(5), 764-770.

<sup>23</sup> Adapted from Sicotte, C., D'Amour, D., & Moreault, M. P. (2002). Interdisciplinary collaboration within Quebec Community Health Care Centres. *Soc Sci Med*, 55(6), 991-1003, p. 997

<sup>24</sup> Adapted from Sicotte, C., D'Amour, D., & Moreault, M. P. (2002). Interdisciplinary collaboration within Quebec Community Health Care Centres. *Soc Sci Med*, 55(6), 991-1003, p. 997

- 32. Where does the case manager you evaluated work in relation to you?<sup>25</sup>**
- a. Different building
  - b. Same building
  - c. Same floor
  - d. Same suite
  - e. Share desk space

**GO TO NEXT PAGE**

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<sup>25</sup> Adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships.

*Ann Pharmacother*, 38(5), 764-770.

**DIRECTIONS:**

For the next section, please circle the number that represents your agreement with the item. For the purpose of this survey, the *care plan* includes the patient's treatment goals and the activities, resources, and medical treatment to achieve them.<sup>26,27</sup>

**SCALE:**

1-Very  
Strongly  
Disagree

2- Strongly  
Disagree

3-Disagree

4-Neutral

5-Agree

6-Strongly  
Agree

7-Very  
Strongly  
Agree

33.	In providing patient care, I need this case manager as much as this case manager needs me.	1	2	3	4	5	6	7
34.	The case manager is credible.	1	2	3	4	5	6	7
35.	My interactions with this case manager are characterized by open communication of both parties.	1	2	3	4	5	6	7
36.	I can count on this case manager to do what he/she says.	1	2	3	4	5	6	7
37.	This case manager depends on me as much as I depend on him/her.	1	2	3	4	5	6	7
38.	This case manager and I are mutually dependent on each other in caring for patients.	1	2	3	4	5	6	7
39.	This case manager and I negotiate to come to agreement on our activities in managing the care plan.	1	2	3	4	5	6	7

<sup>26</sup> Questions 33-46 are adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770.

<sup>27</sup> Questions 47-51 are adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770 and Baggs, J. G. (1994). Development of an instrument to measure collaboration and satisfaction about care decisions. *J Adv Nurs*, 20(1), 176-182.

40.	I will work with this case manager to overcome disagreements on his/her role in managing the care plan.	1	2	3	4	5	6	7
41.	I intend to keep working together with this case manager.	1	2	3	4	5	6	7
42.	I trust this case manager's case management expertise.	1	2	3	4	5	6	7
43.	Communication between this case manager and myself is two-way.	1	2	3	4	5	6	7
44.	This case manager has spent time trying to learn how he/she can help you provide better care.	1	2	3	4	5	6	7
45.	This case manager has provided information to you about a specific patient.	1	2	3	4	5	6	7
46.	This case manager has showed an interest in helping you improve your practice.	1	2	3	4	5	6	7
47.	I work with the case manager to plan the goals of the care plan for our patients.	1	2	3	4	5	6	7
48.	Decision-making responsibilities for our patient's care plan are shared between the case manager and me.	1	2	3	4	5	6	7
49.	There is cooperation between the case manager and me in managing the care plan of our patients.	1	2	3	4	5	6	7
50.	In making decisions for our patients, primary care provider and case manager opinions are considered.	1	2	3	4	5	6	7
51.	Decision making for the patient is coordinated between the case manager and me.	1	2	3	4	5	6	7

***Thank you for your time. Your answers will help us to improve HIV services in New York City.***



# **HIV Primary Care Provider-Case Manager Survey**

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## **Case Manager Cover Letter**

### **Invitation to Participate in a Research Study**

You are being invited to participate in a research study about how case managers and HIV primary care providers work together to manage their patients' care plans.

### **Research Sites**

Anonymous survey conducted by mail.

### **Investigator**

Heather Mavronicolas, MPH

### **Sponsor**

New York City Department of Health and Mental Hygiene and Tulane University School of Public Health and Tropical Medicine.

### **Purpose of Study**

The purpose of this ANONYMOUS survey is to learn more about how HIV primary care providers and case managers in New York City manage their patients' care plans. The study is interested in what approaches seem to work the best in delivering services to HIV patients. The survey asks about case managers working relationships with HIV primary care providers. The survey includes questions about the study participants' background, personal characteristics, and work setting.

### **Disclosure of Potential Conflict of Interest**

The investigator of this study is a health researcher that is interested in learning more about the case managers and HIV primary care providers' management of their patients' care plans. You are under NO OBLIGATION to participate in this anonymous research study.

### **Potential Risks**

We anticipate minimal risks associated with participating in this study. The possible risks arising from your involvement in this study are loss of privacy and confidentiality. We will keep private all research records that identify you.

### **Potential Benefits to Subjects and/or Society**

You will not receive any direct benefits from participation in this study. Knowledge gained from this study may benefit you and others in the future. The study findings will

be used to recommend processes to improve HIV case management services delivered by case managers and HIV primary care providers in New York City.

### **Privacy and Confidentiality**

All information provided in this survey will be kept private and confidential. All data will be stored in a secure location accessible only to the Principal Investigator, research assistants, and a limited number of authorized staff members of the New York City Department of Health and Mental Hygiene. The list of eligible study participants will be maintained separately from the surveys collected. This survey is anonymous. That means that no one, not even members of the research team, will know that the information you give comes from you.

We may publish the results of this study. Your information will be combined with information with other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered.

### **Participation & Withdrawal**

Participation in this survey is completely voluntary. Participants may choose not to answer specific questions and may end the survey at any time. If you decide not to participate, your relationship with the New York City Department of Health and Mental Hygiene will not be affected.

### **Instructions**

If you wish to participate, please complete the attached survey and return the survey in the stamped return envelope. The survey should take about 8-10 minutes to complete.

Thank you in advance for your time and contribution to this important research study.

### **Questions about the study**

If you have any questions about the research, you may contact the investigator, Heather Mavronicolas, at 212-788-4358 or by email at [hmavroni@health.nyc.gov](mailto:hmavroni@health.nyc.gov). If you have any questions about your rights as a volunteer in this research, contact the New York City Department of Health and Mental Hygiene's Institutional Review Board (IRB) at 212-788-4483. An IRB is a group that watches over the rights and safety of people that are in research studies.

**Thank you for completing this survey. The survey should take about 8-10 minutes. Please return the survey in the self-addressed, stamped return envelope provided.**

**This survey asks you to answer questions about yourself and also asks about your relationship with an HIV Primary Care Provider. Consider your working relationship with one HIV Primary Care Provider that you work with the most. Think, in general, about the interactions you've had with the HIV Primary Care Provider over time.**

1. **What is your age?** (fill in answer)  
\_\_\_\_\_ years
2. **Gender** (circle one):
  - c. Male
  - d. Female
3. **What is your highest level of education attained?** (circle one):
  - e. High school/GED or below
  - f. Two year degree
  - g. Four year degree
  - h. Graduate degree
  - i. Doctorate degree
4. **In the last five years, did you take a course that discussed ways in which HIV primary care providers and case managers can work together to improve patient care?** (circle one):
  - c. Yes
  - d. No
5. **How many years have you practiced case management?** (fill in answer)  
\_\_\_\_\_ years
6. **What is the primary specialty of the HIV primary care provider that you**
  - e. Family medicine
  - f. Internal medicine
  - g. Pediatrics
  - h. Other: \_\_\_\_\_
  - i. Don't know

7. **Is the primary care provider you evaluated an HIV specialist?**
- Yes
  - No
  - Don't know
8. **Is the HIV primary care provider that you evaluated board certified or board eligible in a sub-specialty?** (circle ALL that apply or fill in answer):
- Infectious disease (ID)
  - Allergy & Immunology
  - Hematology/Oncology
  - Other \_\_\_\_\_
  - None
  - Don't know
9. **How would you describe the organization that you work in?** (circle one):
- Designated AIDS Center (DAC) Outpatient Clinic
  - Hospital Outpatient Clinic, non-DAC
  - Community based organization (CBO) with primary care on site
  - Community based organization (CBO) without primary care on site
  - Community health center
  - Substance abuse treatment facility with primary care on site
  - Substance abuse treatment facility without primary care on site
10. **What is your discipline?** (circle one):
- Nursing
  - Social work
  - Health educator/treatment adherence counselor
  - Other: \_\_\_\_\_
  - None
11. **What percent of time do you spend on:** (fill in amount, all percents should
- Providing direct patient care \_\_\_\_\_ %
  - Administration \_\_\_\_\_ %
12. **How large is your HIV caseload?** (circle one):
- $\leq 20$
  - 21-50
  - 51-199
  - $\geq 200$

**13. The executive staff (e.g., immediate supervisor, Medical Director or Clinic Administrator) of your practice promote and/or create opportunities for collaboration between case managers and HIV primary care providers. (circle the response that represents your agreement with the question):**

- h. Very Strongly Agree
- i. Strongly Agree
- j. Agree
- k. Neutral
- l. Disagree
- m. Strongly disagree
- n. Very strongly disagree

**14. Does your organization have protocols or policies describing interdisciplinary service delivery processes?<sup>28</sup> (circle one):**

- c. Yes
- d. No

**15. Approximately what proportion of your caseload has an active substance abuse problem? (fill in percent):**

\_\_\_\_\_ %

**16. Approximately what proportion of your caseload has a debilitating**

\_\_\_\_\_ %

**17. Approximately what proportion of your caseload is unstably housed, unemployed or is a single parent? (fill in percent):**

\_\_\_\_\_ %

\_\_\_\_\_

<sup>28</sup> Adapted from Sicotte, C., D'Amour, D., & Moreault, M. P. (2002). Interdisciplinary collaboration within Quebec Community Health Care Centres. *Soc Sci Med*, 55(6), 99.1-1003. P. 997.

18. **Which of the following funding sources reimburses your organization for case management services provided to HIV-infected clients?** (circle ALL that apply):
- h. Ryan White Part A
  - i. Comprehensive Medicaid Case Management / Community Follow-up
  - j. HIV Special Needs Plans—Medicaid Managed Care
  - k. Medicaid fee for service
  - l. Medicaid HIV specialized tiered rate structure—Designated AIDS
  - m. Other: \_\_\_\_\_
  - n. Don't know \_\_\_\_\_
19. **Does the organization you work for provide case management training?**
- a. Yes
  - b. No
20. **In the past three months, how many times have you consulted with this HIV primary care provider to change a patient's plan of care?**<sup>29</sup> (circle one):
- e.  $\leq 5$
  - f. 6-12
  - g. 13-24
  - h.  $\geq 25$
21. **In the past three months, how many times have *you* contacted this HIV primary care provider to discuss any patient-related issue?**<sup>22</sup> (circle one):
- a.  $\leq 5$
  - b. 6-12
  - c. 13-24
  - d.  $\geq 25$
- 

<sup>29</sup> Adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770.

22. **In the past three months, how many times have you asked this HIV primary care provider for patient information?<sup>2</sup> (circle one):**
- a.  $\leq 5$
  - b. 6-12
  - c. 13-24
  - d.  $\geq 25$
23. **In the past three months, how many times have you sent patient information to this HIV primary care provider?<sup>2</sup> (circle one):**
- a.  $\leq 5$
  - b. 6-12
  - c. 13-24
  - d.  $\geq 25$
24. **In the past three months, how many times have you referred a new patient to this HIV primary care provider?<sup>2</sup> (circle one):**
- a.  $\leq 5$
  - b. 6-12
  - c. 13-24
  - d.  $\geq 25$
25. **In the past three months, how many times have you received a referral from this HIV primary care provider?<sup>2</sup> (circle one):**
- a.  $\leq 5$
  - b. 6-12
  - c. 13-24
  - d.  $\geq 25$
26. **In the past three months, how many times have *you been contacted* by this HIV primary care provider to discuss a care-related problem?<sup>2</sup> (circle one):**
- a.  $\leq 5$
  - b. 6-12
  - c. 13-24
  - d.  $\geq 25$
27. **How long have you worked with the HIV primary care provider?**
- \_\_\_\_\_ years

28. **Does your organization have protocols or policies describing the role of the case manager?**<sup>30</sup> (circle one):
- c. Yes
  - d. No
29. **Do you attend case conferences, case reviews or interdisciplinary rounds or team meetings on a regular basis with the HIV primary care provider you evaluated?** (circle one):
- c. Yes
  - d. No
30. **How often are regularly scheduled interdisciplinary case discussions that are attended by HIV providers and case managers held?**<sup>3</sup> (circle one):
- f. Never
  - g. Weekly
  - h. Bi-weekly (every two weeks)
  - i. Monthly
  - j. Quarterly
31. **Does your practice setting have an electronic information system that allows you to share information with the HIV primary care provider you evaluated?** (circle one):
- c. Yes
  - d. No
32. **Do you work for the same organization as the HIV primary care provider you evaluated?** (circle one):
- a. Yes
  - b. No
- 

<sup>30</sup> Adapted from Sicotte, C., D'Amour, D., & Moreault, M. P. (2002). Interdisciplinary collaboration within Quebec Community Health Care Centres. *Soc Sci Med*, 55(6), 991-1003. P. 997.



- 33. Where does the HIV primary care provider you evaluated work in**
- d. Different building
  - e. Same building
  - c. Same floor
  - d. Same suite
  - e. Share desk space

**GO TO NEXT PAGE**

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<sup>31</sup> Adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770.

**DIRECTIONS:**

For the next section, please circle the number that represents your agreement with the item. For the purpose of this survey, the *care plan* includes the patient's treatment goals and the activities, resources, and medical treatment to achieve them.<sup>32,33</sup>

**SCALE:**

1-Very  
Strongly  
Disagree

2- Strongly  
Disagree

3-Disagree

4-Neutral

5-  
Agree

6-Strongly  
Agree

7-Very  
Strongly  
Agree

34.	In providing patient care, I need this HIV primary care provider as much as this HIV primary care provider needs me.	1	2	3	4	5	6	7
35.	This HIV primary care provider is credible.	1	2	3	4	5	6	7
36.	My interactions with this HIV primary care provider are characterized by open communication by both parties.	1	2	3	4	5	6	7
37.	I can count on this HIV primary care provider to do what he/she says.	1	2	3	4	5	6	7
38.	This HIV primary care provider depends on me as much as I depend on him/her.	1	2	3	4	5	6	7

<sup>32</sup> Questions 34-47 are adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770.

<sup>33</sup> Questions 48-52 are adapted from Zillich, A. J., McDonough, R. P., Carter, B. L., & Doucette, W. R. (2004). Influential characteristics of physician/pharmacist collaborative relationships. *Ann Pharmacother*, 38(5), 764-770 and Baggs, J. G. (1994). Development of an instrument to measure collaboration and satisfaction about care decisions. *J Adv Nurs*, 20(1), 176-182.

39.	<b>This HIV primary care provider and I are mutually dependent on each other in caring for patients.</b>	1	2	3	4	5	6 7
40.	<b>This HIV primary care provider and I negotiate to come to agreement on our activities in managing the care plan.</b>	1	2	3	4	5	6 7
41.	<b>I will work with this HIV primary care provider to overcome disagreements on my role in managing the care plan.</b>	1	2	3	4	5	6 7
42.	<b>I intend to keep working together with this HIV primary care provider.</b>	1	2	3	4	5	6 7
43.	<b>I trust this HIV primary care provider.</b>	1	2	3	4	5	6 7
44.	<b>Communication between this HIV primary care provider and myself is two-way.</b>	1	2	3	4	5	6 7
45.	<b>I spend time trying to learn how I can help this HIV primary care provider provide better care.</b>	1	2	3	4	5	6 7
46.	<b>I provide information to this HIV primary care provider about specific patients.</b>	1	2	3	4	5	6 7
47.	<b>I show an interest in helping this HIV primary care provider improve his/her practice.</b>	1	2	3	4	5	6 7
48.	<b>I work with the HIV primary care provider to plan the goals of the care plan for our patients.</b>	1	2	3	4	5	6 7
49.	<b>Decision-making responsibilities for our patient's care plan are shared between the HIV primary care provider and me.</b>	1	2	3	4	5	6 7

<b>50</b>	<b>There is cooperation between the HIV primary care provider and me in managing the care plan of our patients.</b>	1 2 3 4 5 6 7
<b>51.</b>	<b>In making decisions for our patients, case manager and HIV primary care provider opinions are considered.</b>	1 2 3 4 5 6 7
<b>52.</b>	<b>Decision making for this patient is coordinated between the HIV primary care provider and me.</b>	1 2 3 4 5 6 7

***Thank you for your time. Your answers will help us to improve HIV services in New York City***

## Appendix G: Data Dictionaries

### Data Dictionary for HIV PCP-Case Manager Survey- Case Manager Version

Updated 3/19/10

‡ = Categories are different for HIV PCP and Case Managers

\* = derived variable

Care Plan includes the patient's treatment goals and the activities, resources and medical treatment to achieve them.

Variable	Item	Type	Format	Meaning	Possible values
subno		Num		Subject ID number	1-212
cm		Char	kind	Subject is a case manager	1 = Yes 0 = No
age	1	Num		Subject age in years If missing = age set to 41 (median of case manager group)	18-100
new_age		Num		If age indicated to be $\geq 50$ then age = 54 (median of case managers $\geq 50$ yo)	Range = 24-72
age_cat		Char	agegrp	Age categories	1 = 20-29 2 = 30-39 3 = 40-49 4 = 50-59 5 = 60-69 6 = 70+
sex	2	Char	gender	Subject gender	1 = Male 0 = Female
educ <sup>‡</sup>	3	Char	cmeduc	Subject highest level of education	1 = High school/GED or below 2 = Two year degree 3 = Four year degree 4 = Graduate degree 5 = Doctorate degree
inter_educ	4	Char	YN	Training in interdisciplinary care in the last five years that discussed ways in which HIV PCPs and case managers can work together to improve patient care	1 = Yes 0 = No

Variable	Item	Type	Format	Meaning	Possible values
yrspicare	5	Num		Years the subject has spent in providing case management	0-40
pspec	6	Char	spec	Primary specialty of the HIV PCP the subject evaluated	1 = Family Medicine 2 = Internal Medicine 3 = Pediatrics 4 = Other 5 = Don't know
pspec_other	6d	Char		Answer provided by subject	
hivspec	7	Char		HIV Specialist status of the HIV PCP the subject evaluated	1 = Yes 0 = No 2 = Don't Know
brdcert	8	Char	brd	Board certification in a sub-specialty of the HIV PCP that the subject evaluated	1 = Infectious Disease 2 = Allergy & Immunology 3 = Hematology/Oncology 4 = Other 5 = None 6 = Don't know
brdcert_other	8e	Char		Answer provided by subject	
pracset	9	Char	type	Subject practice setting	1 = Designated AIDS Center (DAC) Outpatient Clinic 2 = Hospital Outpatient Clinic, non-DAC 3 = Community based organization with primary care on site 4 = Community based organization without primary care on site 5 = Community health center 6 = Substance
status <sup>2</sup>	10	Char	cmstat	Subject discipline	1 = Nursing 2 = Social work 3 = Health educator/treatment adherence counselor 4 = Other 5 = None

Variable	Item	Type	Format	Meaning	Possible values
status_other	10d	Char		Answer provided by subject	
ptcare	11a	Num		Percent of time the subject spends on direct patient care	0-100
ptadmin	11b	Num		Percent of time the subject spends on administration	0-100
prac_time*		Char	timept	Derived variable based on amount of time spent on either patient care, administration, teaching, or research. If subject spent $\geq 50\%$ of time on one of these they are classified into the categories (see next column). Note: Missing values set to zero before	1= Clinician 2 = Administrator 3= Other 4 = Missing
caseload	12	Char	load	Subject HIV caseload (time available based on size of patient caseload)	1 = $\leq 20$ 2 = 21-50 3 = 51-199 4 = $\geq 200$
exec_leader	13	Num		Executive leadership's support of collaborative practice among HIV PCPs and case managers	7 = Very Strongly Agree 6 = Strongly Agree 5 = Agree 4 = Neutral 3 = Disagree 2 = Strongly Disagree 1 = Very Strongly Disagree
protocol	14	Char	YN	Availability of protocols or policies describing the activities and processes that facilitate interdisciplinary service delivery	1 = Yes 0 = No

Variable	Item	Type	Format	Meaning	Possible values
<i>new_protocol</i>		Char	YNM	Because of 10 missing overall, added a category to account for missing	1 = Yes 0 = No 2 = Missing
case_sub	15	Num		Percent of caseload that has an active substance abuse problem	0-100
case_mental	16	Num		Percent of caseload that has a debilitating mental illness	0-100
case_house	17	Num		Percent of caseload that is unstably housed, unemployed or is a single parent	0-100
sev_score*		Char		Variable reflects a severity score= case_sub+case_mental+and case_house Note: Missing values of the variables listed above will result in a missing value for sev_score	2-289
funda	18a	Char		Funding sources that reimburse subject's organization for case management services to HIV-infected persons	1 = Ryan White Part A 0 = No Ryan White Part A
fundb	18b	Char		See 18a - funda	1 = Comprehensive Medicaid Case Management/COBRA 0 = No Comprehensive Medicaid Case Management/COBRA
fundc	18c	Char		See 18a - funda	1 = HIV Special Needs Plans (Medicaid Managed Care) 0 = HIV Special Needs Plans (Medicaid Managed Care)
fundd	18d	Char		See 18a - funda	1 = Medicaid fee for service 0 = No Medicaid fee for service



Variable	Item	Type	Format	Meaning	Possible values
funde	18e	Char		See 18a - funda	1 = Medicaid HIV specialized tiered rate structure (for DACs) 0 = No Medicaid HIV specialized tiered rate structure (for DACs)
fundf	18f	Char		See 18a - funda	1 = Other 0 = No Other
fundf_other	18f	Char		Answer provided by subject	
fundg	18g	Char		See 18a - funda	1 = Don't Know 0 = Know Funding Stream(s)
econ_incent		Char	fund	Incentive based on whether case manager or HIV PCP is reimbursed for working together (e.g., reimbursement for case conference). COBRA (fund2 = 1) is the only true incentive out of the different payors. If receive COBRA + Ryan White Part A (no incentive)	1 = Definite Incentive 2 = Missing 3 = Partial / Mixed Incentive 4 = No Incentive
pi1	20	Num	prof	In past three months, how many times the subject consulted with this HIV PCP to change a patient's plan of care	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi2	21	Num	prof	In past three months, how many times the subject contacted the HIV PCP to discuss any patient-related issue	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi3	22	Num	prof	In past three months, how many times the subject asked the HIV PCP for patient information	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25

Variable	Item	Type	Format	Meaning	Possible values
pi4	23	Num	prof	In past three months, how many times the subject sent patient information to the HIV PCP	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi5	24	Num	prof	In past three months, how many times the subject referred a new patient to this HIV PCP	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi6	25	Num	prof	In past three months, how many times the subject received a referral from the HIV PCP	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi7	26	Num	prof	In past three months, how many times the subject had been contacted by the HIV PCP to discuss any patient-related issue	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi_1-pi_7		Num		if $n$ (of $pi_1$ - $pi_7$ ) $\geq 5$ then replace each missing item response with each individual's mean of $pi_1$ - $pi_7$	1-4
interact*	derived	Num		Professional Interaction Scale: Volume of interaction between the HIV PCP and case manager in the past three months Derived by adding items $pi_1$ - $pi_7$	7-28
dyad_workyrs	27	Num		Time in years the subject has worked with the HIV PCP	0-40
newyrs_dyad		Num		Missing data (nmiss=9) recoded to 3, which is the median dyad_workyrs for both groups.	0.167-15

Variable	Item	Type	Format	Meaning	Possible values
emprotocol	28	Char	YN	Availability of protocols or policies describing the role of the case manager	1 = Yes 0 = No
caseconf	29	Char	YN	Whether the subject attends case conferences, case reviews or interdisciplinary rounds or team meetings on a regular basis with the case manager they evaluated	1 = Yes 0 = No
intermtg	30	Char		Frequency of regularly scheduled interdisciplinary case discussions that are attended by HIV PCPs and case managers held	1 = Never 2 = Weekly 3 = Bi-weekly (every two weeks) 4 = Monthly 5 = Quarterly
electroninfo	31	Char	YN	Availability of electronic information system that allows the subject to share information with the HIV PCP they evaluated	1 = Yes 0 = No
sameorg	32	Char	YN	Subject and HIV PCP work for the same organization	1 = Yes 0 = No
proximity	32	Char	prox	Physical proximity of the subject and the HIV PCP he/she evaluated	1 = Different building 2 = Same building 3 = Same floor 4 = Same suite 5 = Share desk space
trust1	35	Num	Likert	The HIV PCP is credible	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree

Variable	Item	Type	Format	Meaning	Possible values
trust2	36	Num	Likert	The HIV PCP's interactions with the case manager are characterized by open communication of both parties	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust3	37	Num	Likert	The subject can count on this HIV PCP to do what he/she says	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust4	42	Num	Likert	The subject intends to keep working together with this HIV PCP	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust5	43	Num	Likert	The subject trusts this HIV PCP	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree

Variable	Item	Type	Format	Meaning	Possible values
trust6	44	Num	Likert	Communication between this HIV PCP and the subject is two-way	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust_1-trust_6		Num	Likert	If n (of trust1-trust6) ge 4 then replace each missing item response with each individual's mean of trust1-trust6	1-7
rolespec1	34	Num	Likert	In providing patient care, the subject needs the HIV PCP as much as the case manager needs them	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
rolespec2	38	Num	Likert	The case managers depends on the subject as much as the case manager depends on him/her	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree

Variable	Item	Type	Format	Meaning	Possible values
rolespec3	39	Num	Likert	The case manager and the subject are mutually dependent on each other in caring for patients	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
rolespec4	40	Num	Likert	The case manager and the subject negotiate to come to agreement on their activities in managing the care plan	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
rolespec5	41	Num	Likert	The subject will work with the case manager to overcome disagreements on his/her role in managing the care plan	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
role_1-role_6		Num	Likert	If n (of rolespec1-rolespec5) ge 3 then replace each missing item response with each individual's mean of rolespec1-rolespec5	1-7

Variable	Item	Type	Format	Meaning	Possible values
initiate1	45	Num	Likert	The subject spends time trying to learn how he/she can help this HIV PCP provide better care	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
initiate2	46	Num	Likert	The subject provides information to the HIV PCP about specific patients	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
initiate3	47	Num	Likert	The subject shows an interest in helping this HIV PCP improve his/her practice	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
initiate_1-initiate_3		Num		If n (of initiate1-initiate3) ge 3 then replace each missing item response with each individual's mean of initiate1-initiate3	1-7
initiate*	derived	Num		Relationship Initiation Scale: 3 items: initiate_1-initiate_3	3-21
trust*	derived	Num		Trustworthiness Scale: 6 items: trust_1-trust_3	3-21
role*	derived	Num		Role Specification Scale: 5 items: role_1-role_3	3-21

Variable	Item	Type	Format	Meaning	Possible values
cp1	48	Num	Likert	Subject works with the HIV PCP to plan the goals of the care plan for his/her patients	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp2	49	Num	Likert	Decision-making responsibilities for patients' care plan are shared between the HIV PCP and the subject	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp3	50	Num	Likert	There is cooperation between the HIV PCP and subject in managing the care plan of patients	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp4	51	Num	Likert	In making decisions for our patients, case manager and primary care provider opinions are considered	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp5	52	Num	Likert	Decision making for the patient is coordinated between the HIV PCP and subject	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
collab*	derived	Num		Collaborative Practice Scale: 5 items: cp_1-cp_5	5-35
cm_training	19	Char	YN	Case management training provided by the organization	1 = Yes 0 = No



## Data Dictionary for HIV PCP-Case Manager Survey- HIV PCP Version

Updated 3/19/10

\* = Categories are different for HIV PCP and Case Managers

\* = derived variable

Care Plan includes the patient's treatment goals and the activities, resources and medical treatment to achieve them.

Variable	Item	Type	Format	Meaning	Possible values
subno		Num		Subject ID number	1-212
cm		Char	kind	Subject is a case manager	1 = Yes 0 = No
age	1	Num		Subject age in years	18-100
new_age		Num		If missing = age set to 45.28 (mean of PCP group- age appears normal see SAS notes) If age indicated to be $\geq 50$ then age = 54.24 (mean of PCPs $\geq 50$ yo)	Range = 26-70
age_cat		Char	agegrp	Age categories	1 = 20-29 2 = 30-39 3 = 40-49 4 = 50-59 5 = 60-69 6 = 70+
sex	2	Char	gender	Subject gender	0 = Female 1 = Male
educ <sup>+</sup>	3	Char	pcpeduc	Type of Profession	1 = Physician Assistant 2 = Nurse Practitioner 3 = Medical Doctor 4 = Doctor of Osteopathy 5 = Other
ptype_other	3e	Char		Answer provided by subject	
inter_educ	4	Char	YN	Training in interdisciplinary care	1 = Yes 0 = No
yrspicare	5	Num		Years the subject has spent in direct patient care	0-40

Variable	Item	Type	Format	Meaning	Possible values
pspec	6	Char	spec	Subject primary specialty	1 = Family Medicine 2 = Internal Medicine 3 = Pediatrics 4 = Other
pspec_other	6d	Char		Answer provided by subject	
hivspec	7	Char	brd	HIV Specialist status of subject	1 = Yes 0 = No
brdcert	8	Char		Subject board certification in a sub-specialty	1 = Infectious Disease 2 = Allergy & Immunology 3 = Hematology/Oncology 4 = Other 5 = No
brdcert_other	8d	Char		Answer provided by subject	
pracset	9	Char	type	Subject practice setting	1 = Designated AIDS Center (DAC) Outpatient Clinic 2 = Hospital Outpatient Clinic, non-DAC 3 = Community based organization with primary care on site 5 = Community health center 6 = Substance abuse treatment facility with primary care on site
status <sup>‡</sup>	10	Char	stat	Subject academic status	1 = Intern, Resident or Fellow 2 = Part-time, adjunct faculty appointment/voluntary attending 3 = Full-time faculty appointment 4 = No faculty affiliation
ptcare	11a	Num		Percent of time the subject spends on direct patient care	0-100
ptadmin	11b	Num		Percent of time the subject spends on administration	0-100
ptteach <sup>‡</sup>	11c	Num		Percent of time the subject spends on teaching	0-100
ptresearch <sup>‡</sup>	11d	Num		Percent of time the subject spends on research	0-100

Variable	Item	Type	Format	Meaning	Possible values
<i>prac_time*</i>		Char	timept	Derived variable based on amount of time spent on either patient care, administration, teaching, or research. If subject spent $\geq 50\%$ of time on one of these they are classified into the categories (see next column). Note: Missing values set to zero before	1= Clinician 2 = Administrator 3= Other 4 = Missing
<i>caseload</i>	12	Char	load	Subject HIV caseload (time available based on size of patient caseload)	1 = $\leq 20$ 2 = 21-50 3 = 51-199 4 = $\geq 200$
<i>exec_leader</i>	13		Likert	Executive leadership's support of collaborative practice among HIV PCPs and case managers	7 = Very Strongly Agree 6 = Strongly Agree 5 = Agree 4 = Neutral 3 = Disagree 2 = Strongly Disagree 1 = Very Strongly Disagree
<i>protocol</i>	14		YN	Availability of protocols or policies describing the activities and processes that facilitate interdisciplinary service delivery	1 = Yes 0 = No
<i>new_protocol</i>		Char	YNM	Because of 10 missing overall, added a category to account for missing	1 = Yes 0 = No 2 = Missing
<i>case_sub</i>	15	Num		Percent of caseload that has an active substance abuse problem	0-100

Variable	Item	Type	Format	Meaning	Possible values
case_mental	16	Num		Percent of caseload that has a debilitating mental illness	0-100
case_house	17	Num		Percent of caseload that is unstably housed, unemployed or is a single parent	0-100
sev_score*		Char		Variable reflects a severity score= case_sub+case_mental+and case_house Note: Missing values of the variables listed above will result in a missing value for sev_score	2-289
funda	18a	Char		Funding sources that reimburse subject's organization for case management services to HIV-infected persons	1 = Ryan White Part A 0 = No Ryan White Part A
fundb	18b	Char		See 18a	1 = Comprehensive Medicaid Case Management/COBRA 0 = No Comprehensive Medicaid Case Management/COBRA
fundc	18c	Char		See 18a	1 = HIV Special Needs Plans (Medicaid Managed Care) 0 = No HIV Special Needs Plans (Medicaid Managed Care)
fundd	18d	Char		See 18a	1 = Medicaid fee for service 0 = No Medicaid fee for service
funde	18e	Char		See 18a	1 = Medicaid HIV specialized tiered rate structure (for DACs) 0 = No Medicaid HIV specialized tiered rate structure (for DACs)
fundf	18f	Char		See 18a	1 = Other 0 = No Other
fundf_other	18f	Char		Answer provided by subject	

Variable	Item	Type	Format	Meaning	Possible values
fundg	18g	Char		See 18a	1 = Don't Know 0 = Know Funding Stream(s)
econ_incent		Char	fund	Incentive based on whether case manager or HIV PCP is reimbursed for working together (e.g., reimbursement for case conference). COBRA (fund2 = 1) is the only true incentive out of the different payors. If receive COBRA + Ryan White Part A (no incentive)	1 = Definite Incentive 2 = Missing 3 = Partial / Mixed Incentive 4 = No Incentive
pi1	19	Num	prof	In past three months, how many times the subject consulted with case manager to change a patient's plan of care	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi2	20	Num	prof	In past three months, how many times the subject contacted the case manager to discuss any patient-related issue	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi3	21	Num	prof	In past three months, how many times the subject asked the case manager for patient information	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi4	22	Num	prof	In past three months, how many times the subject sent patient information to the case manager	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25

Variable	Item	Type	Format	Meaning	Possible values
pi5	23	Num	prof	In past three months, how many times the subject referred a new patient to this case manager	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi6	24	Num	prof	In past three months, how many times the subject received a referral from the case manager	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi7	25	Num	prof	In past three months, how many times the subject had been contacted by the case manager to discuss any patient-related issue	1 = ≤5 2 = 6-12 3 = 13-24 4 = ≥25
pi_1-pi_7		Num		If n (of pi1-pi7) ≥5 then replace each missing item response with each individual's mean of pi1-pi7	1-4
interact*	derived	Num		<u>Professional Interaction Scale:</u> Volume of interaction between the HIV PCP and case manager in the past three months Derived by adding items pi1-pi7	7-28
dyad_workyrs	26	Num		Time in years the HIV PCP has worked with the case manager	0-40
newyrs_dyad		Num		Missing data (nmiss=9) recoded to 3, which is the median dyad_workyrs for both groups.	0.083-17
cmprotocol	27	Char	YN	Availability of protocols or policies describing the role of the case manager	1 = Yes 0 = No

Variable	Item	Type	Format	Meaning	Possible values
caseconf	28	Char	YN	Whether the HIV PCP attends case conferences, case reviews or interdisciplinary rounds or team meetings on a regular basis with the case manager they evaluated	1 = Yes 0 = No
intermtg	29	Char		Frequency of regularly scheduled interdisciplinary case discussions that are attended by HIV PCPs and case managers held	1 = Never 2 = Weekly 3 = Bi-weekly (every two weeks) 4 = Monthly 5 = Quarterly
electronfo	30	Char	YN	Availability of electronic information system that allows HIV PCP to share information with the case manager they evaluated	1 = Yes 0 = No
sameorg	31	Char	YN	Case manager and HIV PCP work for the same organization	1 = Yes 0 = No
proximity	32	Char	prox	Physical proximity of the HIV PCP and the case manager he/she evaluated	1 = Different building 2 = Same building 3 = Same floor 4 = Same suite 5 = Share desk space
trust1	34	Num	Likert	The case manager is credible	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree

Variable	Item	Type	Format	Meaning	Possible values
trust2	35	Num	Likert	The subject's interactions with the case manager are characterized by open communication of both parties	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust3	36	Num	Likert	The subject can count on this case manager to do what he/she says	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust4	41	Num	Likert	The HIV PCP intends to keep working together with this case manager	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust5	42	Num	Likert	The HIV PCP trusts this case manager's case management expertise	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust6	43	Num	Likert	Communication between this case manager and the HIV PCP is two-way	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
trust_1-trust_6		Num	Likert	if n (of trust1-trust6) ge 4 then replace each missing item response with each individual's mean of trust1-trust6	1-7



Variable	Item	Type	Format	Meaning	Possible values
rolespec1	33	Num	Likert	In providing patient care, the subject needs the case manager as much as the case manager needs them	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
rolespec2	37	Num	Likert	The case managers depends on the subject (HIV PCP) as much as the subject depends on him/her	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
rolespec3	38	Num	Likert	The case manager and the subject are mutually dependent on each other in caring for patients	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
rolespec4	39	Num	Likert	The case manager and the subject negotiate to come to agreement on their activities in managing the care plan	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
rolespec5	40	Num	Likert	The HIV PCP will work with the case manager to overcome disagreements on his/her role in managing the care plan	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
role_1-role_6		Num	Likert	If n (of rolespec1-rolespec5) ge 3 then replace each missing item response with each individual's mean of rolespec1-rolespec5	1-7

Variable	Item	Type	Format	Meaning	Possible values
initiate1	44	Num	Likert	This case manager has spent time trying to learn how he/she can help you provide better care	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
initiate2	45	Num	Likert	This case manager has provider information to the HIV PCP about a specific patient	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
initiate3	46	Num	Likert	This case manager has showed an interest in helping you improve your practice	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
initiate_1-initiate_3		Num	Likert	If n (of initiate1-initiate3) ge 3 then replace each missing item response with each individual's mean of initiate1-initiate3	1-7
initiate*	derived	Num		Relationship Initiation Scale: 3 items: initiate_1-initiate_3	3-21
trust*	derived	Num		Trustworthiness Scale: 6 items: trust_1-trust_3	3-21
role*	derived	Num		Role Specification Scale: 5 items: role_1-role_3	3-21

Variable	Item	Type	Format	Meaning	Possible values
cp1	47	Num	Likert	HIV PCP works with the case manager to plan the goals of the care plan for his/her patients	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp2	48	Num	Likert	Decision-making responsibilities for patients' care plan are shared between the case manager and the HIV PCP	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp3	49	Num	Likert	There is cooperation between the case manager and the HIV PCP in managing the care plan of patients	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp4	50	Num	Likert	In making decisions for our patients, primary care provider and case manager opinions are considered	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp5	51	Num	Likert	Decision making for the patient is coordinated between the case manager and me	1 = Very Strongly Disagree 2 = Strongly Disagree 3 = Disagree 4 = Neutral 5 = Agree 6 = Strongly agree 7 = Very Strongly agree
cp_1-cp_5		Num		if n (of cp1-cp5) $\geq 3$ then replace each missing item response with each individual's mean of cp1-cp5	1-7
collab*	derived	Num		Collaborative Practice Scale: 5 items: cp_1-cp_5	5-35

## Appendix H: Coding for Financial Incentive to Collaborate

Overview: This table outlines the economic incentives for HIV PCPs to work with case managers and vice versa. Main Question: Is there a financial incentive for HIV PCPs or case managers to take time away from other priorities to work collaboratively with

### Economic Barriers/Incentives for Interdisciplinary Collaboration among HIV PCPs and Case Managers

		HIV PCPs		Mechanism by which to bill for HIV PCP participation in interdisciplinary collaborative care with case manager. Example: Billable for case conferring or joint care plan	
Funding Source	Payment Type to provider	Clinic/Organization has mechanisms to bill separately for provider's participation in Case Management Services	No	Yes	
Ryan White Part A (Pre MCM RFP- before 12/1/09)	NA	No	No	No	No mechanism to bill separately for the provision of interdisciplinary care with case managers
Medicaid Comprehensive Medical Case Management (CMCM)/COBRA	NA	No	No	No	No
Medicaid FFS	FFS	No	No	No	No mechanism to bill separately for CM PCPs & CMs @ clinic provide usual medical treatment & medical case management. No financial incentive for collaborative case management.
HIV Special Needs Programs (SNPs - Medicaid HMO plan)	Capitation	No	No	No	PCPs & CMs @ clinic provide usual medical treatment & medical case management. No financial incentive for collaborative case management.
Medicaid Specialized Tiered rate structure (for Designated AIDS Centers(DACs))	Ambulatory Payment Group (APGs)	No	No	No	PCPs & CMs @ clinic provide usual medical treatment & medical case management. No financial incentive for collaborative case management.
Other	NA	NS	NA	NA	Case management services are <b>not billable</b> using Medicaid reimbursement (APGs).

Note: New York State Department of Health AIDS Institute. (2006). Changes to the HIV primary care Medicaid program. Retrieved February 11, 2010. from [http://www.health.state.ny.us/diseases/aids/testing/primarycaremedicaid/docs/pcmp\\_agreement\\_sept2006.pdf](http://www.health.state.ny.us/diseases/aids/testing/primarycaremedicaid/docs/pcmp_agreement_sept2006.pdf).  
 New York State Department of Health AIDS Institute. (2007). COBRA Community Follow-up Program: Program standards. Retrieved February 8, 2010. from <http://www.health.state.ny.us/diseases/aids/standards/cobra/index.htm>.  
 New York State Department of Health AIDS Institute. (2008). HIV special needs plan model contract. Retrieved February 11, 2010. from [http://www.health.state.ny.us/diseases/aids/resources/snps/docs/hiv\\_special\\_needs\\_plan\\_model\\_contract.pdf](http://www.health.state.ny.us/diseases/aids/resources/snps/docs/hiv_special_needs_plan_model_contract.pdf).  
 New York State Department of Health AIDS Institute. (2010). Community supportive services. Retrieved from [http://www.health.state.ny.us/diseases/aids/about/comm\\_support\\_services.htm#cm](http://www.health.state.ny.us/diseases/aids/about/comm_support_services.htm#cm).  
 T. Tate, personal communication, October 7, 2008.

## Economic Barriers/Incentives for Interdisciplinary Collaboration among HIV PCPs and Case Managers

Case Managers		
Payment Type to provider	Clinic/Organization has mechanisms to bill for provider's participation in Case Management Services	Mechanism by which to bill for case manager participation in interdisciplinary collaborative care with case manager. <i>Example: Billable for case conferencing or joint care plan</i>
<p>Cost-based (or line item)</p> <p>Each agency submits a bill for costs incurred in providing funded services</p> <p>The bill is compared against a budget of costs by category</p> <p>Reimbursement is not tied to the performance of services</p> <p>-because is NOT pay for performance</p>	Yes	No mechanism to bill separately for the provision of interdisciplinary care with PCPs
FFS (Fixed hourly fee schedule)	Yes, mechanism to bill separately for interdisciplinary care management with HIV PCPs.	Yes Case conferencing, comprehensive assessment & reassessment (reassessment every 120 days includes case conference with all agencies involved in service plan). Reimbursement is through an hourly rate billable to Medicaid.
None	No No mechanism to bill separately for CM. PCPs & CMs @ clinic provide usual medical treatment & medical case management. No financial incentive for collaborative case management.	No
None	No PCPs & CMs @ clinic provide usual medical treatment & medical case management. No financial incentive for collaborative case management.	No No mechanism to bill separately for the provision of interdisciplinary care with case managers. Patients with intensive need must bill Medicaid CMCM/COBRA
Ambulatory Payment Group (APGs)	No PCPs & CMs @ clinic provide usual medical treatment & medical case management. No financial incentive for collaborative case management.	No Case management services are not billable using Medicaid reimbursement (APGs).
NA	NA	NA

Note: New York State Department of Health AIDS Institute. (2006). Changes to the HIV primary care Medicaid program. Retrieved February 11, 2010. from [http://www.health.state.ny.us/diseases/aids/testing/primarycaremedicaid/docs/pcmp\\_agreement\\_sept2006.pdf](http://www.health.state.ny.us/diseases/aids/testing/primarycaremedicaid/docs/pcmp_agreement_sept2006.pdf).  
 New York State Department of Health AIDS Institute. (2007). COBRA Community Follow-up Program: Program standards. Retrieved February 8, 2010. from <http://www.health.state.ny.us/diseases/aids/standards/cobra/index.htm>.  
 New York State Department of Health AIDS Institute. (2008). HIV special needs plan model contract. Retrieved February 11, 2010. from [http://www.health.state.ny.us/diseases/aids/resources/snps/docs/hiv\\_special\\_needs\\_plan\\_model\\_contract.pdf](http://www.health.state.ny.us/diseases/aids/resources/snps/docs/hiv_special_needs_plan_model_contract.pdf).  
 New York State Department of Health AIDS Institute. (2010). Community supportive services. Retrieved from [http://www.health.state.ny.us/diseases/aids/about/comm\\_support\\_services.htm#cm](http://www.health.state.ny.us/diseases/aids/about/comm_support_services.htm#cm).  
 T. Tate, personal communication, October 7, 2008.

## SAS Coding Syntax for Financial Incentives- Updated 2/27/10

```

data funding;
  set path.rawdata (keep = fund1-fund7 fundf_other);
*Updated 2/27/10 based on feedback from Dr. Campbell
Incentive based on whether CM or HIV PCP is reimbursed for working together
(e.g. reimbursement for case conf)
  see table based on economic incentives to collaborate for more explanation of coding;
*COBRA- has DEFINITE economic incentive for CM to work with PCPs;
  if FUND2 = 1 and fund1= 0 and fund3 = 0 and fund4 = 0 and fund5 = 0
  and fund6 = 0 and fund7 = 0 then ECON_INCENT = 1; /*only receive funding from one
source that has incentive*/
*if RW only then NO INCENTIVE to collaborate with each other;
  else if fund1 = 1 and fund2 =0 and fund3 = 0 and fund4 = 0 and fund5=0
  and fund6=0 and fund7=0 then ECON_INCENT = 4; /*No incentive*/
  else if (fund6 = 1 or fund7 = 1) and (fund1 = 0 and fund2 =0 and fund3 = 0 and fund4 =
0 and fund5=0
  and fund6=0) then ECON_INCENT = 2; /*Missing*/
  else if fund2 = 1 then do;
if fund1 = 1 or fund3 = 1 or fund4 =1 or fund5 =1
then ECON_INCENT = 3; /*partial/mixed incentive*/
end;
  else if fund1 - fund7 = . then ECON_INCENT = .;
  else econ_incent = 4;
  if econ_incent = 4 and (fund6 = 1 or fund7 = 1) then econ_incent = 2;
  if econ_incent = 2 and fundf_other = 'ADAP' then econ_incent = 4;
run;
proc format;
value fund 1 = 'Definite Incentive'
  2 = 'Missing' /*cannot determine incentive*/
  3 = 'Partial/Mixed Incentive'
  4 = 'No Incentive';
run;

```

## Appendix I: Regression Assumptions

**MLR1.** Population model is linear in parameters

$$y = b_0 + b_1x_1 + b_2x_2 + \dots + b_kx_k + u$$

**MLR2.** Random sample of the population

**MLR3.** Zero conditional mean:  $E(u|x_1\dots x_k)=0$

Where the average value of  $u$ , the error term, in the population is 0. This implies that all the independent variables are exogenous. Endogeneity is present if  $x_j$  is correlated with the error term,  $u$ , for any reason. If  $x_j$  is endogenous, all parameter estimates may be biased.

**MLR4. No perfect collinearity**

None of the  $x$ 's is constant, and there are no exact linear relationships among them.

**MLR5. Homoskedasticity:  $\text{Var}(u|x_1\dots x_k)=$**

The expected mean of the error variance  $\sigma^2$ , given  $x$ , is the same for all  $x$ 's. Otherwise, there is heteroskedasticity.

**MLR6. Normally distributed error:  $u \sim N(0, \sigma^2)$**

Assume that  $u$  (error term) is normally distributed with zero mean and variance  $\sigma^2$ :  $u \sim (0, \sigma^2)$

The population error term is independent of explanatory variables and is normally distributed with mean of zero and equal variance.

### Figure 7. OLS Regression Assumptions

Note: From Hutchinson, P. Multiple Regression Analysis: Inference & Hypothesis Testing. Intermediate Research Methods for Health, INHL 725. March 27, 2007. New Orleans, L

## Appendix J: Associations of Collaborative Practice and Context Factors

### Associations of collaborative practice and context factors ( n = 210)<sup>a</sup>

	n	Mean	SD	p-value <sup>b</sup>
Practice Setting	204			
CBO with Primary Care on Site	36	26.75	6.97	
CBO without Primary Care on Site	32	22.97	7.95	
Community Health Center	26	27.42	7.02	
DAC Outpatient Clinic	80	26.44	6.43	
Hospital Outpatient Clinic, non-DAC	27	27.32	7.02	
Substance Abuse Treatment Ctr with PC	3	26.33	9.02	
Principle Role of Provider	201			
Clinician	159	26.30	6.91	
Administrator	30	24.93	7.66	
Other	12	28.25	7.09	
HIV Caseload	202			
<=20	8	23.75	12.27	
21-50	75	25.53	7.11	
51-199	70	27.29	5.16	
>=200	49	26.14	7.95	
Executive Support of Collaboration	203			**
Very Strongly Agree	79	28.23	6.84	
Strongly Agree	54	26.07	6.20	
Agree	41	25.51	6.44	
Neutral	20	21.55	6.39	
Disagree	7	23.00	9.57	
Strongly Disagree	2	17.50	17.68	
Financial Incentive to Collaborate				
Definite Incentive	21	25.48	7.52	
Partial/Mixed Incentive	49	25.53	8.15	
No Incentive	103	27.08	6.65	
Missing Incentive Information	30	24.86	6.15	
Interdisciplinary Protocol	206			
Missing				
Yes	8	25.09	5.17	
No	25	24.68	6.97	
Missing	173	26.52	7.10	

<sup>a</sup> Column totals may not equal total number of participants due to missing values.

<sup>b</sup> p value for F test.

\* p < 0.05.

\*\* P < 0.01.

^ Values in this section are given as the parameter estimate and (standard error).

Note: CBO = Community Based Organization; DAC = Designated AIDS Center.

Note: PC = Primary Care; CM = Case Manager.



**Associations of collaborative practice and context factors ( n = 210)<sup>a</sup>**

	n	Mean	SD	p-value <sup>b</sup>
Protocol Describing Role of CM	201			
Yes	184	26.24	7.07	
No	17	26.76	6.70	
Attends interdisciplinary meetings on regular basis with case manager/PCP evaluated	204			
Yes	160	26.77	6.76	
No	44	24.64	7.72	
Frequency of Scheduled Interdisciplinary Discussions	200			*
Weekly	66	27.29	5.90	
Bi-Weekly	25	26.11	6.91	
Monthly	48	26.77	6.70	
Quarterly	21	28.52	5.52	
Never	40	23.00	8.72	
Electronic Information System Present	204			
Yes	123	26.98	6.93	
No	81	25.19	6.98	
Missing				
Dyad Works for Same Organization	205			*
Yes	156	27.01	6.73	
No	49	24.04	7.35	
Dyad Proximity to One Another	204			*
Different Building	63	24.46	7.46	
Same Building	48	25.60	6.53	
Same Floor	54	27.63	6.81	
Same Suite	39	28.21	6.38	
Continuous Variables <sup>^</sup>				
Caseload Severity Score	202	-0.0007 (0.007)		
Professional Interaction Score	203	0.2876 (0.079)		**
Dyad years worked together	206	0.433 (0.159)		*

<sup>a</sup> Column totals may not equal total number of participants due to missing values.

<sup>b</sup> p value for F test.

\* p < 0.05.

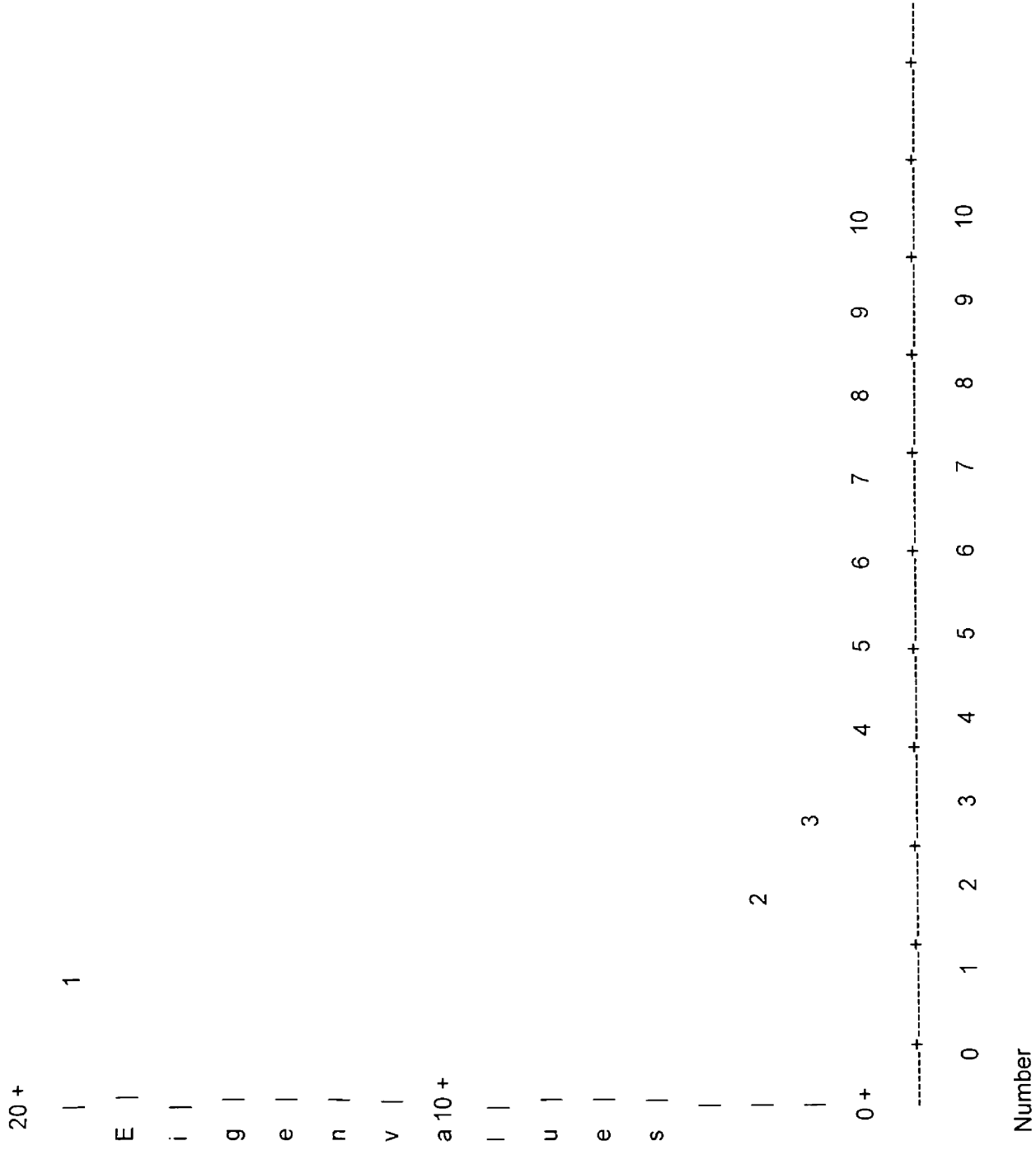
\*\* P < 0.01.

<sup>^</sup> Values in this section are given as the parameter estimate and (standard error).

Note: CBO = Community Based Organization; DAC = Designated AIDS Center.

Note: PC = Primary Care; CM = Case Manager.

# Appendix K: Model 3 EFA Scree Plot



### Appendix L: Model 3 EFA Rotated Factor Pattern

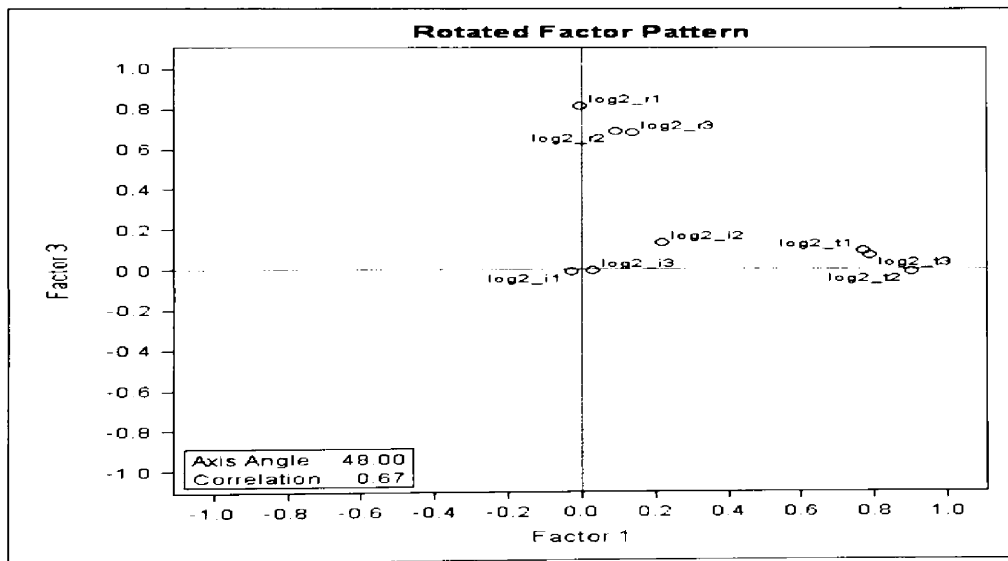
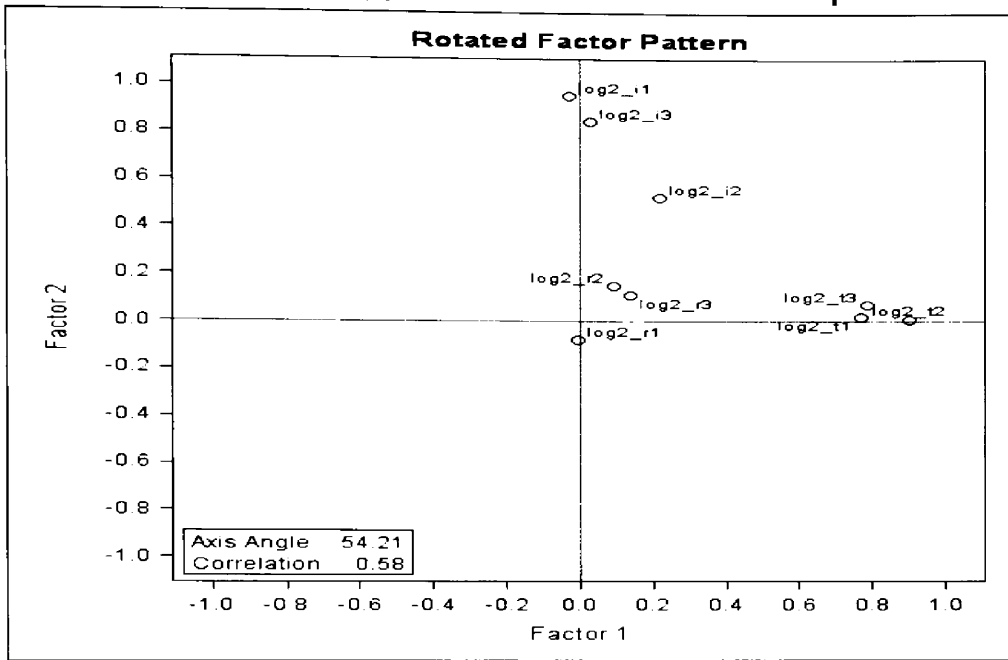
Table D: Model 3 EFA: Rotated Factor Pattern (Standardized Regression Coefficients) With 95% confidence limits; Cover $ *  = 0.4?$ Estimate/StdErr/LowerCL/UpperCL/Coverage Display PCP = Primary Care Provider; CM = Case Manager				
		Factor1	Factor2	Factor3
t2	Interactions characterized by open communication of both parties	<b>0.90208</b>	0.00360	-0.00966
		0.04847	0.03756	0.04715
		0.75012	-0.06989	-0.10174
		0.96355	0.07706	0.08258
		0*[]	[0]*	*[0]
t3	Subject can count on this PCP/CM to do what he/she says	<b>0.78704</b>	0.07193	0.06910
		0.05627	0.04485	0.05739
		0.64915	-0.01630	-0.04379
		0.87485	0.15905	0.18024
		0*[]	[0]*	[0]*
t1	PCP/CM is credible	<b>0.77161</b>	0.01492	0.09217
		0.05795	0.04598	0.06208
		0.63130	-0.07507	-0.03029
		0.86300	0.10466	0.21190
		0*[]	[0]*	[0]*
i1	CM spent time trying to learn how he/she can help	-0.03050	<b>0.95369</b>	-0.01095
		0.03686	0.05165	0.04346
		-0.10245	0.63643	-0.09585
		0.04177	0.99495	0.07411
		*[0]	0*[]	*[0]
i3	CM showed an interest in helping improve your practice	0.02911	<b>0.84561</b>	-0.00441
		0.04818	0.05912	0.05167
		-0.06529	0.68255	-0.10529
		0.12300	0.92847	0.09656
		[0]*	0*[]	*[0]
i2	CM provided info to other about a patient	0.21780	<b>0.52351</b>	0.13181
		0.07553	0.06780	0.07745
		0.06584	0.37832	-0.02190
		0.35989	0.64356	0.27944
		0[]*	0*[]	[0]*
r1	Subject needs PCP/CM as much as the other needs them	-0.00440	-0.08058	<b>0.81383</b>
		0.05115	0.03976	0.06145
		-0.10427	-0.15786	0.65362
		0.09555	-0.00233	0.90423
		*[0]	*[]0	0*[]
r2	PCP/CM depends on subject as much as the subject depends on him/her	0.09491	0.14751	<b>0.68990</b>
		0.06433	0.05826	0.07609
		-0.03202	0.03186	0.51032
		0.21882	0.25927	0.81182
		[0]*	0[]*	0*[]
r3	PCP/CM are mutually dependent on each other in caring for patients	0.14004	0.11183	<b>0.68300</b>
		0.06689	0.05622	0.07627
		0.00724	0.00073	0.50391
		0.26799	0.22021	0.80579
		0[]*	0[]*	0*[]

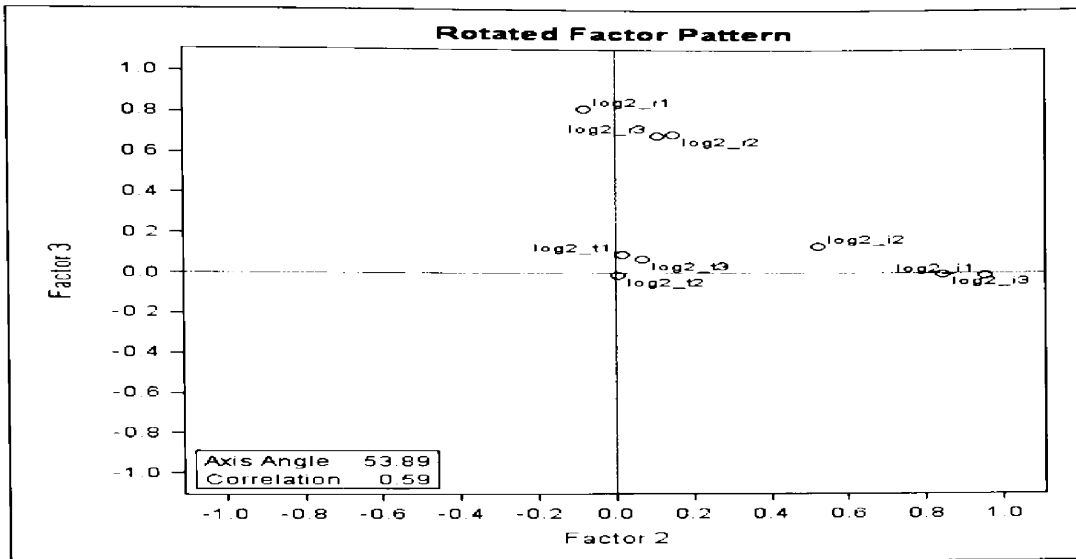


## Appendix M: Model 3 Factor Structure

Table E: Model 3 EFA: Factor Structure (Correlations) With 95% confidence limits; Cover $ *  = 0.4?$ Estimate/StdErr/LowerCL/UpperCL/Coverage Display PCP = Primary Care Provider; CM = Case Manager				
		Factor1	Factor2	Factor3
<b>t2</b>	Interactions characterized by open communication of both parties	<b>0.89771</b>	0.52545	0.59608
		0.02356	0.03619	0.02707
		0.84038	0.45093	0.54041
		0.93518	0.59271	0.64655
		0*[]	0*[]	0*[]
<b>t3</b>	Subject can count on this PCP/CM to do what he/she says	<b>0.87534</b>	0.57292	0.63813
		0.02268	0.03628	0.03065
		0.82277	0.49752	0.57414
		0.91306	0.63973	0.69438
		0*[]	0*[]	0*[]
<b>t1</b>	PCP/CM is credible	<b>0.84200</b>	0.52048	0.61728
		0.02541	0.03583	0.03381
		0.78448	0.44678	0.54662
		0.88516	0.58716	0.67921
		0*[]	0*[]	0*[]
<b>i1</b>	CM spent time trying to learn how he/she can help	0.51990	<b>0.92940</b>	0.53066
		0.03510	0.03095	0.03639
		0.44779	0.83627	0.45563
		0.58530	0.97041	0.59820
		0*[]	0*[]	0*[]
<b>i3</b>	CM showed an interest in helping improve your practice	0.52069	<b>0.86004</b>	0.51340
		0.03532	0.03137	0.03567
		0.44809	0.78464	0.44014
		0.58646	0.91036	0.57986
		0*[]	0*[]	0*[]
<b>i2</b>	CM provided info to other about a patient	0.61216	<b>0.72856</b>	0.58606
		0.04129	0.03424	0.04148
		0.52479	0.65421	0.49888
		0.68677	0.78897	0.66151
		0*[]	0*[]	0*[]
<b>r1</b>	Subject needs PCP/CM as much as the other needs them	0.49304	0.39644	<b>0.76339</b>
		0.03308	0.03559	0.04180
		0.42552	0.32448	0.66845
		0.55510	0.46383	0.83385
		0*[]	0[*]	0*[]
<b>r2</b>	PCP/CM depends on subject as much as the subject depends on him/her	0.64282	0.60958	<b>0.84034</b>
		0.03331	0.04211	0.03145
		0.57283	0.52042	0.76682
		0.70351	0.68559	0.89209
		0*[]	0*[]	0*[]
<b>r3</b>	PCP/CM are mutually dependent on each other in caring for patients	0.66248	0.59623	<b>0.84262</b>
		0.03471	0.04072	0.03085
		0.58890	0.51054	0.77053
		0.72516	0.67020	0.89342
		0*[]	0*[]	0*[]

Appendix N: Model 3 EFA: Oblique Rotation





### Appendix O: Model 3 EFA Final Commonality Estimates

<b>Total Commuality: Weighted = 27.680878 Unweighted = 6.544136</b>		
<b>Variable</b>	<b>Commuality</b>	<b>Weight</b>
t1	0.71435236	3.50097931
t2	0.80593848	5.15305092
t3	0.77423110	4.42904787
i1	0.86468886	7.38982814
i2	0.59198785	2.45113067
i3	0.74014918	3.84862665
r1	0.58715023	2.42164060
r2	0.73067568	3.71323117
r3	0.73496255	3.77333842

<b>Model 3 EFA-CM &amp; PCP</b>		
<b>Variance Explained by Each Factor Eliminating Other Factors</b>		
<b>Factor</b>	<b>Weighted</b>	<b>Unweighted</b>
<b>Factor1</b>	4.59653828	1.04614927
<b>Factor2</b>	6.05354114	1.14163041
<b>Factor3</b>	2.57487623	0.80583013