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FACTORS AFFECTING THE CHANGE IN PATIENT PERCEPTIONS OF PATIENT-CENTRED CARE OVER TIME

Christina Addelaine Bodea

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FACTORS AFFECTING THE CHANGE IN PATIENT PERCEPTIONS OF PATIENT-CENTRED CARE OVER TIME

(Spine title: Change in Patient Perceptions of Patient-Centred Care)

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by

Christina A. Bodea

Graduate Program in Epidemiology and Biostatistics

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SCHOOL OF GRADUATE AND POSTDOCTORAL STUDIES

CERTIFICATE OF EXAMINATION

Supervisor	Examiners
Dr. Moira Stewart	Dr. Bill Avison
Supervisory Committee	Dr. Kathy Speechley
Dr. Neil Klar	Dr. Leora Swartzman
Dr. Amardeep Thind	

The thesis by

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Factors Affecting the Change in Patient Perceptions of Patient-Centred Care over Time

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ABSTRACT

Introduction: The relationship between patient-centred care and health outcomes is important to the development of quality primary care practices. A systematic review of studies that investigated this relationship (since 2000) was conducted to summarize the effects of patient-centred care. Moreover, this review found that the timing of implementing patient-perceived patient-centred care measures relative to the patient-physician interaction in question varied from five days to one year and studies capturing these recalled perceptions did not report on the impact of the timing of measurement, which threatened the validity of their results. Over such varied elapsed time periods, patients' perceptions of the patient-centred care they received from an earlier time point are likely subject to change. Inadequate account of changes in patient perceptions over time may have been in part due to insufficient research on factors affecting recall of patient-centred care. ***Objective:*** To determine the factors that affect changes in patient perceptions of patient-centred care over time using a conceptual framework derived from the cognitive psychologic literature. ***Methods:*** Secondary analysis of patients (n = 315) visiting family physicians (n = 39) practicing in Southwestern Ontario. Patient perception scores of patient-centred care collected at T1 (immediately following the visit) and at T2 (approximately two months later asking patients to recall the patient-centredness of their visit at T1) both using the 14-item PPPC allowed for the study of change in patient perceptions over time. ***Analysis:*** ANCOVA was used on a sample of 253 patients from 32 physicians to test three main hypothesized effects: (1) elapsed time, (2) post-T1 health visits, and (3) change in symptom discomfort on change in patient perceptions from T1 to T2, controlling for clustering and additional covariates. ***Results:*** The main effects were not significantly related to changes in patient perceptions; however, among the covariates, patients' who perceived more negatively of their health at T2 and were more anxious at T1 had a significantly greater change in their perceptions. ***Conclusions:*** Studies implementing patient perception measures later in time relative to the patient-physician interaction in question should consider the potential for the above-mentioned factors to impact changes in patients' perceptions of patient-centred care.

Key Words: patient-centred care, change in perceptions, recall, primary care

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LIST OF ABBREVIATIONS

95% CI	95% Confidence Interval
ANCOVA	Analysis of Covariance
CCFP	Certification from the College of Family Physicians
CFCP	College of Family Physicians of Canada
FP	Family Physician
HP	Health Provider other than Family Physician
MPPC	Measure of Perceptions of Patient-Centred Care (audiotape measure)
PCC	Patient-Centred Care
PPPC	Patient Perceptions of Patient-Centred Care Questionnaire
PPPC1	PPPC completed at T1
PPPC2	PPPC completed at T2
T1	Immediately following the index visit with the FP (i.e. baseline)
T2	Approximately two months following T1 (i.e. follow-up period)
SD	Standard Deviation
SF-20	Measures of Outcome Study Short Form Survey-20
VAS	Visual Analog Scale

CHAPTER ONE
INTRODUCTION

1.1 DEFINING PATIENT-CENTRED CARE

Effective communication between patients and physicians is vital to the quality of patient care. Patient-centred care is one aspect through which the quality of patient-physician communication is measured. Patient-centred care represents a holistic concept that embraces the philosophy of respecting the patient's perspective and circumstances, and involving the patient in the decision-making process. A review[1] of the literature on patient-centred care found that the most comprehensive definition was provided by Stewart and colleagues[2]. This particular patient-centred clinical model is defined through six dynamic and interconnecting components: (1) exploring both the disease and the illness experience; (2) understanding the whole person; (3) finding common ground regarding management; (4) incorporating prevention and health promotion; (5) enhancing the patient-physician relationship; and (6) being realistic about personal limitations and issues such as the availability of time and resources (see Figure A.1).

1.2 FINDINGS FROM STUDIES RELATING PATIENT-CENTRED CARE TO OUTCOMES

Patient-centred care can be measured by clinical observation (i.e. with the use of audiotapes or videotapes) or by patient perceptions. Specifically, patient perceptions of patient-centred care are meaningful[3] and are the primary focus of the Ontario Health Quality Council due to their impact on outcomes such as patient adherence to medical advice[4,5], patient complaints[6], malpractice claims[7,8], and most importantly, the actual health and functional status of patients[9,10,11]. A review of the recent literature relating patient-centred care to health outcomes was conducted in this thesis (Chapter 2) and highlights the results of ten of twelve observational studies and five of eight experimental studies for which patient perceptions of patient-centred care were obtained. Overall, eight of these fifteen studies of strong to moderate quality reported significant findings relating patient-centred care to various objective and subjective health outcomes, which included:

glycosylated haemoglobin and triglyceride levels; chest pain; symptom burden; anxiety; depression; and well-being (see Tables 2.3 and 2.8).

A noteworthy finding from these studies was the variation in the timing of implementing their patient-centred care measures relative to the timing of experiencing the patient-physician interaction. Only a select few commented on the influence of obtaining recalled reports of patient-centred care over periods ranging from five days to one year; however, none reported an assessment of the validity of their measure in relation to the timing of its implementation. This raised a critical question to the pursuit of this thesis: would recalling patient-centred care experiences over such varied periods of time influence the validity of these studies' results?

1.3 DETERMINING THE MAGNITUDE OF THE PROBLEM

Several studies have examined whether and how patient characteristics such as age, race/ethnicity, gender, socioeconomic status, physical and mental health status, attitudes, and expectations of care may also influence patient perceptions of quality of care[12]. Overall, research indicated that older patients reported more positively about their care, and similarly, patients in better health (which can be defined to include not only physical health status but also less disability, higher quality of life, and less psychological distress) reported higher ratings of their care. However, two concerns arose from these findings: one, these results are specifically related to patient satisfaction, a different form of patient perception of care from that of patient-centred care[13]; and two, these findings show that systematic differences in patient reports of quality care exist even in the absence of patient recollection over time.

The concern over systematic differences existing when patients recalled the quality of care they received at a later point time from the time of their patient-physician interaction was addressed in only one study that we could find. Jackson and colleagues[14] found that patient ratings of the quality of the visit, measured by patients' satisfaction, went up over time: 52% of patients rated their overall care as excellent immediately post-visit, 59% gave an excellent rating two weeks later, and 63% gave this rating three months later. Of greater interest was that there was some change in the determinants of satisfaction, and of dissatisfaction, over these three points in time. For example, patients with a shorter symptom duration, whose symptoms had improved, who were less worried about having a serious illness and had not required another physician visit were more satisfied two weeks and three months later. Therefore, over time from the patient-physician interaction itself, patients' satisfaction with the quality of care they received shifted to the course and impact of their symptoms.

In addition, there has been limited research of factors which contribute to bias due to differential recall between cases and controls. A review[15] of the literature found the following variables worthy of concern for influencing patients' recall of a variety of exposures: the time interval since exposure; the degree of detail required; patient characteristics such as age, education and socioeconomic status; the significance of the past events; the social desirability of the exposure; and the interviewing technique (i.e. including supplementary devices that cue the patient to the original event in question).

Few publications were found that reported on the consistency of patients perceptions over time of the quality of their visit, none of which directly pertained to patient-centred care. However, what was found in studies of satisfaction and in a review of epidemiologic studies was that there was no one factor that drove patient recalled reports; rather, different studies reported different factors. How these factors, and many others elucidated from additional research of patient-physician interactions (Chapter 3), link together and present themselves in the cognitive psychologic literature was integral to the development of a conceptual framework (Chapter 4) for answering this research question. Memory recall and the processes through which memory works have been extensively examined in this literature. Therefore, this body of literature was sought to understand how variables affected the processes of memory through which distortions of patient perceptions of patient-centred care may arise.

1.4 SUMMARIZING THE OBJECTIVE OF THIS RESEARCH

The preliminary investigations of Chapters 3 and 4 proved that numerous variables directly and indirectly affected the encoding, retention and retrieval memory processes and therefore, were worthy to consider with respect to recall of experiences. Furthermore, the literature from Chapter 3 on recall of patient-perceived quality care and specifically patient-physician interactions provided critical evidence that patient perceptions are not consistent over time. In the context of patient-centred care, determining the change of patients' perceptions over time is of paramount importance for developing a health care system that is perceived as high quality. For that reason, retrospective studies must thoroughly consider the implications of recall bias. This is especially critical for studies that investigate patient-centred care in family practices, the gateway to our health care system.

Therefore, this thesis seeks to investigate patient, physician, and visit-related factors, supported by previous literature, that contribute to patients' change in perceptions of their patient-physician experience. The data are from a previously published study[16] which was actually one of the twelve observational studies reviewed in the systematic review (Chapter 2) in which the effect of patient-centred care in family practice was investigated in relation to health outcomes. This study is unique from the remaining eleven observational studies in that it measured both the immediate patient-centred care perceptions following the visit and approximately two-months following the visit with family physician, which allows for the measurement of change in perceptions. Results of this thesis investigation will serve to inform future studies that seek to measure recalled patient perceptions of patient-centred care regarding the validity of their results.

1.5 THESIS OUTLINE

This thesis has been prepared in integrated-article (manuscript) style and consists of seven chapters and five appendices. Chapter 1 has provided a brief introduction to the problem and the research contained within the thesis. A comprehensive definition of patient-centred care is illustrated in Appendix A. Chapter 2 is the first manuscript: a systematic review of the health care literature that explores the relationship of patient-centred care to patient health outcomes. It serves as a platform for Chapter 3, which addresses how the timing of measures of patient-centred care relative to the time of a health care visit has been found to be affected by patient memory recall, which in turn affects the validity of the results of the studies included in Chapter 1. Chapter 3 highlights the thesis rationale i.e. the focus on memory recall. Chapter 4 outlines the general theory of memory recall from the cognitive psychologic literature. The chapter closes with the three main hypotheses tested in the thesis. Chapter 5 describes the methodology of the study presented in Chapter 4 and additional supporting data is provided in Appendix B. Chapter 6 is the second manuscript and the results of this thesis. Chapter 7 is an amplification of the discussion of the results and a synthesis of all aspects of the thesis. Appendices C-E present additional results alluded to in Chapters 6 and 7.

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CHAPTER TWO

PATIENT-CENTRED CARED AND HEALTH-RELATED OUTCOMES: A SYSTEMATIC REVIEW OF EXPERIMENTAL AND OBSERVATIONAL STUDIES

2.1 INTRODUCTION

Patient-provider communication is of paramount importance to the quality of care in a medical visit. One commonly researched and strongly endorsed dimension of patient-provider communication, specifically in primary health care, has been patient-centred care. Patient-centred communication is often contrasted with a biomedical, or 'doctor-centred' communication style, which encompasses a disease-oriented approach to patient problems and a doctor-centred method to decision-making[1]. The universal key to patient-centred care, however, is to develop common ground with patients for integrated management of their illnesses. Research in recent years has produced evidence that patient-centred approaches can increase patient satisfaction, adherence to treatment, result in fewer diagnostic tests and unnecessary referrals[2,3,4]. Furthermore, a number of studies have shown significant correlations between specific elements of communication and such outcome measures as anxiety, psychological distress, and improvement of symptoms[5,6,7,8].

Literature that has examined the relationship between patient-centred care and patient health outcomes is of value to medical educators and primary care practitioners because it attests to the extent to which impact quality provider communication can have on patient health. However, previous reviews remarked that the evidence for the benefits of patient-centred care on health outcomes from 30 years of literature was ambiguous and was supported by methodologically weak observational studies[9,10]. In addition, only a few rigorous trials of adequate quality demonstrated positive patient health outcomes among intervention groups receiving some form of patient-centred care training[11]. These reviews to date have all contested that previous studies lacked explicit theoretical framework that justifies the link between the patient-provider communication element measured and the patient health outcome(s) of interest.

The movement towards patient-centred care is now well established in primary care with a new body of literature to answer the question of whether patient-centred visits lead to improved patient health outcomes. Therefore, the aim of the present review is to elucidate this question from both observational and experimental studies conducted in the last ten years based on the a priori definition of ‘patient-centredness’, as defined by the Patient-Centred Care Clinical Model of Stewart, Brown, Weston, McWhinney, McWilliam and Freeman[4]. Currently, Mead contends that this model provides the most comprehensive description of patient-centredness, which proposes six interrelated dimensions: (1) exploring both the disease and the illness experience; (2) understanding the whole person; (3) finding common ground regarding management; (4) incorporating prevention and health promotion; (5) enhancing the patient-doctor relationship; (6) being realistic about personal limitations and issues such as the availability of time and resources (see Figure A.1). Classifying the studies included in this review based on these Patient-Centred Care components, as reflected in their patient-provider communication measure (for observational studies) or patient-centred interventions (for experimental studies), will provide a new lens through which to assess the studies, while maintaining a unifying expression of patient-centred care for the patient-provider communication review literature.

2.2 METHODS

2.2.1 Search Strategy

Relevant studies published from 1997-2007 in peer-reviewed journals were systematically selected from the MEDLINE, PsycINFO, and Science Direct on-line databases. The key search terms used included: “patient-centred care”, “patient-physician relationship”, “patient-provider relationship”, “patient-physician communication”, “doctor-patient communication” and “patient-provider communication”. Bibliographic lists of all selected articles were searched for further references.

A preliminary examination of available abstracts was conducted to assess the nature of the provider-patient interaction and the outcome being measured. Full reports were obtained to conduct a more thorough assessment of studies that appeared to meet the majority of the inclusion criteria. Two authors (Dr. Stewart and I) independently reviewed the degree to which the selected articles met the inclusion criteria and any disagreements were resolved by discussion. Among the 20 studies identified using the final selection criteria, there was agreement on 19, giving a reliability of 95%.

2.2.2 Inclusion Criteria

From the retrieved articles, studies were selected for inclusion if they met the following criteria:

1. Primary or secondary medical or nursing care settings where interactions between health providers and patients were empirically studied either through experimental or observational designs. Health providers could have represented family physicians, specialists (i.e. specialists working in secondary care), residents, and nurses. No restrictions were placed on the type of illness presented to the health provider by the patient.

2. At least one health-related outcome was assessed in relation to the patient-provider interaction and was not required to be the primary outcome of interest. This outcome may have been either subjectively or objectively measured and could have represented physiological as well as psychological aspects of health, such as functional health status, symptom resolution, pain, and anxiety.

3a. All observational studies had to evaluate the patient-provider interaction through either subjective or objective measures.

3b. All experimental studies had to emphasize altering the interaction between the patient and health provider. No restrictions were placed on the type of intervention used or to whom the intervention was applied (i.e. patient, health provider, or both the patient and provider). Randomized and non-randomized designs were both included.

4a. The dimension of patient-provider interaction measured in all observational studies had to reflect at least one of the six Patient-Centred Care components.

4b. Interventions altering the interaction between the patient and health provider had to incorporate at least one of the six Patient-Centred Care components.

2.2.3 Data Extraction

For both observational and experimental studies, the following information was extracted and recorded on standardized forms: setting; number of patients and the number of clusters (i.e. of practices, medical units, etc.); type of health outcomes and aspect of provider communication measured; component(s) of Patient-Centred Care measured, based on the model of Stewart and colleagues; length of follow-up; methods; information regarding intervention and control group descriptions (if applicable); and variables used to control for confounding.

2.2.4 Assessment of Study Quality

The methodologic quality of the selected studies was examined using the Quality Assessment Tool for Quantitative Studies[12] developed by the Effective Public Health Practice Project, Canada. This standardized assessment tool was judged suitable to be used in systematic reviews of effectiveness[13] and can be used for randomized controlled trials (RCTs), quasi-experimental studies and uncontrolled studies. Content and construct validity had been established[13].

The format of the Quality Assessment Tool was a checklist with additional summary judgment. The following six criteria were ranked as "strong", "moderate" or "weak" for each of the studies according to the proposed guidelines[12]: selection bias; allocation bias; confounders; blinding of outcome assessors (if applicable); data collection methods; and withdrawals and drop outs. An overall assessment of "strong", "moderate", or "weak" quality was summarized based on the individual rankings of the above-mentioned criteria. In order for a study to be rated as "strong", four of the six quality assessment criteria had to be rated as strong, with no weak ratings. A rating of "moderate" was achieved if less than four criteria were rated strong and one criterion was rated weak. A rating of weak was given if two or more criteria rated weak. Two reviewers (Andrea Burt from the Centre for Studies in Family Medicine and I) independently rated all relevant articles for quality and differences in scoring were resolved by discussion. These summary ratings were meant to readily interpret the quality of each study; however, they should be interpreted in consideration of all of the design and methodological components[14] tabulated in Tables 2.1, 2.2, 2.4, 2.5, 2.6, and 2.7.

2.2.5 Analysis

Meta-analysis was not undertaken because the studies varied substantially in terms of study design, settings and participants, interventions assessed (where applicable), process and outcome measurements, methodologic quality, and completeness of data reporting.

First, this review provided summaries of the study design characteristics, interventions, and process and outcome measures separately for each of the included experimental, observational cohort and cross-sectional studies using three tables (Tables 2.1, 2.4, and 2.5). Second, this review provided summaries of the methodological quality characteristics of each of these groups of studies (Tables 2.2, 2.6 and 2.7). Finally, this review provided overall quality ratings of experimental and observational studies (Tables 2.3 and 2.8). The overall quality ratings were stratified according to the combination of Patient-Centred Care components incorporated in either the interventions or reflected in the process measures. Specifically for observational studies, overall quality ratings were first determined separately within either the cohort or cross-sectional studies. However, quality ratings were adjusted for cross sectional studies to take in to account their weaker study design when comparing between cohort and cross-sectional studies, as shown in Table 2.8. Stronger study designs and methodologies were presented in ascending order in each of these eight tables.

Interpretation of the effect of patient-centred care on health outcomes was directed by the findings of studies for which strong or moderate quality ratings were observed, and furthermore, for which a health outcome was the principal outcome of interest for both the experimental and observational studies. Lesser quality studies were not as thoroughly interpreted due to their greater presence of bias which could over-estimate or under-estimate the effect reported.

2.3 RESULTS

2.3.1 Search Strategy

The electronic database and bibliographic search identified approximately 8,000 articles. Based on the abstracts of these 8,000 articles, 33% were not empirical, 29% clearly did not evaluate a health outcome and 37% were based on relationships with other health care providers (i.e. chiropractors, physiotherapists, dentists, etc.). Therefore, full text screening of eighty-eight studies was conducted to further evaluate the nature of the patient-provider relationship discussed in the abstracts and to assess their eligibility for inclusion in the review. Twenty (23%) of the 88 studies met all four inclusion criteria (see Section 2.2). Sixty eight studies were excluded for the following main reasons: a health-related outcome was not evaluated (n = 29); technical aspects of care (i.e. reorganization of hospital services) were assessed in relation to health outcomes (n = 25); and an interaction, either visit-specific or more generally between a patient and a health provider was not emphasized (n = 14).

Of the twenty studies reviewed, twelve (60%) represented observational studies. These included six cohort studies[*] and six cross-sectional studies[†]. One particular cohort study[24] separately evaluated the effect of two different measures of patient-centred care on patient health outcomes and therefore, was analyzed as two separate studies. The remaining eight studies included seven randomized-controlled studies[15-21] and one quasi-experimental study[22].

2.3.2 Participants and Settings

Tables 2.1, 2.3, and 2.5 highlight key sample characteristics of the reviewed studies. In general, the study populations were very heterogeneous. Fifty-five percent of all

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[*] 23, 24, 27, 28, 29, 32

[†] 25, 26, 30, 31, 33, 34

studies were conducted internationally, nine of which were carried out in Europe[э] and two in Asia[22, 25]. Among the North American studies, one was carried out in Canada[24].

Among the observational studies, three cohort studies[23,28,32] and four cross-sectional studies[25,30,33,34] were conducted in a hospital or health centre setting in comparison to three cohort studies that were conducted in general practices[24,27,29]. Two of the cross-sectional studies sampled nationwide household adults[26] and statewide adult workers[31] and therefore, the setting was non-specific. Nonetheless, both studies evaluated patient-centred care in the context of a specific patient-physician relationship. Similarly, among the experimental studies, only two were carried out in general practices[15,16], whereas the remaining six studies were set in hospitals and health centres[17-22]. Therefore, 65% of included studies examined dimensions of patient-centred care in the context of hospital care.

Approximately 15,000 patients participated, with the largest contributors from the two population-based studies[26,31]. Tables 2.1, 2.4 and 2.5 show the variation in patient groups in the types of illnesses presented to their health provider for experimental, cohort and cross-sectional studies, respectively. Six of the 12 observational studies (five cross-sectional studies[‡] and one cohort study[27]), accepted patients with non-specific illnesses. Of the remaining observational studies, three sampled patients with chronic illnesses (i.e. diabetes and cancer)[23,25,32], two sampled patients with acute illnesses[24,28] and one admitted patients with a new episode of care[29]. In contrast, six of the eight patient groups in the experimental studies represented patients with chronic illnesses such as: diabetes, cardiac disease, and chronic musculoskeletal pain[15-19,22]. The remaining two experimental studies had no patient-illness specifications[20,21]. Therefore, eight (40%) of the total 20 studies reviewed surveyed patients with non-specific illnesses.

[э] 15, 16, 17, 18, 27, 29, 30, 32, 33

[‡] 26, 30-34

2.3.3 Quality Assessment of Experimental Studies

Results of the quality of the study design and methodology from Tables 2.1 and 2.2 and a final summary of the overall quality ratings presented in Table 2.3 is provided below for the experimental studies.

Study Design, Selection Bias, and Control for Clustering Effect

Among the eight experimental studies, four types of designs emerged from the review contributing to varying strengths of patient sample selection: multi-centre cluster-randomized trials (four studies[15-18]); single-centre cluster randomized trials (two studies[20,21]); single-centre patient randomized trials (one study[19]); and quasi-experimental design (one study[22]). Summaries of study characteristics in Tables 2.1 and 2.2 were stratified according to these four designs. Table 2.2 shows that five of these eight studies failed to mention the number of patients approached to participate, which hindered the credibility of sufficient control of selection bias. Furthermore, among clustered sampling designs, only three of the six studies performed sufficient analyses to control for this effect[16,17,21].

Units of Randomization and Allocation Bias

Table 2.1 shows the various units of randomization used in the seven relevant studies, of which included: the physician/resident for three studies[18,20,21]; the practice/health centre for three studies[15-17]; and the patient for one study[19]. Furthermore, in Table 2.2, the method of random allocation and concealment of the treatment allocation at randomization was reasonably described for only two of the remaining seven studies[15,16]. Therefore, control for allocation bias could not be adequately assessed for five of the seven studies.

Control for Confounders and Data Collection Methods

Table 2.2 shows that comparison of patient characteristics between intervention and control groups was not reported for three studies[18,20,22] and therefore, control for confounders could not be assessed. One additional study reported differences between groups for two confounders; however, they were not adequately managed in the analysis[15].

A wide variety of both subjectively and objectively-measured health outcomes were used in the reviewed studies, all of which provided references to their validity and reliability. Therefore, Table 2.2 shows 7 of eight experimental studies with strong report of their data collection methods.

Assessment of Interventions and Blinding

Table 2.1 shows that four studies targeted patient-centred interventions to health providers (i.e. physicians, residents, and nurses)[15,16,18,20], two studies targeted patient-centred interventions only to patients[21,22], and two studies targeted patient-centred interventions to both patients and health providers[17,19]. Intervention training for health providers included receiving prompt cards and leaflets, attending seminars and participating in group discussions. In contrast, the training directed towards only patients involved both group and individual sessions addressing psychosocial, treatment and management concerns. In addition, one study administered a pre-visit questionnaire to the intervention group to elicit patient-centred concerns and evaluate the degree to which the physicians met these concerns during the visit[21]. The objective of most interventions aimed towards both the health providers and patients was to elicit mutual discussion, develop a partnership, deliver clear information, and offer support. The control groups represented patients receiving conventional care. All of the interventions incorporated at least two of the Patient-Centred Care components, primarily components (1) and (3).

The application of the patient-centred related intervention was not evaluated for two studies[17,22]. Table 2.1 shows that for five studies[16,18-21], however, patient-perceived ratings of the communication with their health providers after the intervention was obtained, while one study used a direct audiotape measure of the consultation[15]. The validity of the self-administered questionnaires evaluating the integrity of the intervention among three of the five studies was not reported.[16,19,20].

Among studies that evaluated objective health outcomes, it was not possible to determine if the outcome assessors were blinded to the patients' intervention status for three of the six applicable studies[17,18,22] as shown in Table 2.2.

Withdrawals, and Intention-to-Treat Analysis

Table 2.2 shows that a moderate percentage of patients completed the trials ranging from 70% to 98% for the intervention and control groups. The quasi-experimental study however, reported a 58% loss-to-follow up due to the lengthy 12-month trial period. Intention-to-treat analysis was adequately performed for six of the eight studies.

2.3.4 Overall Quality Rating Classified by the Patient-Centred Care Components

Table 2.3 shows that six of the eight studies, with ranging overall quality ratings from strong[15,16], moderate[17,18,19] to weak[20], incorporated Patient-Centred Care components (1) and (3) in their interventions (refer to Section 2.1 for explanation of components). The principal health outcome of interest for the two strong quality-ranked studies was glycosylated hemoglobin. Neither of these studies demonstrated a significant association favouring the intervention group for this principal outcome. However, one study[17] demonstrated a significant association favouring the intervention group for secondary health outcomes, which included triglyceride and cholesterol levels as well as the patient's wellbeing.

The effect of the intervention on the process of the patient-physician interaction was also found to be significant for the principal outcome of two[17,19] of the three moderate quality-ranked studies. For both of these studies, the principal outcome was objectively measured. Moreover, for 4 of the 5 experimental studies that were either of strong or moderate overall quality, which incorporated Patient-Centred Care components (1) and (3), these studies were found to be significantly associated with the intervention group for either the principal outcome[17,19] or the secondary outcomes[16,18].

One of the eight experimental studies[21] incorporated three Patient-Centred Care components (1, 2, and 3), which had an overall moderate quality rating and showed significant associations favouring the intervention group for the secondary outcomes only. However, for the final of the eight experimental studies[22], four Patient-Centred Care components (1, 2, 3, and 4) were incorporated in the intervention. This particular study received an overall weak quality rating and therefore, its significant effect on glycosolated haemoglobin for the intervention group was cautiously interpreted.

Based on the rigorous assessment of the quality of the eight experimental studies, overall evidence from the six (75%) of the eight studies (two studies[15,16] with strong quality ratings and the four studies with moderate quality ratings[17,18,19,,21]) support the effect of patient-centred care on patient health outcomes. This support is based on the studies which measured at least two components of the Patient-Centred Care model (1) and (3) in either primary[15-18,21] or secondary medical[19] care settings.

2.3.5 Quality Assessment of Observational Studies

Results of the quality of the study design and methodology for cohort studies (based on Tables 2.4 and 2.6) and for cross-sectional studies (based on Tables 2.5 and 2.7) are summarized below in Sections 2.3.5.1 and 2.3.5.2 respectively. Following is a summary of the overall quality ratings presented in Table 2.8 for all observational studies.

2.3.5.1 Assessment of the Methodologic Quality of the Cohort Studies

Study Design, Control for Clustering Effect and Selection Bias

Table 2.4 shows that patients analyzed in four of the six cohort studies were clustered within either: family physicians[24,27], health centres[23], or hospitals[28]. However, as shown in Table 2.6, only two of the four studies[24,29] adequately reported controlling for the clustering effect.

Table 2.6 shows that three of the six cohort studies[24,27,28] reported moderate control of selection bias, ranging in response rates from 62% to 76%; however, the remaining studies did not report on the percentage of patients who agreed to participate. Furthermore, two of those three remaining studies[29,30] failed to provide patient non-response analysis in order to ensure that the target patient population was adequately represented.

Data Collection Methods and Control for Confounding

Based on Table 2.4, three categories of patient-provider communication and patient health outcome measures emerged from the review: objective ascertainment of patient-provider communication and subjective ascertainment of health outcomes[24,29,32]; subjective ascertainment of patient-provider communication and objective ascertainment of health outcome[24]; and subjective ascertainment of patient-provider communication and subjective ascertainment of health outcomes[24,27,28]. Summaries of study characteristics in Table 2.4 were stratified according to these three process and outcome measure categories. One study[24] evaluated the relationship between patient-centred care and health outcomes using both a subjective and objective measure, and therefore, the results of these effects were examined separately. All communication measures, two of which included newly developed and piloted measures[25,27], demonstrated good reliability ratings ranging from a Cronbach's alpha of 0.7 to 0.9. A variety of subjective health measures were used, which predominately assessed general health status, commonly evaluated with the SF-36 measure. Overall, data collection methods were adequately reported for all cohort studies. Confounders were adequately controlled in analyses of five[23,24,27,28,29] of the six cohort studies.

Follow-up and Withdrawals

Table 2.4 shows the follow-up period for the six studies ranged from two weeks to 12 months and therefore, varying percentages of patient withdrawals were reported from strong[23], moderate[24,27,32] to weak[28,29]. Table 2.6 shows that the range of patients completing the study was from 27% to 72%.

2.3.5.2 Assessment of the Methodologic Quality of the Cross-Sectional Studies

Study Design, Control for Stratification/Clustering and Selection Bias

Table 2.5 shows the six cross-sectional studies included population-based probability sampling[26,31], multi-centre clustered[30,33,34] and single-centre physician clustered[25] sampling designs. Summaries of study characteristics in Table 2.5 were stratified according to these three designs. Table 2.7 shows that three studies reported controlling for stratification[26,34] and the effect of clustering[25]. Remaining studies that sampled patients from hospitals, for which the patient was the unit of analysis, failed to report adjusting for the clustering effect[30,33]. For one study, the medical unit within the hospital was the unit of analysis[35].

Table 2.7 shows that four[25,30-33] of the six studies reported adequate response rates ranging from 64% to 86%; however, due to either reported differences in characteristics of the respondents versus the non-respondents or failure to report a non-response analysis, these studies were ranked as only moderately controlling for selection bias. The percentage of individuals selected to participate was not reported for the remaining two studies[26,34]; however, one study[34] was directed at nationally-sampled adults across the United States, where the denominator would not be known and therefore, not applicable for quality review.

Data Collection Methods and Control for Confounding

Table 2.7 shows that all six studies reported strong data collection methods, for which evidence was provided to support the reliability and validity of provider communication and health outcome measures. As shown in Table 2.5, The Picker Inpatient Questionnaire[35] was the measure of choice to assess hospital patient-centredness among two studies[30,34].

The relationship between provider communication and health outcomes was assessed using the Structural Equation Modeling (SEM) statistical technique for two studies[33,34], and therefore, SEM was considered to take account of confounders. Remaining studies adequately reported confounders and appropriately adjusted for them using multivariate statistical techniques.

Withdrawals

Five[25,26,30-33] of the six studies reported a moderate to strong percentage of participants completing the studies, as would be expected of cross-sectional study designs.

2.3.6 Overall Quality Rating Classified by the Patient-Centred Care Components

Table 2.8 shows that four of the 12 observational studies (two cohort studies[23,24] and two cross-sectional studies[25,26]) incorporated Patient-Centred Care components (1) and (3) in the provider communication measures (refer to Section 2.1 for explanation of components. The remaining eight studies incorporated Patient-Centred Care components (1), (2) and (3). One study[24] captured components (1) and (3) in the patient-perceived patient-centredness measure and also captured components (1), (2) and (3) using the audiotape measure[36] of patient-centred care. For ease of comparing studies in this section, this particular study will represent two studies, allowing for a total of 13 studies to be summarized in this section.

Overall, nine[23-25,27-31] of the thirteen studies were found to be of moderate quality, which was the highest quality rating given among the observational studies. Three of the eight studies which captured Patient-Centred Care components (1) and (3) were all shown to have significant associations with their principal outcome of interest. Of the remaining six studies, which captured Patient-Centred Care components (1), (2) and (3), only three[27,28,30] studies were shown to have significant associations with the principal health outcomes. The remaining three studies of moderate quality were shown to have no significant associations for the secondary outcomes as well. Examples of outcomes for which associations were found included: glycosolated hemoglobin, symptom recovery, anxiety, symptom burden, physical and mental health, and overall health. Therefore, the majority of these outcomes for which associations were found were subjectively measured.

Based on the rigorous assessment of the quality of the thirteen observational studies (twelve of which are unique), overall evidence from six[23-25,27,28,30] (46%) of the thirteen studies with moderate quality ratings support the effect of patient-centred care on patient health outcomes. This support is based on the studies which measured at least two components of the Patient-Centred Care model (1) and (3) in either primary[24,27] or secondary medical[23,25,28,30] care settings.

2.3.7 Summary of Experimental and Observational Study Findings

These descriptive analyses based on results from Tables 2.1 to 2.8 report that among the 21 studies (20 of which are unique) of either experimental or observational study design, fifteen (71%) studies were of adequate quality. Only two[15,16] of these 15 studies, which were both multi-centre cluster-randomized trials, received overall strong quality ratings. The remaining 13 studies were of moderate quality, which were of the following study designs: randomized controlled trials[17,18,19,21] (n = 4); cohort studies[23,24,27,28,29] (n = 6); and cross-sectional studies[25,30,32] (n = 3). Overall, 12 (80%) of these 15 studies (14 of which are unique) demonstrated significant associations between patient-centred care and health outcomes. Six of these twelve studies were randomized controlled trials, four of these twelve studies were cohort studies and the remaining two studies were cross-sectional studies. Components (1) and (3) from the Patient-Centred Care Model were incorporated in all six interventions and all six process measures in the observational studies. Outcomes were diverse across studies and were measured both objectively and subjectively.

2.4 DISCUSSION

This review found that the empirical research from the last ten years demonstrated strong support for the association of patient-centred care with patient health outcomes from 12 (86%) of the 14 unique and methodologically sound studies (i.e. strong and moderate quality). Furthermore, six of these 12 studies demonstrated support for this effect through randomized controlled trials, which is worthy of note since selection bias and unknown confounders were additionally controlled for in such studies as compared to observational studies.

In addition, this review found that the effect of patient-centred care on patient health outcomes has expanded beyond the primary health care setting and has been evaluated in the context of many diverse patient-provider relationships. Specifically among hospital settings and disease-specific centres, more emphasis has been placed on the delivery of nontechnical aspects of care to promote a range of long-term patient health outcomes, such as symptom recovery and improved quality of life, in addition to intermediate patient health outcomes, such as anxiety reduction. Furthermore, there should be an appreciation for the research of the population-based studies[26,31] included in this review, since the relationship of patient-centred care on health outcomes has not been explored in such a manner before.

As contested in previous reviews[9-11], patient-centred care has adapted many different meanings for different health professionals such as physicians, specialists, and nurses working in different settings such as general practices, disease-specific centres or hospitals. Therefore, the heterogeneous sources of patient populations included in this review resulted in an inconsistent operationalization of patient-centred care. Although a valid attempt was made in this review to classify studies according to the Patient-Centred Care components established by Stewart and colleagues in order to provide a unifying definition of patient-centred care, it does not, however, exempt the majority of studies for failing to provide adequate theoretical framework of their own. On the other hand, there is something to be said for the fact that all studies incorporated at least components (1) and (3) of the Patient-Centred Care model in either the intervention protocol or the communication process measure. These two dynamic and interlinked components, exploring the illness experience and finding common ground, represent the universal underpinnings of patient-centred care[10]. The findings from this review suggest that among the strong and moderate quality studies, strong associations between patient-centred care and health outcomes were found among studies that incorporated only components (1) and (3); however, results from studies that incorporated additional components, such as (2) and (4), did not produce as consistent of results. One potential explanation for this finding is that the operationalization of understanding the whole person (2) and incorporating health promotion and prevention (4) is under-researched in health care and may not be of common practice for understanding patient-centred care. Nonetheless, these components are integral to the delivery of patient-centred care according to Stewart et al, and should be considered in future research.

There is currently no single obvious candidate tool for assessing the quality of both experimental and observational epidemiological studies[45]. Assessment of study quality and susceptibility to bias in this review was carried out using one dynamic tool[12], which adequately distinguished between the quality of reporting and the quality of what was actually performed in the design, conduct and analysis for both experimental and observational studies. This tool was selected based on demonstrated merit, in addition to incorporating a summary judgement checklist that concentrated on the principal potential sources of bias in a study's finding. Reviewers of quality assessment tools have suggested that qualitative as compared to quantitative summary scores may be less prone to inappropriate analysis[45,46]. Although the tool used in this review has been recommended for systematic reviews of public health promotion literature with differing study designs[47], the author considered its use appropriate since the effect of patient-centred care was explored in relation to the health of patients from a variety of medical care centres. A different tool may have been more sensitive in differentiating the quality of studies, which may have facilitated a weighting of study results and provided more conclusive outcomes.

The primary contributing factor for the weak quality ratings among both experimental and observational studies was inadequate reporting of control of selection bias. Moreover, lack of concealment of allocation in randomized clinical trials can invite selection bias; this explains why the quality of several included randomized trials was hindered due to failure of even reporting the method of random allocation. Future randomized trials investigating the effect of patient-centred-driven interventions on patient health outcomes in health care research should place more emphasis on the reporting of the random allocation process in order to more definitely address the likelihood of bias. Among observational studies, reporting of differences between participating and non-participating patients was weak. To facilitate judgements about representativeness and cross-study comparison, future research should present details about these groups of participants.

Due to the nature of health care research, generating patient data that is clustered per practice or per physician is inevitable. Seven studies in this review failed to take into account the clustered structure of the study design during the planning phase of the study, which can lead to underpowered study designs in which the effective sample size and statistical power to detect differences are smaller than planned[47]. Furthermore, ignoring the intracluster correlation in the analysis could lead to incorrect significant values, confidence intervals that are too small, and biased estimates and effect sizes, all of which can lead to incorrect interpretation of associations between variables[48]. Therefore, future studies should not overlook both the special analysis challenges and the unique opportunities inherent with clustered data.

The strengths of the review included using a comprehensive search strategy that enabled studies to be selected based on strict inclusion criteria. Efforts were made to include unpublished papers presented in annotated bibliographies; however the inclusion criteria were not met for these obtained unpublished studies. Furthermore, the interpretability of the results from this review was improved, in comparison to previous reviews, by explicitly linking elements of patient-provider communication measures and intervention protocols to the multi-dimensional model of patient-centred care proposed by Stewart and colleagues. Finally, the quality of each study was rigorously examined using a quantitative assessment tool that discriminated between studies of varying susceptibility to bias to more adequately interpret the effect of interest. However, the heterogeneity of the patient and physician populations limited the analysis and generalizability of the results.

2.5 CONCLUSIONS

This review found evidence that supported patient-centred interventions and patient-centred communication by health providers on patient health outcomes in randomized controlled trials and observational studies. Therefore, data from this systematic review suggest that patient-centred care delivered in primary, secondary, and tertiary care settings may have potential short and long term health value to patients. Since the studies reviewed were of generally moderate quality, particularly those of randomized controlled trials, conclusions of this review were adequately supported. Future studies should emphasize robust, well-designed randomized controlled trials to test claims that additional components of the patient-centred care model, such as understanding the whole person and incorporating health promotion and prevention in addition to exploring the illness experience and finding common ground, indeed have a positive effect on patient health outcomes. Therefore, it is imperative that future research explores the different inter-related dimensions of patient-centred care to gain a stronger appreciation for their dynamic roles in improving patients' health.

Table 2.1 Design Characteristics of Experimental Studies (n = 8)

Study	Objectives	Cluster unit & number I:C	Patient number I:C	Patient Group	Setting	Partici-pant group receiving I	I & C Group Descriptions	Aspect of provider communication measured (Name of measure)	Health Outcomes measured (Name of measure)	Length of Follow-up
Multi-centre Cluster-Randomized Trials: Adequate report of random allocation*										
Kin-month et al, 1998[16]	**1.Test effect of PC training on patient physiological and psychological status**	General Practices 21:20	199:161	Type 2 diabetes	UK	GPs Nurses	I: Theoretical, practical PC consulting, support sessions, behaviour change booklet for GPs C: Similar support sessions only	Doctor/Nurse Communication (study-specific scale)	*1. HbA1c* *2. Plasma cholesterol* *3. triglyceride levels* *4. BMI* 5. Functional, psychological status (ADDQoL, Wellbeing Q)	12 month post-visit
Pill et al, 1998[15]	**1. Test effect of training in a PC intervention on patient outcomes**	General Practices 15:14	95:95	Type 2 diabetes	UK	GPs Nurses	I: PC communication skills training using prompt cards, roleplay, discussion of patient care plans C: Diabetes leaflets, bimonthly newsletters	Physician initiation of change in patient health behaviour (audiotape measure)	*1. HbA1c* *2. Blood pressure* 3. Overall, physical, mental health status (SF-36)	2 years post-visit
Multi-centre Cluster Randomized Trials: No report of method of random allocation										
Horn-sten et al, 2005[17]	**1. Test effect of PC intervention than conventional diabetes care with regard to patient metabolic control, well-being,** and treatment satisfaction	Health centres 4:4	44:60	Type 2 diabetes	Sweden	Nurses Patients	I: Discussions regarding patients' personal understanding of illness in care planning & consultations (nurses); Group sessions exploring illness understanding (patients) C: Usual Care	Not Evaluated	*1. HbA1c* *2. triglycerides* *3. Cholesterol* *4. BMI* 5. Overall Well-being (Wellbeing Q) 6. Diabetes complication symptoms (DSC)	12 months post-visit
Alamo et al, 2002[18]	1. Test effectiveness of PC consultations than usual care **2. Test differential physical and psychological characteristics between I & C groups**	GPs 10:10	63:46	CMP/F	Spain	GPs	I: PC communication skills training using prompt cards C: Usual Care	Physician communication skills (GATHA-RES rating scale)	*1. Number of tender points (Radiological exam)* 2. Health status (NHP) 3. Intensity of Pain (VAS) 4. Psychological disturbance (GSAD)	12 month post-visit
Single-centre Cluster Randomized Trials: No report of method of random allocation										
Honn-berger et al, 1997[21]	1. Test effect of pre-visit Q to increase GP awareness of patients' concerns on visit duration, content of discussion, satisfaction **2. Test differences in health outcomes between I & C group**	GPs 5:5	96:105	Regularly seen patients	US	Patients	I: Pre-visit concern form administered to patients and discussed with physician during visit C: Usual care	Frequency of nontechnical services provided (Patient Concerns Form)	1. Overall, physical, mental health status (SF-36) 2. Anxiety, depression (HADS)	Post-visit

Table 2.1 continued.

Study	Objectives	Cluster unit & number I:C	Patient number I:C	Patient Group	Setting	Participant group receiving I	I & C Group Descriptions	Aspect of provider communication measured (Name of measure)	Health Outcomes measured (Name of measure)	Length of Follow-up
Single-centre Cluster Randomized Trials continued: No report of method of random allocation										
Smith et al, 1998[20]	1. Test effect of PC training program on residents' attitudes **2. Test effect of PC training on patients' physical, psychological wellbeing and satisfaction with care**	Residents 31:32	124:128	Standardized & actual resident patients	US	Residents	I: Theoretical, practical PC training in interviewing using physician-patient relationship model C: Usual care	Physician interviewing behaviour (study-specific scale)	1. Health status (GHQ, FHS)	3 months post-visit
Single-centre Individual Randomized Trial: No report of method of random allocation										
Trummer et al, 2006[19]	**1. Test effect of PC training skills on patient outcomes** 2. Examine how these effects can be explained as unspecific or specifically related to the informational or emotional quality of the provider-patient communication	N/A	97:98	Patients who underwent 4 standard cardiac surgeries	Austria	GPs Nurses Patients	I: Sessions in biological, psychological, sociological topics (provider); Discussions regarding treatment process and active participation C: No comparison group	Perceived Quality and Emotional quality of provider communication (study-specific scale)	*1. Incidence of post-operative complications* 2. Pain Status (VAS) 3. Overall, physical, mental health status (SF-36)	1 day pre-discharge
Quasi-Experimental Design										
Prueksaritanond et al, 2004[22]	**1. Test effect of PC on Type 2 diabetes patients**	N/A	78	Type 2 diabetes	Thailand	Patients	I: Group sessions and workshops exploring nature of illness, drug compliance, nutrition, exercise C: No comparison group	Not Evaluated	*1. FPG* *2. HbA1c* *3. Cholesterol* 4. Symptoms of diabetes	12 month post-visit

Note: Bolded objectives represent relevant objectives for review; Italicized health outcomes represent objectively measured health outcomes; * Assessment of the method of random allocation was based on the guidelines of the Quality Assessment Tool for Quantitative Studies 2003[12] (Adequate = report of central randomization, opaque sealed and sequentially numbered envelopes, random numbers table or computer and central office).

I: Intervention Group; C: Control Group; PC: Patient-centred care; Q: Questionnaire; HbA1c: glycosylated hemoglobin; BMI: Body Mass Index; ADDQoL: Audit of Diabetes-Dependent Quality of Life; CMP/F: Chronic musculoskeletal pain/Fibromyalgia; NHP: Nottingham Health Profile; VAS: Visual Analog Scale; GSAD: Goldberg Scale of Anxiety and Depression; GATHA-RES: G-General Data, A-Attitude/behaviour of interviewer, T-communication task, HA-interviewing skills, RES-residents; HADS: Hospital Anxiety and Depression Scale; GHQ: General Health Questionnaire; FHS: Functional Health Survey; DSC: Diabetes Symptoms checklist, FPG: Fasting plasma glucose.

Table 2.2 Quality of Methodological Characteristics of Experimental Studies (n = 8)

Study	Results*	Selection Bias (% patients agreed to participate)	Allocation Bias	Controlled for Confounders	Blinding of outcome assessors	Data Collection Methods	Withdrawals and Drop-outs (% of patients completing the study)	Intention -to-Treat Analysis	Control for Cluster Effect
Multi-centre Cluster-Randomized Clinical Trials:									
Pill et al, 1998[15]	1, 2, 3. Clinical and functional health status measures did not significantly differ between IG & CG	Moderate (83%)	Strong (Reported concealed method of random allocation)	Weak	Strong	Strong	Strong (81% IG, 93% CG)	Performed	No
Kinmonth et al, 1998[16]	1, 2. NS differences reported between IG & CG 3, 4. Lower triglyceride levels & BMI favoured the CG 5. Higher Wellbeing scores favoured the IG$^+$	Weak (Not Reported)	Strong (Reported concealed method of random allocation)	Strong	Strong	Strong	Moderate (71% IG, 67% CG)	Performed	Yes
Hornsten et al, 2005[17]	1, 2, 3. Lower HbA1c, triglycerides, cholesterol levels favoured the IG$^+$ 4, 5, 6. NS differences reported between IG & CG	Weak (51%)	Weak (No report of method of allocation)	Strong	Not Reported	Strong	Strong (90% IG, 98% CG)	Performed	Yes
Alamo et al, 2002[18]	1. Reduction in number of tender points favoured the IG$^+$ 2, 3. NS differences reported between IG & CG 4. Reduction in anxiety favoured the IG$^+$	Weak (Not Reported)	Weak (No report of method of allocation)	Not Reported	Not Reported	Strong	Moderate (76% IG, 70% CG)	Performed	No
Single-centre Cluster-Randomized Clinical Trials:									
Hornberger et al, 1997[21]	1. NS differences reported between IG & CG 2. Lower anxiety$^+$ and depressive scores favoured the IG	Strong (95%)	Weak (No report of method of allocation)	Strong	Not Applicable	Strong	Strong (94% overall reported)	Performed	Yes
Smith et al, 1998[20]	1. Physical and psychological health status measures did not significantly differ between IG & CG	Weak (Not Reported)	Weak (No report of method of allocation)	Not Reported	Not Applicable	Strong	Not Reported	Not Reported	No
Single-centre Individual Randomized Clinical Trials:									
Trummer et al, 2006[19]	1. Incidence of post-surgery complications occurred less frequently in IG$^+$ 2, 3. Self-assessed health, pain status did not significantly differ between IG & CG	Weak (Not Reported)	Weak (No report of method of allocation)	Strong	Weak	Moderate	Moderate (80% IG, 77% CG)	Not Reported	N/A
Quasi-experimental design:									
Prueksa-ritanond et al, 2004[22]	1, 2. Mean FPG and HbA1c significantly decreased over 12 months$^+$ 3, 4. NS reduction in cholesterol and diabetes symptoms reported	Weak (Not Reported)	N/A	Not Reported	Not Reported	Strong	Weak (42% overall reported)	Performed	N/A

Note: * Numbers in the results section for each study correspond to the numbered health outcomes from Table 2.1;$^+$ Significantly favoured IG ($p<0.05$) in expected direction.

NS: Non-significant ($p>0.05$); IG: Intervention Group; CG: Control Group.

Table 2.3 Overall Quality Ratings of Experimental Studies based on Patient-Centred Care Components Incorporated in the Interventions (n = 8)

Study	Overall Quality Ratings*	Principal Outcome		Other health outcomes		Associations favouring IG⁺		
		Objective	Subjective	Objective	Subjective	Principal outcome	Other outcomes: Objective	Other outcomes: Subjective
Patient-Centred Care Components (1), (3)								
Pill et al, 1998[15]	Strong	-HbA1c		-BMI -BP -Clinical complications	-overall, physical, mental health status	NS	NS	NS
Kinmonth et al, 1998[16]	Strong	-HbA1c		-Cholesterol -Triglyceride -BMI	-Functional, psychological status -Well-being	NS	-Triglycerides -BMI	-Wellbeing
Hornsten et al, 2005[17]	Moderate	-HbA1c		-Triglycerides -Cholesterol -BMI	-Wellbeing -Symptom complications	-HbA1c	-Triglycerides -Cholesterol	NS
Alamo et al, 2002[18]	Moderate		-Pain Intensity	-Number of tender points	-Number of symptoms -Anxiety -Depression -Health profile	NS	-Number of tender points	-Anxiety
Trummer et al, 2006[19]	Moderate	- Incidence of post-operative complications			-Pain -overall, physical, mental health status	-Incidence of post-operative complications		NS
Smith et al, 1998[20]	Weak		*-Residents' attitudes toward training program*		-Wellbeing	N/A		NS
Patient-Centred Care Components (1), (2), (3)								
Hornberger et al, 1997[21]	Moderate		*-Types of topics discussed during visit*		-Anxiety -Depression	N/A		-Anxiety -Depression
Patient-Centred Care Components (1), (2), (3), (4)								
Prueksari-tanond et al, 2004[22]	Weak	HbA1c		-Cholesterol	-Diabetes symptoms	HbA1c	NS	NS

Note: Italicized outcomes represent non-health related principal outcomes of interest; * Determined from the Effective Public Health Practice Project Quality Assessment Tool 2003[12]; ⁺ Significant associations favouring the intervention group (IG) at $p<0.05$ presented.

NS represents outcomes non-significantly associated with the IG; HbA1c: glycosylated hemoglobin; BMI: Body Mass Index; BP: Blood pressure; N/A: results not applicable (outcome is not health-related).

Table 2.4 Design Characteristics of Cohort Studies (n = 6)

Study	Objectives	Cluster unit & number	Patient number analyzed	Patient Group	Setting	Aspect of provider communication measured (Name of measure)	Reliability of communication measure	Health outcome(s) measured (Name of measure)	Length of Follow-up
Objective ascertainment of PCC& subjective ascertainment of health outcomes; Clustering effect present									
Stewart et al, 2000[24]	**Test effect of the degree of PC of doctor-patient communication on:** **1. patient recovery** and 2. subsequent medical care	FPs 39	315	First episode of acute illnesses	Canada	Patient-centred communication (Audiotape Measure of Patient-Centred Communication Score)	Interrater reliability = 0.69-0.91[24,36,37]	1. Overall, physical, and mental health status (SF-36) 2. Recovery from symptom discomfort (VAS)	2 months post-visit
Ong et al, 2000[32]	1. Test relationship between doctors' and patients' communication during oncology visit and patients' QOL and satisfaction **2. Test relationship between oncologists' PC and patients' QOL and satisfaction**	Oncolo-gists 11	96	Cancer (Non-specific)	Amsterdam	Oncologist's patient-centredness (Roter Interaction Analysis System)	Interrater reliability = 0.68-1[38]	1. Psychological and physical distress, global evaluation of life (RSC)	3 months post-visit
Objective ascertainment of PCC& subjective ascertainment of health outcomes; Clustering effect not present									
Kinnersley et al, 1999[29]	**Test effect of PC consulting on:** 1. patient-perceived doctor-patient agreement, patient satisfaction, **2. resolution of symptoms,** resolution of concerns, & **functional health status**	FPs 143	143	New episode of care	UK	Patient-centred communication (Audiotape Measure of Patient-Centred Communication Score)	Interrater reliability = 0.69-0.91[, 36,37]	1. Functional health status (COOP/WONCA charts) 2. Resolution of symptoms	2 weeks post-visit
Subjective ascertainment of PCC & objective ascertainment of health outcome; Clustering effect not present									
Williams et al, 1998[23]	**1. Test effect of patient perceptions of autonomy supportiveness (i.e PC) from diabetes care providers on glucose control**	Diabetes Centre 1	128	Type 1, 2 diabetes	US	Perceptions of health providers' (physician, nurse, dietician) autonomy supportiveness (MHCCQ)	Cronbach's α = 0.8[23]	1. HbA1c levels	12 months post -study start date

Table 2.4 continued.

Study	Objectives	Cluster unit & number	Patient number analyzed	Patient Group	Setting	Aspect of provider communication measured (Name of measure)	Reliability of communication measure	Health outcome(s) measured (Name of measure)	Length of Follow-up
Subjective ascertainment of PCC & subjective ascertainment of health outcomes(s); Clustering effect present									
Fremont et al, 2001[28]	**1. Test association between patient-reported problems with nontechnical aspects of hospital care and patient health status, cardiac symptoms**	Hospitals 23	762	Acute MI	US	Nontechnical aspects of hospitalization care (Picker Inpatient Questionnaire)	Cronbach's α = 0.7[35]	1. Overall, physical, and mental health (SF-36) 2. chest pain & shortness of breath (Modified London school of hygiene measures)	12 months post-discharge
Little et al, 2001[27]	**1. Measure patient perceptions of PC and the relation to health outcomes**	General Practices 3	661	Non-specific illnesses	UK	Perception of physician's consultation approach (Study-specific scale)	Cronbach's α = 0.87-0.92[39]	1. Symptom burden (MYMOP)	1 month post-visit
Stewart et al, 2000[24]*	**Test effect of the degree of PC of doctor-patient communication on:** **1. patient recovery** and 2. subsequent medical care	FPs 39	315	First episode of acute illness	Canada	Patient-centred communication (Patient Perceptions of Patient-Centred Care Scale)	Cronbach's α = 0.71[40,41]	1. Overall, physical, and mental health status (SF-36) 2. Recovery from symptom discomfort (VAS)	2 months post-visit

Note: * Stewart et al.[24] evaluated patient-centred communication both subjectively (patient perceptions) and objectively (audiotape measure) in relation to the health outcomes and therefore is represented twice in this table.

PC: Patient-centred care; FPs: Family Physicians; MI: Myocardial Infarction, HbA1c: glycosylated hemoglobin; VAS: Visual Analog Scale, MYM OP: Measure Yourself Medical Outcome Profile; RSC: Rotterdam Symptom Checklist, MHCCQ: Modified Health Care Climate Questionnaire, QOL: Quality of Life.

Table 2.5 Design Characteristics of Cross-Sectional Studies (n = 6)

Study	**Objectives**	**Sample Design & stratum/ cluster unit**	**Patient number analyzed**	**Patient Group**	**Setting**	**PCC**	**Aspect of provider communication measured (Name of measure)**	**Reliability of communi-cation measure**	**Health Outcome(s) measured (Name of measure)**	**Time period reflecting process/outcome data**
Population-based probability sampling: Nationally-representative data										
Rutten et al, 2006[26]	**Examine differences in patient perceptions of health care provider communication by:** 1. sociodemographic, 2. health care access, and **3. health status variables**	DSRS Households	4528	Adults having seen FP in last 12 months	US	1, 3	Perceptions of quality provider communication behaviour (adopted items from CAHPS for HINTS)	Cronbach's α = 0.82[26, 42]	1. Perceived health status 2. Cancer history 3. Depressive symptoms (items adopted from NHIS 1997)	Over 12 months pre-study/Study start-date (current)
Population-based probability sampling: State-representative data										
Safran et al, 1998[31]	**Test the association between 7 elements* of primary care and:** 1. patients' adherence 2. patient satisfaction **3. improved health outcomes**	SRS 12 State Health Plans	6024	Massachu-setts state employees	US	1, 3	Patient-Provider Communication (PCAS)	Cronbach's α = 0.74-0.95[43]	1. Physical health, mental health (SF-12)	Entirety of patient-provider relationship/4 years pre-study
Multi-centre cluster sampling design										
Bechel et al, 2000[34]	**Test association between:** **1. PC hospital units and better patient health outcomes** 2. PC hospital units and lower cost 3. Hospital units with better outcomes and lower costs	20 Michigan Hospitals	200	Discharges from medical, surgical, obstetric hospital units	US	1, 2, 3	Hospital patient-centredness (PIQ)	Cronbach's α = 0.7[35]	1. Unexpected deaths (APRDG) 2. Unexpected complications (RACI)	2 months-post discharge/12 months pre-study start date
Covinsky et al, 2000[30]	**Examine differences in quality of communication during hospitalization and health outcomes** 1. between men and women **2. for all patients**	27 Cleveland Hospitals	502	MI discharge diagnosis	US	1, 2, 3	Quality of communication during hospitalization and at discharge (PIQ)	Cronbach's α = 0.7[35]	1. Physical health, mental health (SF-36)	3 months post-discharge
Suhonen et al, 2007[33]	**Test relationship between individualized care and patient:** 1. satisfaction 2. autonomy **3. Health-related quality of life**	6 Hospitals	861	Discharges from medical, surgical, obstetric hospital units	Finland	1, 2, 3	Individualised nursing care (Individualised Care Scale)	Cronbach's α = 0.91-0.94[33, 44]	1. Perceived health-related Quality of Life (15D questionnaire)	End of hospital period, pre-discharge

Table 2.5 continued.

Study	Objectives	Sample Design & stratum/ cluster unit	Patient number analyzed	Patient Group	Setting	PCC	Aspect of provider communication measured (Name of measure)	Reliability of communi-cation measure	Health Outcome(s) measured (Name of measure)	Time period reflecting process/outcome data
Single-centre cluster sampling design										
Tomoko et al, 2001[25]	**1. Test relationship between patients' perceptions of physicians' communication styles and patient anxiety levels**	13 oncologists	138	Cancer (Non-specific)	Japan	1, 3	Perceptions of physician's communication Style (study-specific scale)	Cronbach's α = 0.73-0.9[25]	1. Patient anxiety (STAI)	Post-visit

Note: * 7 elements of care as defined by the Primary Care Assessment Survey (PCAS) include: accessibility, continuity, comprehensiveness, integration of care, clinical interaction (clinician-patient interaction), interpersonal treatment and trust.

FP: Family Physician; PC: Patient-centred care; MI: Myocardial Infarction; HINTS: Health Information National Trends Survey; NHIS: National Health Interview Survey; APRDG: All-Patient-Refined Diagnosis-related group; RACI: Risk-Adjusted complications Index; STAI: State Trait Anxiety Inventory Scale; PIQ: Picker Inpatient Questionnaire; DSRS: Disproportionate stratified random sampling (oversampling of Blacks and Hispanics[27]); SRS: Stratified random sampling.

Table 2.6 Quality of Methodological Characteristics of Cohort Studies (n = 6)

Study	Results*	Selection Bias (% patients agreed to participate)	Patient Non-respondent Analysis (Variables for which differences were reported)	Controlled for Confounders	Data Collection Methods	Withdrawals and Drop outs (% of patients completing the study)	Unit of Analysis	Controlled for Clustering Effect
Little et al, 2001[27]	1a. Positive and clear approach to problem associated with less symptom burden^{+} 1b. Personal relationship with FP associated with greater symptom burden	Moderate (76%)	Performed (age, gender, marital status)	Strong	Strong	Moderate (66%)	Patient	Inadequate
Stewart et al, 2000[24]	NS associations reported between audiotaped PC scores and: 1. health status 2. recovery from symptom discomfort Positive patient perceptions of PC associated with: 1. better emotional health^{+} 2. better recovery from symptom discomfort^{+}	Moderate (72%)	Not Reported (Physician non-respondent analysis performed only)	Strong	Strong	Moderate (68%)	Patient	Adequate
Fremont et al, 2001[28]	1. Patients with worse care had poorer a) overall health, b) physical health^{+} 2. Patients with worse care experienced greater odds of having chest pain^{+}	Moderate (62%)	Performed (age, comorbidity, hospital transfers, coronary artery procedures)	Strong	Strong	Weak (42%)	Patient	Inadequate
Williams et al, 1998[23]	1. Perceived autonomy support associated with reduction in HbA1c^{+}	Not Reported	Performed (age, race, number of complications, number of visits to centre before study)	Strong	Strong	Strong (86%)	Patient	Not Applicable
Kinnersley et al, 1999[29]	NS associations reported between PC scores and: 1. functional health status (5 dimensions) 2. resolution of symptoms	Not Reported	Not Reported (Physician non-respondent analysis performed only)	Strong	Strong	Weak (27%)	Patient	Not Applicable
Ong et al, 2000[32]	1. Doctor mean cure:care ratio (measure for patient-centredness) was 2:4:1, implying that during the visit, 2.5 more time was spent on 'cure-type' than 'care-type' behaviour	Not Reported	Not Reported	Not Reported	Strong	Moderate (72%)	Patient	Inadequate

Note: * Numbers in the results section for each study correspond to the numbered health outcomes from Table 2.4; $^{+}$ Significant association ($p<0.05$) in expected direction.

NS: Nonsignificant associations; PC: patient-centre care, HbA1c: glycosylated hemoglobin;

Table 2.7 Quality of Methodological Characteristics of Cross-Sectional Studies (n = 6)

Study	Results*	Selection Bias (% patients agreed to participate)	Patient Non-respondent Analysis (Variables for which differences were reported)	Controlled for confounders	Data Collection Methods	Withdrawals and Drop outs (% of patients completing the study)	Unit of Analysis	Controlled for stratification / clustering effect
Suhonen et al, 2007[33]	1. A low significant association was found between individualized care and perceived health-related quality of life^{+}	Moderate (82%)	Performed (age, gender, education)	Strong	Strong	Strong (80%)	Patient	Inadequate
Covinsky et al, 2000[30]	Patients reporting 1+ problems with: 1a. hospitalization and 1b. discharge communication had lower physical and mental scores vs. patients with no problems^{+}	Moderate (64%)	Performed (no differences)	Strong	Strong	Strong (85%)	Patient	Inadequate
Tomoko et al, 2001[25]	1. Positive patient evaluation of PC communication was related to decreasing post-anxiety levels^{+}	Moderate (86%)	Not Reported	Strong	Strong	Strong (80%)	Patient	Adequate
Safran et al, 1998[31]	1.NS association reported between non-technical aspects of care and patient health status	Moderate (69%)	Not Reported	Strong	Strong	Strong (83%)	Patient	Adequate
Rutten et al, 2006[26]	1, 3. Lower ratings of provider communication were associated with general health perceived as fair or poor and with higher depressive symptom scores^{+} 2. NS association reported between provider rating and patient cancer history	Not Applicable	Not Applicable	Strong	Strong	Moderate (63%)	Patient	Adequate
Bechel et al, 2000[34]	Hospital units that were more PC were associated with: 1. lower deaths and 2. lower complications	Not Reported	Not Reported	Strong	Strong	Not Reported	Hospital	Not Applicable

Note: * Numbers in the results section for each study correspond to the numbered health outcomes from Table 2.5;$^{+}$ Significant association (p<0.05) in expected direction.

NS: Nonsignificant associations; PC: patient-centre care

Table 2.8 Overall Quality Ratings of Observational Studies based on Patient-Centred Care Components Reflected in the Process Measures (n = 12)

Study	**Overall Quality Rating[*]**	**Principal Outcome**		**Other health outcomes**		**Associations[+]**		
		Objective	Subjective	Objective	Subjective	Principal outcome	Other outcomes Objective	Other outcomes Subjective
Patient-Centred Care Components (1), (3)								
Williams et al, 1998[23]	Moderate	-HbA1c				-HbA1c		
Stewart et al, 2000[24]	Moderate		-Symptom recovery		-Overall, physical, mental health	Symptom recovery		-Mental health
Takayama et al, 2001[25†]	Moderate		-Anxiety			Anxiety		
Rutten et al, 2006[26†]	Weak		*-Sociodemographic traits*		-General health -Cancer history -Depressive symptoms	N/A		-General health -Depressive symptoms
Patient-Centred Care Components (1), (2), (3)								
Little et al, 2001[27]	Moderate		*-Patient enablement*		-Symptom burden	N/A		-Symptom burden
Fremont et al, 2001[28]	Moderate		-Overall, physical, mental health		-shortness of breath -chest pain	- Overall health - Physical health		-chest pain
Stewart et al, 2000[24‡]	Moderate		-Symptom recovery		-Overall, physical, mental health	NS		NS
Kinnersley et al, 1999[29]	Moderate		*-Doctor-patient agreement*		-Symptom resolution -Functional health status	N/A		NS
Covinsky et al, 2000[30†]	Moderate		-Overall, physical, mental health			-Overall, physical, mental health		
Safran et al, 1998[31†]	Moderate		*-Adherence to physician advice*		-Overall, physical, mental health	N/A		NS
Ong et al, 2000[32]	Weak		-Psychological, physical distress & overall health			NS		
Suhonen et al, 2007[33†]	Weak		*-Satisfaction*		-Health-related quality of life	N/A		-Health-related quality of life
Bechel et al, 2000[34†]	Weak	-Unexpected Deaths & complications				-Unexpected Deaths & complications		

Note: Italicized outcomes represent non-health related principal outcomes of interest; [*] Determined from the Effective Public Health Practice Project Quality Assessment Tool 2003[12]; [+] Significant associations with the communication process measure at $p< 0.05$ recorded; [†] Cross-sectional studies quality ratings adjusted to compare between cohort and cross-sectional studies. [‡] Stewart et al.[24] evaluated patient-centred communication both subjectively (patient perceptions) and objectively (audiotape measure) in relation to the health outcomes and therefore is represented twice in this table; this entry represents the results from the objectively measured communication process.

NS represents non-significant associations with the outcome(s); HbA1c: glycosylated hemoglobin; N/A: results not applicable (outcome is not health-related).

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CHAPTER THREE
THESIS RATIONALE

3.1 BRIDGING THE SYSTEMATIC REVIEW TO THE RECALL LITERATURE

This thesis now transitions from the literature on the extent to which patient-centred communication is associated with patient health outcomes, to an interest in the timing of the measures of patient-centredness relative to the time of the visit in question.

Time constraints and limited resources often pose challenges for observational studies that seek to measure patients' baseline perceptions of the patient-centredness of visits. Researchers may alternatively obtain an approximation of the patients' perceptions of patient-centred by actually assessing the patients' recall at some point after the visit or hospitalization occurred.

For example, of the twelve cohort and cross-sectional studies reviewed in the last chapter, ten studies used a self-reported measure of patient-centred care. Three[1,2,3] of these ten studies measured patient-centred care immediately following the visit of interest. However, the remaining seven[4,5,6,7,8,9,10] studies implemented their measure from five days to a maximum of one year since the patients engaged in a patient-provider relationship (the majority were time periods of one to five months). Only two of these studies[4,8] briefly commented on the influence of obtaining recalled reports of patient-centred care; however, none reported an assessment of the validity of their measure in relation to the timing of its implementation, which is the topic of this thesis.

The remainder of this chapter will review the literature of recalled patient reports of medical care. The chapter closes with the next thesis steps of presenting the thesis conceptual framework and hypotheses.

3.2 OVERVIEW OF RECALL LITERATURE IN A MEDICAL CONTEXT

The theoretical development and understanding of memory recall has been extensively examined from both a neurological and cognitive psychologic perspective over the last century. Researchers investigating patient-physician interactions have only recently been exploring the validity of measures that rely on patient recall, particularly of: (1) medical information, (2) technical care, and (3) health status. However, this thesis research found no body of literature that examines the validity of measures that rely on patient recall of quality of care indicators, specifically patient-centred care.

Patients' retrospective reports may not provide valid measures because their consistency over time depends on human factors, such as memory and perception, which are inherently subject to distortion[11]. Therefore, it is imperative to examine the degree to which patient perceptions of patient-centred care change over time due to various factors from the available literature in order to understand the threat imposed on the validity of such retrospective studies.

3.2.1 Recall of Medical Information

In studies that measure recall of information communicated to patients, facts are given to the patient and the proportion of facts correctly recalled is measured at some point in time after the visit. Characteristics of both patients and of the material presented have shown affects on recall, which in turn has implications for later compliance and satisfaction.

Results from one study have shown that depending on the type of health condition, 40 to 80 percent of information provided by physicians can be forgotten immediately[12]. Other studies on patients with asthma and rheumatoid arthritis have found that patients remembered proportionately less information after one month the more they were told during visits (for visits that ranged from two to eleven minutes)[13,14]. This finding supports the relationship initially proposed by Ley and colleagues[15] whereby the greater number of statements presented, the smaller the mean percentage recalled. Nonetheless, patients with chronic illnesses have been shown to recall more information regarding treatment than diagnosis as compared to patients with minor medical problems[16]. Information pertaining to treatment is likely perceived as more self-relevant and therefore, may be better recalled in comparison to information which is perceived as less important[17].

Additional research has shown that among patients with diabetes, hypertension and heart disease, the majority of patients failed to recall elements of potentially important medical advice from their providers after one to two weeks and furthermore, failed to comply with the advice that was recalled[18]. Some researchers have explained this failure to recall important medical information as linked to the *primacy effect*, whereby material presented first is better recalled[19]. In addition, such results can call into question the level of understanding of information received by patients. For example, studies have found that 50 to 90 percent of primary care patients do not understand what they are told about prescriptions and treatment advice[20,21,22]. Misunderstanding of information communicated by a health care provider has not only shown to be incorrectly remembered[9,15], but has also shown to lead to decreases in satisfaction, compliance with recommendations and outcomes, and increases in anxiety, treatment time and cost[23]. Research has suggested that the level of the patient's understanding may be attributable to the patient's level of medical knowledge and similarly, to the patient's level of education, whereby the latter has shown a low but consistent relationship to recall, with correlations ranging from 0.18 to 0.26[24]. Similarly, age differences in recall can be affected by the knowledge of the content material that a patient possesses[25].

A further complication regarding patient recall, specifically among patients with common illnesses, is their expectations of what is likely to be said. When some or all expectations are met during a visit with a health provider, recalling information may become easier[24]. For example, Jackson and colleagues[26] found that among patients presented to a walk-in clinic with a physical symptom, poorer recall of visit information resulted for patients with unmet expectations regarding either: diagnosis, duration of symptom, prescriptions, diagnostic tests, or referrals after two weeks. An additional finding from this research was that for patients with an unmet expectation, 64 per cent reported worsening of symptoms at two weeks. Therefore, failure of meeting patients' pre-visit expectations influenced both their recall of the information provided during their visit and the subsequent resolution of their symptom.

3.2.2 Recall of Technical Care

Patients' reporting of technical medical data began in the 1960s in the National Health Interview Survey (NHIS), which considered the recall of patients 12 months after their hospitalization period[27]. Although physician medical records have been regarded as a good source of past medical information, it is known that for numerous reasons, medical records may have gaps and be incomplete[28,29]. Therefore, an alternative may be to obtain patient self-reports, which are most often recalled self-reports, of clinical diagnostic tests, diagnoses and treatment decisions for use by physicians and researchers. However, reliance on patient recall of their past medical events requires consideration of the accuracy and reliability of recall as it can be affected by both the patient's health-related and personal characteristics.

Consistent recall of medical events has been associated with the severity of patients' illness experiences. Measures of severity of a health episode (number of symptoms, impairment, duration) and chronicity (years with a diagnosis) have been shown to be strongly predictive of improved recall in studies of patients diagnosed with depression and anorexia nervosa[30,31]. Furthermore, the types of medical events to be remembered may have induced stressors at the time of the event, as in the case of patients receiving prolonged mechanical ventilation in an intensive care unit or of critically ill patients receiving daily sedatives, and therefore such patients have also shown to recall such events more consistently[32,33].

Patients are also subject to forgetting their medical care experience. Research has shown that patients may forget due to the progression of time, as well as, due to what they experienced before and after a critical experience[34]. This thesis research identified three factors from the literature that captured the latter concept of forgetting: (1) the recency of the medical events[35,36]; (2) the volume of physician visits[37]; and (3) the volume of tests given that were administered in similar manner[38]. These factors represent a process known as *memory interference*, whereby patients' recollection of events can be altered by subsequent experience. This finding supports the *retroactive interference hypothesis*, originally proposed by McGeogh, which purports that memory interference is highest among later experiences that share features with the original experience (i.e. family physician visits versus visits with other health professionals).

Research has also demonstrated over-reporting of physician health assessment protocols among outpatients after three months. One mechanism to explain this finding suggested that patients' desired to give socially preferred answers to protect physicians from being blamed for a lapse in their care[34]. Therefore, a need for social desirability may affect a patient's ability to recall events objectively.

The effects of emotional states and personality traits on recall have also been demonstrated in the medical literature. For example, in comparison to medical records of ambulatory events, patients who were depressed selectively recalled three months later more negatively evaluated experiences and events then they did when not depressed[34]. This finding has been supported by other studies involving the reporting of breast cancer-related and cardiac events[39,40]. Moreover, this phenomenon has been explained as the *mood congruency effect*, which results in a consistent bias for the depressed patient towards perceiving and recalling items that were consistent with the depressed mood, and a preoccupation with, and rehearsal of, the negative events of the past[41].

Patients with an anxious personality have also shown inconsistencies between their baseline and recalled reports of their technical care: the more anxious the patient, the more is recalled[21,42]. However, some research has also concluded that moderately anxious patients recalled more medically-related events than highly anxious or non-anxious patients[43]. Nonetheless, anxious patients, much like depressive patients, may overestimate the likelihood of negative events, albeit for different reasons. In contrast to the depressive patient, literature has described the anxious patient as preoccupied with the threat implied by their physical health on their future or by their interpretation of visiting a health provider, such that there is a readiness to perceive threat-related stimuli, and therefore, recall more events[44].

The clinician's level of anxiety has also shown to affect patient's recall. In a breast cancer study, high risk patients recalled less of their recommendations given for tamoxifen treatment and for genetic testing if the physician appeared worried rather than unworried[45]. These results have also been shown for other breast cancer and smoking cessation counselling[46,47] events and diagnostic procedures. Furthermore, these results suggest that physician affect plays a critical role in patient reaction and retention of medical information, which have implications for compliance research, patient satisfaction, and physician training.

Patients are also subject to reconstructing their memory of medical events. Research proposed by Ross[48] stated that individuals may extend their knowledge inferentially and use memories that they can retrieve to reconstruct an original memory. This *reconstructive memory hypothesis* may extend to non-technical aspects of medical care, such that patients may inferentially reconstruct their medical care visit from what is more salient to them, such as their change in health status. Although this particular research question has not been explored in the literature of patient-physician interactions, psychologic research asserts that individuals tend to tend to unconsciously fill in missing information in order to complete the reconstruction of their memory in the following three ways: (1) by combining two memories into one; (2) by using expectations of what was probably experienced; or, (3) by using information gathered after the fact[49].

3.2.3 Recall of Health Status

Literature contends that in order to track changes in patients' health status after a medical intervention or event, comparison of health outcomes with baseline assessments should be made. Since prospective assessment of health status may not always be feasible, patient recalled reports may be obtained as an alternative. However, psychometric research has consistently shown that the retrospective recall of a change in symptoms or health status is not as accurate as the difference recorded in a prospective study[50]. Therefore, researchers have recently begun to consider the impact of these reports on the validity of their results. The accuracy of patient recall of their health status has been investigated in particular for studies of pain, functional status, self-rated health, and quality of life. Psychological factors and timing have been examined in such studies as sources of recall discrepancies.

Research has shown that patients have recalled their baseline quality of life as being better than it actually was (when compared with data collected at baseline), after undergoing challenging procedures. This was shown in a study of patients undergoing radial prostatectomy for early-stage prostate cancer[51]. However, younger and more educated patients in a similar study[52] recalled their baseline more accurately.

It is suggested elsewhere that changes between baseline and recalled reports of health status may also significantly depend on the time interval between the event and the time of its assessment, i.e. the longer the interval, the higher the probability of incorrect recalls[53]. This finding supports the *decay hypothesis*, a forgetting mechanism originally proposed by Ebbinghaus, which states that recall weakens as a function of time[54]. Additional research contends that with increasing time since baseline, inconsistencies in health status perceptions between baseline and recall are more likely to be driven by personality traits than the actual health state in question[55]. Numerous studies have evaluated the effect of changes between baseline and recall reports using different periods of elapsed time to recall original health status, ranging from one week to five years; however, due to the variations in findings, suggesting a cut point whereby patients' recall begins to diminish was discouraged. Nonetheless, the timing of recall has been regarded by review studies[28,56] as a relevant factor to consider for its effect on the consistency between baseline and recalled health reports.

Multiple factors have also been demonstrated to influence pain reporting, such as physiological and psychological stressors, disease state, mood, psychosocial factors, such as work environment and patient variables such as age and gender[57,58,59]. Further research has also linked self-reported stress and patients' appraisal of their mood to reports of weaker baseline physical health[60]. Health psychology research has also investigated the effect of patient coping skills on recall and findings suggested that patients with an internal locus of control, whereby patients were more likely to direct the flow of the conversation and ask more questions, were more likely to exhibit better recall of their health status[61,62].

Studies have also evaluated patient recall of their health status prior to the onset of a disease. For example, self-reported health status collected on or after the onset of the ocular herpes simplex virus (HSV) disease was more likely to be over-reported (i.e. recalled better) when compared to the same data collected before the onset of the disease[63]. This differential reporting was explained by the concept of *rumination bias*, whereby people with a disease tend to think harder about their prior exposures than disease-free people[64].

A study of early-stage prostate cancer patients also obtained over-reported quality-of-life scores at a follow-up time relative to their baseline scores and the underlying explanation was labelled as a *response shift*[48]. In the literature, a response shift may occur over time due to a variety of experiences that patients endure, which can alter their frame of reference for rating their level of pain or functional ability[65]. An additional explanation for this discrepancy has been referred to as *present-state bias* whereby patients may use their post-event state as the frame of reference for deducing their health status before the event[66]. Therefore, studies that utilize recalled health status must be aware of these potential implicit changes that take place in the memory of patients when asked to quantify their health from an earlier period.

3.2.4 Summary of Recall Literature Reviewed

In the medical literature of patient-physician interactions, the consistency between baseline and recalled patient reports has been predominately evaluated for: (1) medical information, (2) technical care, and (3) patient health status. Critical variables that have been found to explain consistency between baseline and recalled reports are presented in Table 3.1. This table shows overlapping themes in the variables investigated in this literature. Therefore, this literature overview demonstrates the high magnitude of human memory error and its impact on the consistency of reports over time of recalled medical experiences for studies of any design.

3.3 SUMMARY OF CHAPTER THREE AND NEXT STEPS

Studies reviewed in Chapter 2 that examined the relationship between patient-centred care and health outcomes did not sufficiently acknowledge that patient perceptions are likely subject to change over time when recall is implicated, thereby threatening the validity of their results. Therefore, exploring the impact of relevant factors highlighted in Table 3.1 on change in patient perceptions between baseline and recalled reports (i.e. change in perceptions or consistency of perceptions over time) is new to the literature on patient-centred care. In order to more fully understand the implications of using recalled patient reports beyond the context of medical information, technical care, and health status, a clear understanding of the theoretical memory processes by which humans recall experiences must also be presented, followed by a conceptual framework of the thesis (Chapter 4).

Table 3.1 Summary of critical variables investigated in the literature for the effect on the consistency of recalled reports (i) for medical information, (ii) of technical care, and (iii) of health status

Medical Information	Technical Care	Health Status
Age		Age
Level of education		Level of education
Type of health condition	Severity of health condition	State of health condition
	Type of medical event	Severity of procedure undergone
	Induced stressors at time of medical event	Stressors
Time interval*		Time interval*
Order of material presented	Recency of medical events**	
Amount of information told by provider	Volume of physician visits**	
	Volume of tests given administered in similar manner**	
	Social desirability	
	Depressed emotional states	Mood
	Anxious personality	Personality traits
		Coping skills
	Provider's level of anxiety	
Expectations of what will be said	Expectations of what should have happened***	
	Post-care information***	Post-event health state
Self-relevance of information		
Understanding of information		
Level of medical knowledge		

Note: *represents factors that relate change in perceptions to forgetting as a result of time ; ** represents factors that relate change in perceptions to forgetting as a result of interference; ***represents factors that relate change in perceptions to memory reconstruction.

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CHAPTER FOUR

CONCEPTUAL FRAMEWORK AND HYPOTHESES

4.1 OVERVIEW OF CHAPTER FOUR

This thesis now turns from the literature that identified critical variables associated with recall accuracy in the context of patient-physician interactions to defining the conceptual framework of this thesis. This chapter begins by presenting key inter-relating classification systems of memory, which serve as the basis for understanding how memory recall works and how it can be distorted. Next, the processes of memory that affects the consistency in perceptions over time are explained and their associated factors, derived from relevant variables presented in Table 3.1, are integrated into a conceptual framework. The chapter ends by presenting the three hypotheses, that are from the conceptual framework, and that are tested in this thesis.

4.2 DEFINING MEMORY

Many scholars regard memory as a set of cognitive processes that differentially contribute to our ability to store and recall information[1,2]. These multiple interacting systems are related to each other and information may often be stored in more than one system/subsystem.

4.2.1 Explicit vs. Implicit Memory System

One commonly accepted multiple-systems-model holds that there are two major memory systems: an explicit and implicit one (also referred to as declarative and procedural memory systems)[3]. Implicit memory is engaged when performance on a task is facilitated in the absence of conscious recollection and explicit memory is engaged when performance on a task requires conscious recollection of prior experiences[4]. Primary care research studies that use recalled reports specifically capture explicit memory.

4.2.2 Episodic vs. Semantic Memory

Two subsystems of explicit memory include episodic and semantic memory, originally investigated by Tulving and colleagues.[5]. Episodic memory refers to the memory of events, time, and associated emotions in relation to an experience. In contrast, semantic memory refers to the memory of factual information, such as the memory of meanings, understandings and other concept-based knowledge unrelated to specific experiences. Therefore, in order for patients to retrieve information from their past based on a particular physician visit, they must first exercise their episodic memory to isolate the event in question spatiotemporally.

4.2.3 Autobiographical Memory

Memory for information relating to the patient itself, however, is retrieved through the use of autobiographical memory and is a distinct system. Autobiographical memory is a personal representation of general or specific events and personal facts[6]. When patients do not remember exactly everything that occurred during their visit, it is due to distortions in their autobiographical memory. Autobiographical memory is constructed and reconstructed as an evolving process of past history, which is why the reliability of such memories becomes questionable[7]. Furthermore, retrieving information from autobiographical memory is driven by an individual's schema, which represents an organized body of general information or personal beliefs and therefore, is subject to change over time[8].

4.3 MEMORY BIAS

Due to the subjective nature of memory recall, cognitive psychologic literature affirms that memory perception can be distorted in systematic ways, particularly via the following three ways: (1) by forgetting memories due to the passage of time (see Section 3.2.3); (2) by forgetting memories due to interfering events (see Section 3.2.2); and (3) by reconstructing memories using more salient memories also linked to the event in question (see Section 3.2.2). These three concepts are later explored as the testing hypotheses of this thesis in Section 3.5.

4.4 DERIVATION OF CONCEPTUAL FRAMEWORK

There are three sequential processes of memory through which experiences are converted into memory. These processes, as defined by Anderson[9], are: Acquisition, Retention and Retrieval. Factors that affect any of these processes are hypothesized to directly and indirectly affect changes between baseline and recalled perceptions (= change in perceptions). The conceptual model, presented in Figure 4.1, applies these processes and their associated theoretical variables to patients' recalling patient-centred care of family physicians. The scale of measurement, operationalization, and interpretation of the score for each variable is described in Chapter 5.

Acquisition represents the first process in memory, which involves acquiring physical sensory and encoding the information related to the experience into memory. There is a large body of psychologic literature that explores various mechanisms through which information is encoded, but this is beyond the scope of this thesis. For this thesis, variables hypothesized to affect the acquisition process reflect patient and situational characteristics such as: age; gender; education; anxiety and coping skills.

Retention represents the second process in memory, which involves storing the information in either short or long-term memory. For this thesis, variables hypothesized to affect the retention process reflect time-sensitive variables that take place between encoding the memory of the family physician visit (= T1), storing it, and subsequently retrieving it for recollection (= T2). Examples of such variables include: time elapsed between T1 and T2; number of additional visits with the family physician between T1 and T2; and number of additional visits with other health care providers between T1 and T2.

Retrieval represents the third process in memory, which involves recalling the memory. Factors that affect retrieval may represent variables that are in effect at the time of recall. This is likely the case when individuals engage in free recall, whereby no cues are given to assist recall, and metacognitive strategies are used to make the best of their memory[9]. Examples of variables hypothesized to affect the retrieval process include: main presenting problem; history of main presenting problem; presence of additional health problems; duration of patient-physician relationship; visit length, change in health status; current emotional status and current health perceptions.

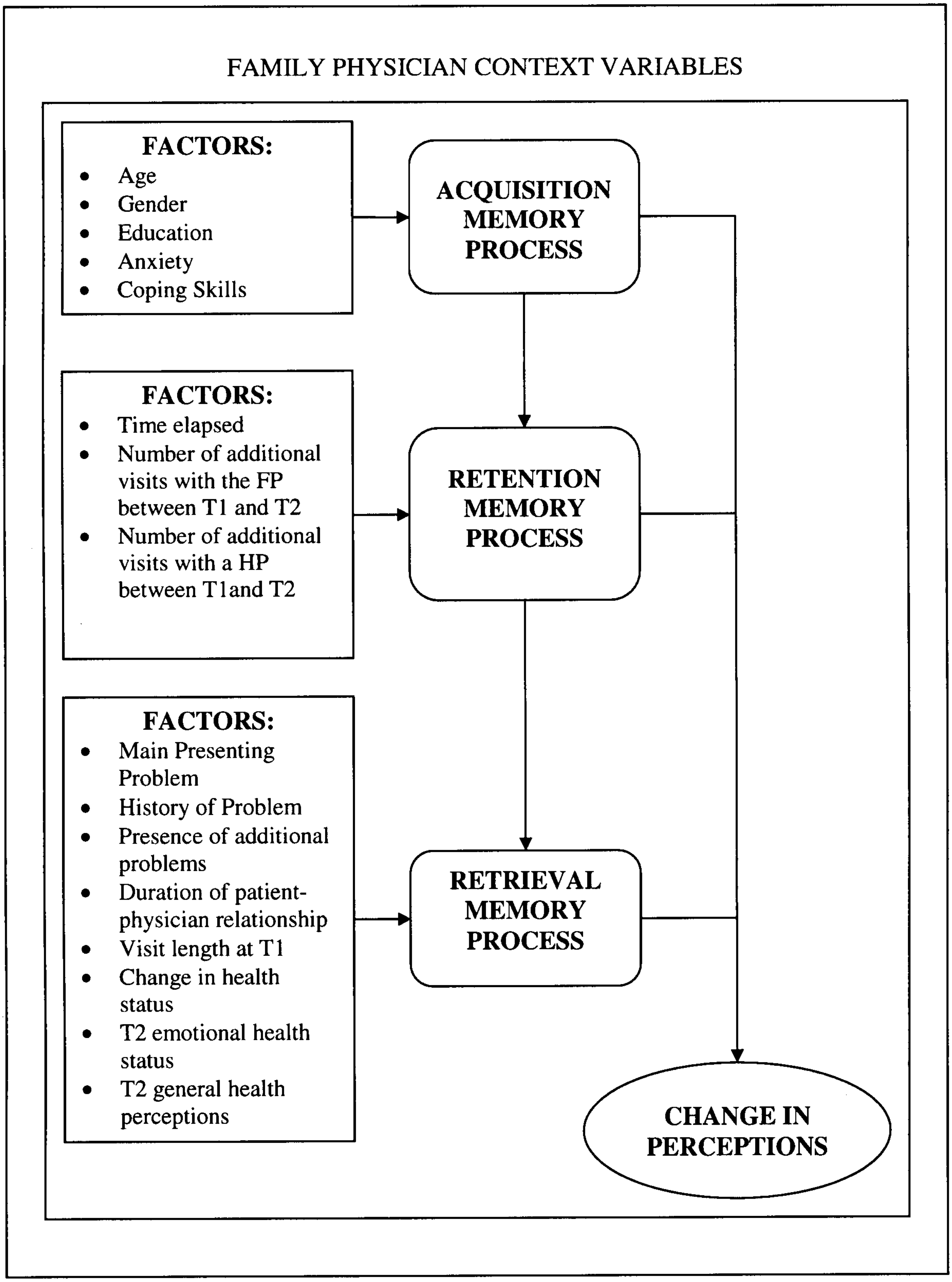

Figure 4.1 Conceptual Model of Thesis (adapted from Anderson[9])

4.5 CONCEPTUAL HYPOTHESES

Factors hypothesized to affect the memory processes presented in the conceptual model (Figure 4.1) were combined with the following three key psychologic themes that emerged from the literature in Chapter 3 (see Table 3.1 and Section 4.3) to develop the main testing hypotheses that affect change in patient perceptions of patient-centred care: (1) forgetting events due to the passage of time; (2) forgetting events due to the interference of post-event experiences; and (3) reconstructing memory of events using more salient memories also linked to the event in question (see Table 4.1). These relevant themes were investigated as the three independent variables in the thesis through three hypotheses (one for each variable) stated in Sections 4.5.2 to 4.5.4.

4.5.1 Main Outcome: Change in Perceptions of Patient-Centred Care

It is hypothesized that patients will recall at T2 (i.e. approximately 2 months after their visit at T1) the patient-centredness of their T1 visit differently relative to their perceptions at the time of the visit (i.e. at T1). This hypothesized change is between baseline (T1 perceptions) and recalled perceptions of T1 (T2 perceptions) of patient-centred care and this change in perceptions over time may also be referred to in the thesis as an inconsistency in perceptions over time.

4.5.2 First Hypothesis: Passage of Time

It is hypothesized that a greater change between T1 and recalled perceptions at T2 of the patient-centred care received at T1 is explained by a greater amount of time that has lapsed between T1 and T2.

4.5.3 Second Hypothesis: Interference of Post-Event Experiences

It is hypothesized that amount of health care visits experienced by the patients, such as with the family physician and/or other health providers, between T1 and T2 will interfere with the retention of the original memory of the visit experienced at T1. Therefore, it is hypothesized that patients who did not experience any additional visits between T1 and T2 will exhibit smaller changes in their T1 perceptions and recalled perceptions of patient-centred care at T2 of T1 as compared to patients who experienced increasingly more visits with other physician and/or health-provider visits between T1 and T2.

4.5.4 Third Hypothesis: Memory Reconstruction using Salient Memories

It is hypothesized that in the event patients are unable to recall their T1 experience, patients inferentially recreate their target T1 experience from what is more salient to them based on constructs which are also linked to their T1 experience, such as their change in health status from T1 to T2, to produce recalled patient-centred care scores. Therefore, a greater change between baseline perceptions and recalled perceptions of patient-centred care at T2 of T1 is hypothesized to be associated with a greater change in patients' symptom discomfort from T1 to T2.

4.6 SUMMARY OF CHAPTER FOUR AND NEXT STEPS

A conceptual framework was adapted from the cognitive psychology literature to guide the three main research hypotheses of this thesis, which were derived from the three main themes that emerged from Chapter 3. The main independent variables in hypotheses 4.5.2 and 4.5.3 represent factors hypothesized to affect the retention process of memory, while the variable in hypothesis 4.5.4 represents a factor hypothesized to affect the retrieval process of memory. Furthermore, factors that affect the acquisition and retrieval memory processes will be explored as potential confounders in the analysis and only the direct pathway of the conceptual framework in Figure 4.1 will be tested. The data source and methodology used to test these hypotheses are described in Chapter 5.

Table 4.1 Matrix of Acquisition, Retention, and Retrieval Memory Process Factors and the Three Psychologic Themes Representing the Main Testing Hypotheses

		THEMES OF TESTING HYPOTHESES		
		(1) Forgetting events: due to passage of time	**(2) Forgetting events: due to the interference of post-events**	**(3) Reconstructing memory of events: using more salient memories**
MEMORY PROCESSES AND ASSOCIATED MEASURED FACTORS	**Acquisition**	-	-	-
	Retention	Time interval between T1 and T2	Amount of additional visits between T1 and T2	-
	Retrieval	-	-	Change in Health status between T1 and T2

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CHAPTER FIVE

METHODOLOGY

5.1 STUDY DESIGN

This thesis tests the three hypotheses presented in Chapter 4 that patients' change in perceptions of patient-centred care from T1 to T2 increases (i.e. the greater the inconsistency or difference between T1 to T2 perceptions) as:

1) more time elapses between T1 and T2;
2) patients experience additional health care visits with their family physician and/or other health care providers between T1 and T2;
3) patients experience a greater change in their symptom discomfort from T1 to T2.

A longitudinal study design was used based on prospectively collected data from 1993 for a study entitled "The Impact of Patient-Centred Care on Patient Outcomes in Family Practice". This study was proposed by Stewart and colleagues of the Thames Valley Family Practice Research Unit and was funded by the Ministry of Health of Ontario in October 1990 and will be referred to as the "1993 Stewart et al. study" for the remainder of the thesis. The 1993 Stewart et al. study was based on a two-stage cluster sampling strategy, which first involved recruiting eligible family physicians and second, recruiting eligible patients from the practices of the recruited family physicians. The reader should note that some methods are derived from the 1993 Stewart et al. study while others are specific to the current thesis, as described below.

5.2 PHYSICIAN STUDY POPULATION

5.2.1 Physician Sampling and Recruitment Method

The sampling frame comprised a mailing list of 250 family physicians who were members of the College of Family Physicians of Canada (CFPC) London, Ontario chapter. The physicians were numbered sequentially on the list and using a random number table, a random sample of 102 family physicians was drawn. The sample was randomly selected such that physicians were representative in terms of year of graduation and geographic location.

Physicians were recruited by nine family physicians and two primary care researchers who were all partners with the Thames Valley Family Practice Research Unit, a Health System Linked Research Unit funded by the Ontario Ministry of Health formed by the Center for Studies in Family Medicine of The University of Western Ontario. Physician recruiters were chosen on the basis of their professional standing and influence in their communities. Candidate participants were provided with information packages by recruiters that included a description of the project and its objectives, a policy statement on confidentiality, and the approval of the study by The University of Western Ontario ethics review committee. Physician recruiters approached from one to forty candidates with a mean of 2.3 candidates. Their success in recruiting candidates ranged from zero to 100%. The method for recruitment of physicians was adapted from a method developed by Borgiel and colleagues[1].

From the initial selection of 102 physicians, 19 physicians were ineligible to participate because either researchers found inadequate office space to conduct to the post-visit interview with the patients or the physicians were no longer practicing in the London and surrounding area. Therefore, 83 physicians remained as eligible to participate. Forty-four physicians refused to participate primarily due to the time imposed by the demands of their family practice. Figure 5.1 shows the details of the procedure for recruiting the sample of family physicians. A total time of 18 months was required to recruit the 39 family physicians who agreed to participate.

5.2.2 Physician Eligibility Criteria

The physician population only included family physicians practicing in London, Ontario and surrounding areas, which encompassed Middlesex, Lambton, Oxford, Elgin and Perth counties. Physicians were also required to have adequate office space to accommodate the post-visit patient interview with the research assistant. No restrictions were placed on the number of years in practice, type of practice (for example, solo or group practice), and location of medical school education.

5.2.3 Physician Data Collection

Upon consent to participate, the following variables were collected by the research assistants: (1) physician gender, (2) year of medical school graduation, (3) certificant status from the College of Family Practice of Canada, (4) region of practice, and (5) size of practice. These five variables represented potential physician-level confounders in testing the hypotheses.

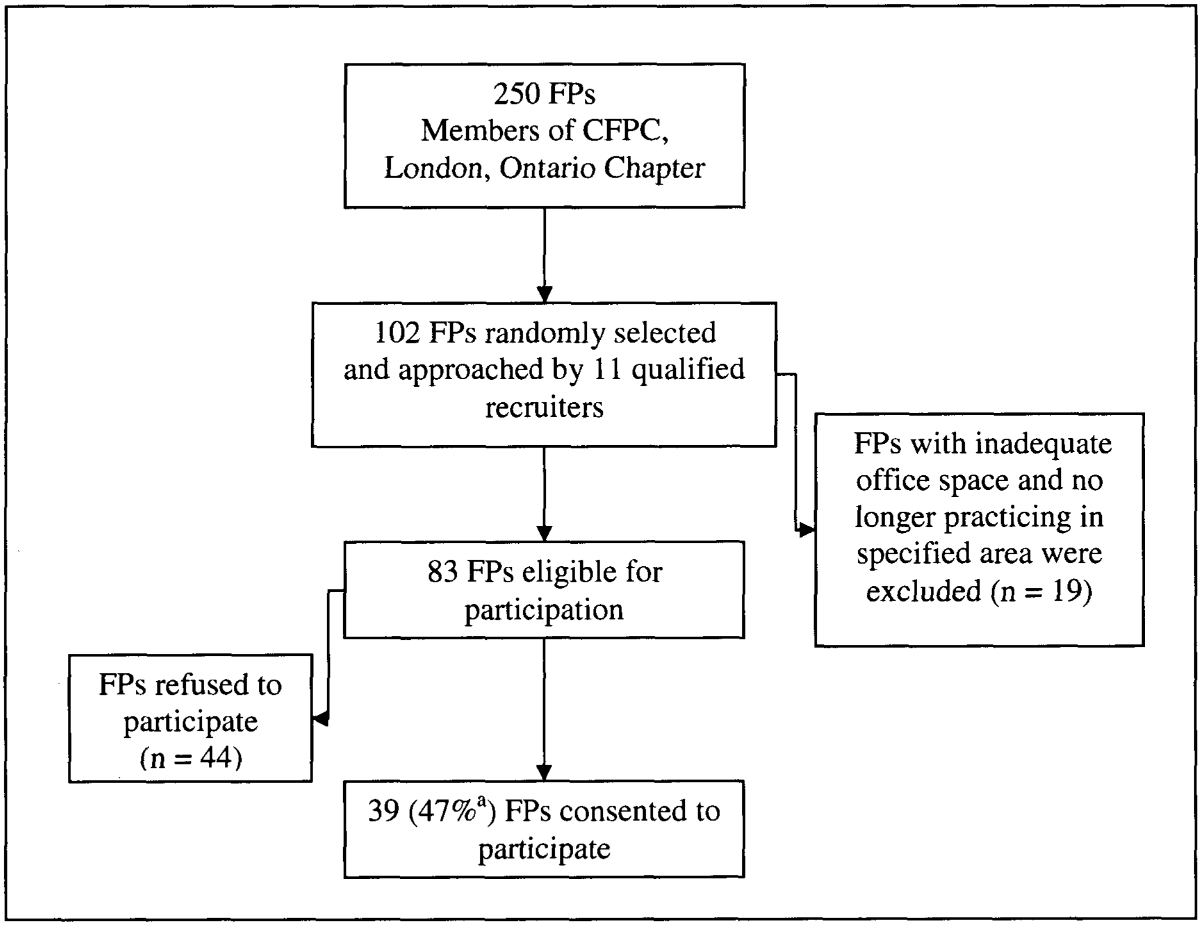

Figure 5.1 Stage One of Study Sample Recruitment: Recruitment of Family Physicians.

Note: FP = Family Physician. CFCP = College of Family Physicians of Canada. a) 47% represents 39 consented FPs of the 83 eligible FPs in the 1993 Stewart et al. study. The primary analytic sample of this thesis included 32 FPs, which represents 39% of the 83 eligible FPs.

5.3 PATIENT STUDY POPULATION

5.3.1 Patient Sampling and Recruitment Method

A consecutive sampling design was employed to recruit patients who visited the pre-recruited family physicians. Patients who visited the family physician's office on one of the days of the research assistant's attendance, were approached prior to being seen by the physician to identify their eligibility for participation. Consent was obtained after patients met the two entrance characteristics as described below. Patients refused to participate mainly due to time constraints. Two research assistants were used in this patient recruitment process. Research assistant #1 approached 391 patients at the offices of 27 physicians and research assistant #2 approached 148 patients at the offices of the remaining 12 physicians. Based on the content of the patient information letter (see Figure B.1), all patients were blind to the current thesis study i.e. regarding the recall of their physician visit experiences during the follow-up.

5.3.2 Patient Eligibility Criteria

In order for patients to participate in the 1993 Stewart et al. study, patients were required to meet the following inclusion criteria:

1. patients were over 18 years of age;
2. the main reason for the visit was based on a new episode of one of a variety of common symptoms including: abdominal symptoms, back or neck pain, chest pain, fatigue, headache, eye symptoms, upper respiratory symptoms, rashes and joint pain.

Patients were excluded if:

1. they were too ill or disabled to answer the questions before their visit with the physician;
2. the main reason for the visit was to receive counselling for an emotional or social problem;
3. additional parties accompanied the patient to the encounter with the physician;
4. they had a limited command of the English language;
5. they were cognitively impaired.

A total of 62 patients were ineligible to participate from the 539 patients who were approached by the two research assistants. From the 477 eligible patients approached for consent, 132 patients refused to participate. Therefore, 345 patients were available to provide baseline perceptions of the patient-centredness of their physician visit (see Figure 5.2).

Since a core component of the 1993 Stewart et al. study was to score the level of patient-centredness of the patient-physician communication using an audiotape procedure developed by Brown and colleagues[2], patients who did not have complete audiotape recordings of their visit were excluded. Although this exclusion criterion was not relevant to this study, post-visit interview data from these patients were no longer available and therefore, these patients (n = 3) remained excluded (see Figure 5.3).

For the purposes of this current thesis study, patients who met the above-mentioned inclusion criteria and consented to participate in the 1993 Stewart et al. study were still subject to exclusion if seven or more of the 14 items of the self-reported patient-centred care measure were missing (n = 62). See section 5.6 for further discussion of missing data.

Follow-up in the 1993 Stewart et al. study was prepared for the 345 patients who provided baseline data; however, since the current thesis study excluded 62 patients with incomplete patient-centred care data, follow-up data from 283 patients was examined. A total of 23 patients either dropped out or could not be contacted for follow-up and 28 patients did not provide complete follow-up data on their recalled perceptions of the patient-centredness of their study visit (see Figure 5.3). Therefore, the primary analytic sample included 253 patients.

5.3.3 Patient Data Collection and Definition of Time Frames

For the current thesis study, relevant data requiring patient contact were collected at three time points and are summarized below.

1. Immediately Pre-Visit with Physician (T0)

Prior to being examined by the physician, the only information sought from the consented patients was their (1) age and (2) main presenting symptom in order to avoid influencing the communication between the patient and physician. These two variables were analyzed as potential confounders.

2. Immediately Post-Visit with Physician (T1, Baseline)

Following the visit with the physician, 345 consented patients were interviewed to collect the following relevant data:

a) baseline patient perceptions of the patient-centred care pertaining to the visit they just experienced;
b) current level of symptom discomfort[i];
b) potential confounders: (3) gender; (4) marital status; (5) level of education; (6) anxiety; (7) coping skills; (8) length of time experiencing main presenting symptom; (9) length of visit in minutes; (10) number of years seeing the physician; and (11) presence of additional health problems.

The length of the interview was approximately 20 minutes and was conducted in the physician's office.

3. Two Months Post-Visit with Physician (T2, Follow-up)

Patients who completed a post-visit interview were further evaluated in a two-month follow-up phone interview of approximately 10 minutes in length. The research assistants were blind to the level of patient-centredness of the communication as evaluated by the audiotape measure. The following data were collected during the phone interview:

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[i] Represents the first component of the change score of symptom discomfort, which is one of the three main independent variables (see Section 5.7.4 for full description).

a) recollection of the patients' perceptions of the patient-centredness of their visit experienced at T1;
b) current level of symptom discomfort[ii];
c) number of visits to the recruited family physician and other health professionals such as, emergency room physicians, specialists, walk-in clinic physicians, and chiropractors between T1 and T2;
d) potential confounders: (12) general health perceptions at T2 and (13) emotional health status at T2.

The time difference between T1 and T2, in weeks, was collected without requiring patient contact and was calculated by the rater upon completion of the follow-up telephone interview.

5.4 SUMMARY OF STUDY SAMPLE

Therefore, the effects of the three main independent variables (elapsed time between T1 and T2, additional health care visits between T1 and T2, and change in symptom discomfort from T1 to T2) on the change in patient perceptions of patient-centred care from T1 to T2 was investigated using a primary analytic sample of 253 patients from 32 pre-recruited family physicians. Relationships with 18 potential confounding variables, five variables originally collected at the physician level (see Section 5.2.3) and 13 variables collected at the patient level (see 5.3.3) were also explored. This final patient sample represented approximately 53% of the initial consented patients as compared to 66% in the 1993 Stewart et al. study[iii]. This decrease in representativeness was primarily due to enforcing more stringent exclusion criteria to control for missing patient-perceived patient-centred care T1 and T2 items (see Section 5.6).

[ii] Represents the second component of the change score of symptom discomfort, which is one of the three main independent variables (see Section 5.7.4 for full description).

[iii] 66% represents a final sample of 315 in the Stewart et al study of the 477 patients approached for consent.

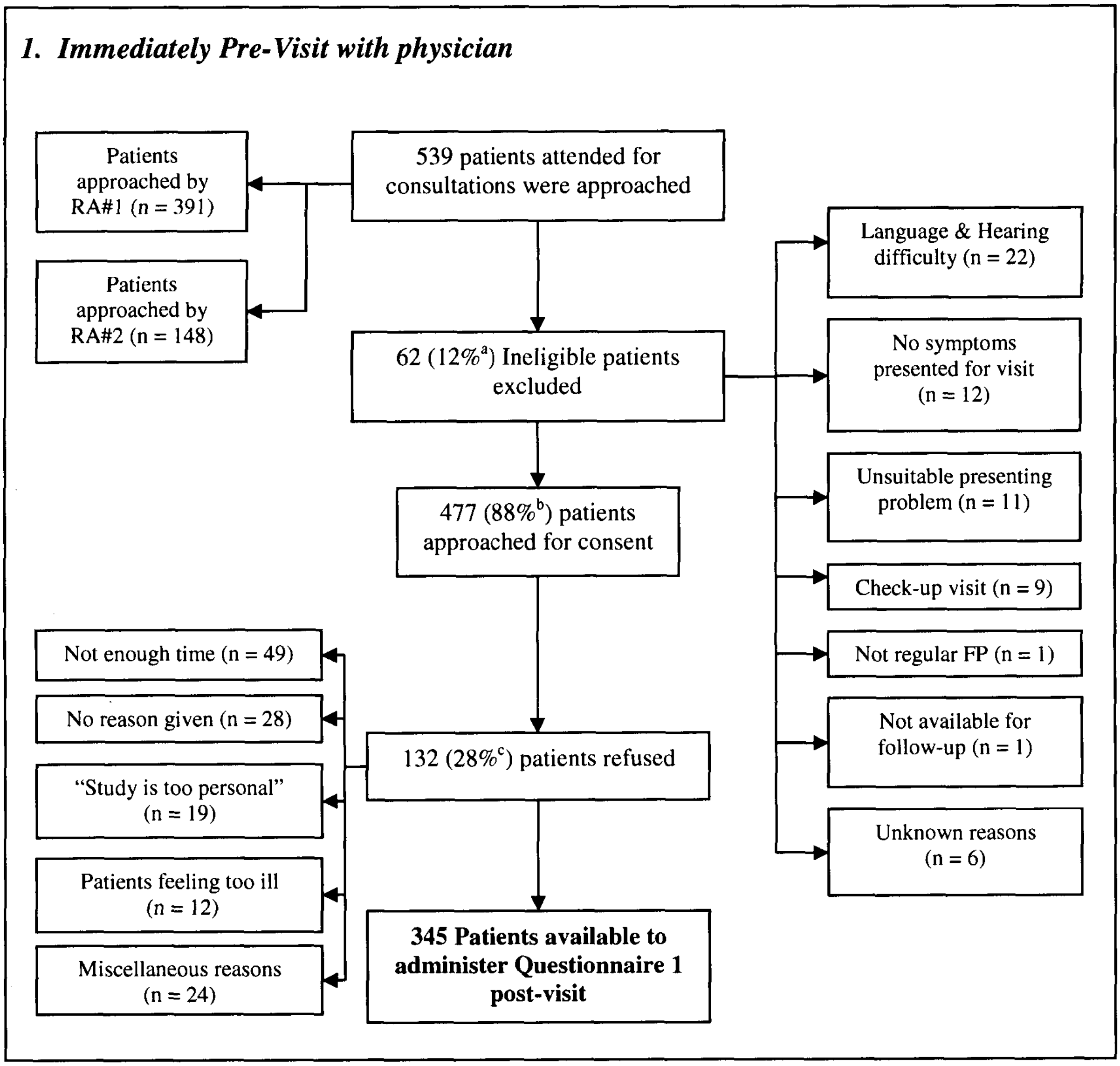

Figure 5.2 Stage Two of the Study Sample Recruitment: Recruitment of Patients

Note: Questionnaire 1: Baseline level of perceptions of patient-centred care and demographic details.
a) 12% represents 62 ineligible patients of 539 targeted patients; b) 88% represents 477 eligible patients approached for consent of 539 targeted patients; c) 28% represents 132 refusals of 477 patients approached for consent.

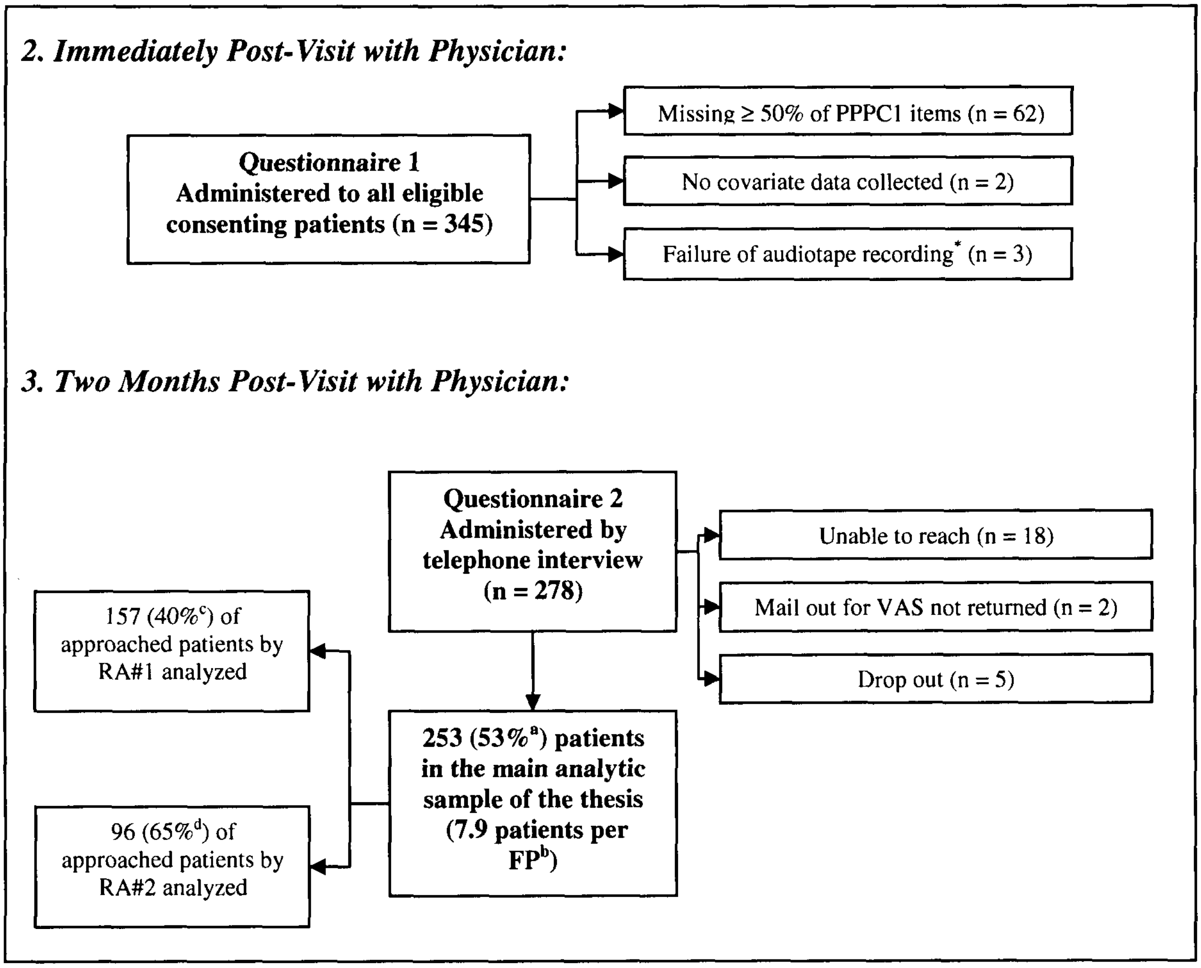

Figure 5.3 Flow Chart of Process of Patient Data Collection

Note: * The 1993 Stewart et al. study used an audiotape measure and a patient self-report measure of patient-centred care; patients who did not have this audiotape data were excluded from the database and were not followed up. Questionnaire 2: Recall of perceptions of PCC; RA = research assistant; VAS = Visual Analog Scale (measure for symptom discomfort).

a) 53% represents 253 patients analyzed of the 477 patients approached for consent; b) 7.9 patients per FP represents 253 patients from the final 32 FPs (7 FPs excluded due to patient exclusions) c) 40% represents 157 patients in the final analysis of the 391 patients approached by RA#1 from the original 539 patients approached; d) 65% represents 96 patients in the final analysis of the 148 patients approached by RA#2 from the original 539 patients approached.

5.5 DATA SOURCE

Patient data collected from the 1993 Stewart et al. study were stored in the "Impact of Patient Centred Care on Patient Outcomes in Family Practice (IPCC)" database, SPSS Version 12.0. Documentation used to aid in the interpretation of the data source included: patient questionnaires code books (for T1 and T2); chart review code sheets; and a record of the physician-level variables.

The IPCC database had both strengths and limitations. Patient data variables relevant to the current thesis hypotheses were readily available for 315 patients and required minimal manipulation. In addition, minimal data entry errors were found in the IPCC database and were appropriately corrected. However, data from excluded and non-responding physicians, such as reason for exclusion, age and main presenting problem, were not transcribed from the original records and therefore, an additional dataset was created to overcome this limitation. Furthermore, the IPCC database excluded physician level variables. These variables were stored in a separate database and were merged with the IPCC database such that each patient had a record of the physician-level variables.

Missing data values were easily identifiable in the IPCC database; however, for patient-perceived patient-centred scores at T1 and T2, only patients with more than seven of the 14 items were coded as missing. In order to investigate the implications of analyzing different number of patient samples with different degrees of complete data, mean patient-centred scores were recalculated.

Overall, there were minimal limitations in the use of the IPCC database for the current thesis study, all of which were overcome through data investigation and data manipulation.

5.6 MISSING DATA

Primarily data for the outcome patient perceptions of patient-centred care and the second independent variable, additional health visits between T1 and T2, were missing and are elaborated in the following subsections. Other variables explored in the analysis had minimal missing data; nonetheless, the number of patients with missing values for each variable is reported in the appropriate tables in Chapter 6 and Appendices D and E.

5.6.1 Missing Data for Self-Reported Patient-Centred Care (PPPC) Scores

The total available analytic sample from the 1993 Stewart et al. study was 315 patients. However, since the current thesis study examined the change in patients' perceptions of the patient-centredness of their physician visit from T1 to T2, it was imperative to examine the degree of missing items for each of the 14 pairs of items at T1 and T2. Table 5.1 shows that the items with the largest proportion of missing data at T1 were: Item 13 (21.9%), Item 12 (20.6%), and Item 9 (19.7%). In contrast, at T2 the items with the largest proportion of missing data were: Item 7 (11.7%), Item 13 (5.4%), and Item 11 (4.1%). Overall, there were fewer patients with missing data at T2 than at T1.

There were 194 (61.6%) of the 315 patients with complete T1 and T2 data for all 14 items. At T1, 62 (19.6%) of the 315 patients were missing seven to fourteen items. Upon examining the archived PPPC T1 measure, it was found that these 62 patients were missing data due to changes made to the number of items questioned during the survey process. For example, the T1 questionnaire package for three patients (i.e. ID 101, 102 and 104), who were recruited from the first study physician, did not contain a copy of the Patient Perceptions of Patient-centred Care measure. For four patients (i.e. ID 106, 201, 202, and 203), only six of the final 14 items were recorded as questions asked in their T1 questionnaire package (i.e. item numbers were: 1, 3, 4, 5, 7, and 14). For 55 patients (i.e. ID 204 to 807), seven of the final 14 items were recorded as questions asked in their T1 questionnaire package (i.e. item number 2 added). Based on this finding, it was assumed that these data were missing completely at random. Upon exclusion of these 62 patients from the primary analysis, 32 (12.6%) of 253 patients were missing, on average, only one item per patient at T1 (range was one to two items missing per patient). Similarly at T2, 38 (15%) of 253 patients were missing, on average, only one item per patient (range was one to four items missing per patient). In total, 59 patients were missing, on average, one item per patient at either T1 only, T2 only, or at both time points.

Since, on average, only one item was missing per patient among these 59 patients, four different imputation methods were pursued, which used 13 of the 14 patient's own PPPC values. The reasoning for this method was that the imputed value, based on the patient's own scores, would be more realistic than based on scores across the remaining patients. The four imputation methods were: mean, median, maximum and minimum. Hypothesis testing analyses using these imputation methods were compared to ensure consistency in results and to strengthen the validity of using a primary sample that included imputed data versus only complete data (i.e. n = 194). These results (not shown in this Chapter) demonstrated consistent findings for the main effects and therefore, the primary sample represented 253 patients with mean imputed scores. Furthermore, as shown in Table B.2, patients' whose values were imputed, and would have otherwise been excluded from analysis if the outcome was based solely on complete PPPC data, were significantly different on the following variables: age, coping skills, T2 emotional status, T2 health perceptions, and type of interviewer at T1. Therefore, including these 59 patients improved the variability of the data and furthermore, the generalizability of the results. To ensure that those excluded from the primary analytic sample (n = 62) were not different than those included (n = 253), key patient characteristics were also compared (results are shown in Table C.1 and Chapter 6).

5.6.2 Missing Data for Number of Family Physician Visits between T1 and T2

Inspection of the dataset revealed that 53 patients were missing data for the self-reported number of physician visits they experienced between T1 and T2, which was measured at T2 (see Section 5.7.3 for details of the measure). Since T2 questionnaires could not be located to verify these missing data, original patient charts were examined and were available for all 315 patients. Dates of additional visits with the physician were abstracted and the number of visits since the date of the T1 visit was recorded for all 315 patients. These data represent an accurate reflection of the number of physician visits experienced between T1 to T2 relative to self-report data.

Table 5.1 Comparing Missing Data of Patient-Perceptions of Patient-Centred Care (PPPC) Items at T1 and T2 from the 1993 Stewart et al. Study

Item No.	**PPPC 14-item measure**	**N (T1)**	**N (T2)**	**% missing of n=315* T1/T2**
1	"To what extent was the main problem discussed"	311	314	1.3/0.3
2	"Did the doctor know that this was one of your reason for coming"	308	315	2.2/0
3	"To what extent did the doctor understand the importance of your reason"	309	314	1.9/0.3
4	Item 4: "How well do you think the doctor understood you"	311	313	1.3/0.6
5	"How satisfied were you with the discussion of your problem"	311	315	1.3/0
6	"To what extent did the doctor explain this problem to you"	254	310	19.3/1.6
7	"To what extent did you agree with the doctor's opinion about the problem"	280	278	11.1/11.7
8	"How much opportunity did you have to ask your questions"	255	313	19.0/0.6
9	"To what extent did the doctor ask about your goals for treatment"	253	309	19.7/1.9
10	"To what extent did the doctor explain treatment"	255	307	19.0/2.5
11	"To what extent did the doctor explain how manageable this treatment would be for you"	254	302	19.3/4.1
12	"To what extent did you and the doctor discuss your respective roles"	250	306	20.6/2.9
13	"To what extent did the doctor encourage you to take the role you wanted in your own care"	246	298	21.9/5.4
14	"How much would you say the doctor cares about you as a person"	311	310	1.3/1.6

Note: * n = 315 represents the maximum sample size available for analysis from the Stewart et al. study[5]

5.7 MEASUREMENT OF VARIABLES

5.7.1 Patient Perceptions of Patient-Centred Care (Outcome)

Patient perceptions of patient-centred care scores were based on mean scores of the 14-item Patient Perception of the Patient-centred Care Measure (PPPC)[4] at T1 (reflecting on T1) and T2 (reflecting on T1). The inter-item reliability of this measure was found to be adequate (Chronbach's alpha = 0.71)[3] and the validity of the PPPC measure was established through a significant correlation with the MPCC ($r = 0.16$, $P = 0.01$)[4] and a significant correlation with patient health outcomes and with the efficiencies in the use of health services[5]. The mean PPPC scores were calculated by summing all item values and dividing by the total number of items completed. Each of the 14 items were measured on a 4-point scale whereby individual item scores ranged from (1) completely to (4) not at all. High mean PPPC scores were interpreted as negative perceptions of patient-centred care.

5.7.2 Elapsed Time between T1 and T2 (Independent Variable)

The amount of time elapsed from T1 to T2 was measured as a continuous variable, in number of weeks. This variable was determined from the difference in dates of the T1 and T2 patient interviews recorded by the research assistants. The projected follow-up time after the index visit in the 1993 Stewart et al. study was two months (8 weeks).

5.7.3 Additional Health Care Visits between T1 and T2 (Independent Variable)

The amount of additional visits patients experienced between T1 and T2 was measured using the modified version Browne et al. Health Services Utilization Inventory[6], which measures a patient's use of eight categories of direct health services over a recall time span of two weeks. The 1993 Stewart et al. study examined the utilization of four of the Browne et al. health services' categories over an average recall time span of approximately eight weeks: (1) primary care physicians (defined as the patients' regular T1 family physician); (2) emergency room physicians; (3) specialists; and (4) chiropractors. A fifth, and relevant health service category, (5) walk-in clinic physicians, was also included. For each of these five health services, patients were asked (a) if they ever accessed these services and if so, (b) how many times between T1 to T2.

These numbers of visits with either patients' family physician and/or alterative health providers were compiled to get a total score.

5.7.4 Change in Symptom Discomfort between T1 and T2 (Independent Variable)

A change in health status was directly measured by a change in the patients' symptom discomfort from T1 to T2, which was measured as a continuous variable. Symptom discomfort was measured at T1 and T2, and at both times, patients recorded on a visual analogue scale[7] (VAS) the severity of the symptom they identified as the main presenting problem upon visiting with the family physician at T0. Note that at T2, patients were mailed a copy of the VAS measure. Patients indicated their current perceived symptom severity of discomfort along a 100 mm horizontal line, and this rating was then measured from the left edge (= VAS score) where scores could range from "no discomfort" (0 mm) to "extreme discomfort" (100 mm). Therefore, high VAS scores represented high symptom discomfort. VAS scores have shown to possess linear scale properties, such that the difference in symptom discomfort between each successive increment is equal[8] and have been tested for reliability and validity in studies of pain[9,10]. Furthermore, Carlsson[7] has demonstrated that patients are not necessarily influenced by previous ratings when asked to repeat measurements.

The change in symptom discomfort was calculated by subtracting the VAS discomfort score at T2 from the VAS discomfort score at T1. A positive change in the symptom discomfort score represented a decrease in symptom discomfort from T1 to T2, with higher positive change scores signifying the symptom getting better (i.e. maximum observed change in discomfort score of 100 mm) and higher negative change scores signifying the symptom getting worse (i.e. a minimum observed change in discomfort score of -95 mm).

5.7.5 Potential Confounders

The thirteen potential confounders collected from patients are provided below and on Table 5.2. They are grouped according to the three memory processes (acquisition, retention, retrieval) hypothesized to affect change in perceptions over time. The five potential confounders collected from physicians are presented in Table 5.2 only and are not further described in the text.

5.7.5.1 Potential Confounders Associated with Memory Acquisition

The following six variables: age; gender; marital status; educational attainment; anxiety; and coping skills represent patient characteristics hypothesized to have a confounding effect on change in perceptions. The measurement of three of these six variables is described below: educational attainment, anxiety and coping skills.

The highest level of patient education was used as a proxy for socioeconomic status and was measured at an ordinal level with six categories: public school, incomplete high school, complete high school, community college, university, and other. The "other" category represented other accredited post-secondary institutions which do not grant degrees. The categories used were comparable to education variable used in the Statistics Canada Census and Canadian Community Health Survey (CCHS)[11].

Patients' anxiety was a continuous variable measured by the semantic differential Jackson Personality Inventory Anxiety Scale[12]. Strong reliability estimates from two student samples of n = 82 and n = 307 were found (Cronbach's alpha = 0.85 and 0.83 respectively)[13]. This semantic differential scale was defined with the contrasting adjectives "relaxed" and "tense", and patients reported the directionality and intensity of these adjectives from "(1) most relaxed" to "(9) most tense". A value of "5" was considered neutral. Scores were reversed in order to maintain a consistent interpretation with other scales used in this analysis such that the lower the score the worse the anxiety at T1.

Coping skills was a continuous variable measured by the 7-item Pearlin Mastery Scale[14], which captured the extent of patients' mastery or control over their lives. Patients recorded the degree to which they agreed or disagreed with a statement based on five response categories ranging from (1) strongly agree to (5) strongly disagree. A total mastery score was obtained by first reversing two negatively phrased items in order to obtain a positively oriented scale, such that higher scores represented the perception of greater mastery or control over one's environment, and then responses from each item were summed. Thus, a range of 7 (low mastery/weak coping skills) to 35 (high mastery/strong coping skills) was possible. The instrument has shown satisfactory psychometric properties with regard to both validity and reliability[15,16]. The internal consistency reliability was adequate (Cronbach's alpha = 0.73)[18].

5.7.5.2 Potential Confounders Associated with Memory Retention

There are no variables associated with the memory retention process hypothesized to confound the effect of change in perceptions. The independent variables, elapsed time and amount of additional visits between T1 and T2, are the only two variables analyzed within this thesis that are hypothesized to influence change in perceptions through this particular memory process.

5.7.5.3 Potential Confounders Associated with Memory Retrieval

The following seven variables: main presenting problem at T1; history of main presenting problem prior to T1; additional health problems at T1; length of patient-physician relationship from T1; visit length; T2 emotional status; and T2 general health perceptions are hypothesized to have a confounding effect on change in perceptions. The measurement of four of these seven variables: main presenting problem; history of main presenting problem prior to T1; T2 emotional status; and T2 general health perceptions is described below.

The patients' main presenting problem was based on a new or reoccurring symptom, which had precipitated the visit with the family physician at T0. This symptom was classified according to the first version of the International Classification of Primary Care (ICPC-1) system[17], which consisted of 17 chapters[iv]. Since patient symptoms fell into only 14 of these chapters, and the frequency counts for 11 of these chapters ranged from only 1 to 12 counts, data were pooled to create an "other" chapter in order for frequency

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[iv] 17 Chapters of ICPC-1: General & Unspecified, Blood, Digestive, Eye, Ear, Circulatory, Musculoskeletal, Neurological, Psychological, Respiratory, Skin, Endocrine, Urology, Pregnancy, Female Genital, Male Genital, and Unspecified.

counts to be comparable across all remaining chapters. Therefore, the main presenting problem was measured at a nominal level with five categories: digestive, musculoskeletal, respiratory, skin, and other, and patients presenting with respiratory problems at T0 represented the mode. Furthermore, the reliability of this variable was assessed by the measure of agreement between the patient's perception of their main problem and the family physician's diagnosis (abstracted from the patient's medical record), as both were classified according to ICPC-1, and a substantial agreement[18] (kappa = 0.78) was found among 177 valid cases (see Table B.1).

The length of time patients had experienced their main presenting problem prior to T0 was transcribed on the questionnaire and was subsequently entered in the data set as a categorical variable with the following seven ranges of time periods: one to two days; three to six days; one to two weeks; greater than two weeks to less than one month; one month to less than three months; three months to six months; and, greater than six months. Modeling this potential confounder as a categorical variable would potentially expend 6 degrees of freedom; therefore, original transcribed data were re-entered in order to model this variable as continuous in days.

Patients' T2 emotional status was a continuous variable measured from the 5-item mental health scale (MHI-5) used in the Medical Outcomes Study 20-item Short-form Health Survey[19]. The MHI-5 was administered at T2 and one item from each of the following major mental health dimensions was reflected upon from four weeks preceding T2: anxiety, depression, loss of behavioural or emotional control, and psychological well-being. Six response categories were used from (1) all of the time to (6) none of the time. The internal consistency reliability of the MHI-5 was previously shown to be 0.88[20]. Emotional status was scored by summing the item responses, after reversing the scoring of two items so that a high score indicated better emotional health. The total score was then transformed linearly to a 0-100 scale, with 0 and 100 assigned to the lowest and highest possible scores, respectively. Low scores (less than 50) represented feelings of nervousness and depression all the time, and high scores (greater than 75) represented feelings of peacefulness, happiness and calmness all of the time, in the past 4 weeks[21].

Patients' T2 health perceptions represented a continuous variable, which was measured from the 5-item health perceptions scale, used in the Medical Outcomes Study 20-item Short-form Health Survey[22]. This scale combined the widely used single-item rating of overall health, which used a 5-point scale ranging from (1) excellent to (5) poor and four additional items from the Current Health scale, constructed from the Health Perceptions Questionnaire[23]. The final four items used a 5-point scale ranging from (1) definitely true to (5) definitely false. The reliability of the 5-item health perceptions scale was 0.87[23]. The T2 health perceptions variable was scored by first recoding the response choices of the overall health item to better reflect the unequal intervals of the item based on the SF-20 guidelines[22]. Responses to two of the four items from the current Health scale were also reversed in order to obtain a positively oriented scale before summing items into a total score. The total score was then transformed linearly to a 0-100 scale, with 0 and 100 assigned to the lowest and highest possible scores, respectively. Low scores (less than 50) were interpreted as patients perceiving their personal health was poor at T2 and likely to get worse, and high scores (greater than 75) were interpreted as patients perceiving their personal health was excellent at T2[22].

Table 5.2 Descriptions of the Independent and Potential Confounding Variables

Variable Type	Data Type	Categories
	Independent Variables	
Elapsed Time between T1, T2	Continuous (weeks)	N/A
Total Health Care Visits with FPs and HPs between T1, T2	Continuous (number of visits)	N/A
Change in Symptom Discomfort between T1, T2 (T1-T2)	Continuous (low is worsened change in symptom discomfort)	N/A
	Potential Confounding Variables (Patient Data)	
Main Presenting Problem	Categorical	Digestive Musculoskeletal Respiratory Skin Other
History of Main Presenting Problem	Continuous	N/A
Other Health Problems	Categorical	Yes, No
Duration of Patient-Physician Relationship	Continuous (years)	N/A
Age	Continuous	N/A
Gender	Categorical	Male, Female
Marital Status	Categorical	Married, Other
Educational Attainment	Categorical	Public School Incomplete High School Complete High School Community College University Other
Anxiety	Continuous (low is high anxiety)	N/A
Coping Skills	Continuous (low is poor coping)	N/A
Visit Length	Continuous (minutes)	N/A
T2 Emotional Status	Continuous (low is weak emotional health)	N/A
T2 Health Perceptions	Continuous (low is negative health perceptions)	N/A
	Potential Confounding Variables (Physician Data)	
Gender	Categorical	Male, Female
Years since Graduation	Continuous	N/A
CCFP Status	Categorical	Yes, No
Region of Practice	Categorical	Urban, Rural
Volume of Practice	Categorical	≤ 25 patients seen/day 25-49 patients seen/day ≥50 patients seen/day

Note: FP = family physician; HP = Other health care providers (ER physician, specialist, walk-in physician, chiropractor); CCFP = Certification from the College of Family Physicians.

5.8 SAMPLE SIZE

This research was a secondary analysis of the Stewart et al. study. Therefore, sample size was fixed to a maximum of 315 patients for which data were available (see Section 5.3). The primary analytic sample included 253 patients from 32 family physicians, which included 194 patients with complete T1 and T2 data and patients 59 patients with mean imputed PPPC scores. A retrospective power calculation was not undertaken due to evidence from research[24,25] stating that such calculations are misleading. Furthermore, research has demonstrated that post-hoc estimates of power are of little help in interpreting results and instead, the focus of attention should be exclusively on confidence intervals[26].

An effect size of clinical importance for this thesis was derived from previous literature relating patient-centred care to health outcomes, since literature on the consistency of patient-perceived patient-centred care over time has yet to be established. This literature sought to detect small effect sizes[27] ranging from 0.15 to 0.30[5,28,29]. An effect of 0.2 would be of scientific interest to this thesis and would signify that patients' recalled the patient-centredness of their care received at T1 would shift either towards or away from the four levels of patient-centred care by 20%. These four levels are: that patients' perceived receiving (1) complete patient-centred care; (2) mostly patient-centred care; (3) a little patient-centred care; and (4) no patient-centred care at all. (derived from the PPPC measure[3])[v]. Furthermore, we have chosen a small effect because it is likely that within approximately two months, perceptions may not change by much.

5.9 ANALYSIS

Analyses were performed using SAS statistical software (version 9.1). Frequencies of values for all of the study variables were checked, particularly for PPPC scores at T1 and T2, to describe change in perceptions of patient-centred care as both a continuous and categorical outcome. Change scores of patient-centred care were calculated (mean PPPPC

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[v] If the effect size of interest is 0.2 and mean PPPC scores range from 1-4 on a continuous scale, such that the 4 categories of patient-centred care described above represent mean scores equalling 1-4, then 20% is obtained by dividing the effect size of interest by the maximum difference of mean values between categories 1-4 i.e. 0.2/1.

at T2 – mean PPPC at T1) and were categorized into 5 discrete groups to reflect the degree and direction of change in perceptions, from large positive mean PPPC change to large negative mean PPPC change.

The primary regression analysis using n = 253 modeled change in patient perceptions using extensions of analysis of covariance (i.e. regressor variable method[30]) such that mean PPPC scores at T2 represented the dependent variable, while controlling mean PPPC scores at T1 as a covariate. Secondary analyses using n = 253 modeled change in patient perceptions directly using the differences of scores approach, whereby the outcome was a change score (mean T2 PPPC scores – mean T1 PPPC scores). One assumption of this analysis of difference scores is that a one unit increase in the T1 score is always associated with a unit increase in the T2 score and violation of this assumption may lead to inappropriate adjustment of the PPPC score at T2[31]. Therefore, it has been suggested that covariate adjustment may be more powerful than using the change score approach. For that reason, results using analysis of covariance to model change in perceptions are presented in Chapter 6. However, analyses of both methods were pursued and results using the change score approach were presented in Appendix D and discussed in Chapter 7. Additional analyses were conducted using these two models of change in perceptions for the complete case sample of n = 194.

The relationship between each of the covariates presented in Table 5.2 and the outcome change in patient perceptions (i.e. mean T2 PPPC scores controlling for mean T1 PPPC scores in the primary analysis or mean T2 PPPC scores – mean T1 PPPC scores in the secondary analyses) was tested using bivariate analyses. A P-value of < 0.1 was used for the selection of covariates and were subsequently controlled for in the appropriate multivariable models. Exploratory analysis of two-way interactions terms of three independent variables (i.e. three two-way interaction terms for n = 253) were tested in relation to change in perceptions over time. Terms which were not significant ($P > 0.05$) were not included in the multivariable models.

Linear regression analysis was performed used the SAS "Proc Mixed" Procedure to control for the clustering effect of physicians in all multivariable models. This was accomplished by treating physician Identification Code as a random effect and all other variables as fixed effects. Degrees of freedom were estimated using the Satterthwaite approximation. Experimental residual diagnostic plots showed no deviation from the normal distribution.

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CHAPTER SIX

FACTORS AFFECTING CHANGE IN PATIENT PERCEPTIONS OF PATIENT-CENTRED CARE IN FAMILY PRACTICE

6.1 INTRODUCTION

There is growing consensus that patient-centred care contributes to improved patient satisfaction, adherence to treatment, decreased anxiety and psychological distress, in addition to improved symptoms[1,2,3,4,5]. Of particular interest to health practitioners and policy makers is its effect on health outcomes, which means that the validity of such studies is of prime importance. A recent systematic review of this effect found that seven of ten studies, based on patient self-reports of the patient-centredness, overlooked the potential for inaccurate patient recall (see Chapter 2). Self-reports of patient participants are subject to human error, particularly when patients invoke their recall of non-technical aspects of their medical experience[6,7]. Therefore, it is crucial that health care researchers have a firm understanding of the factors associated with change between baseline and recalled patient perceptions (i.e. change in perceptions over time) when investigating the relationship between any process of care, in this case patient-centred care, and health outcomes.

Only two methodologic reports of the factors which contribute to recall bias have been published in the medical literature[8,9]; neither of these focus on the patient in general or patient-centred care specifically. Furthermore, we found limited research that has applied memory theories to explain the inconsistency in perceptions over of patient reports .The objective of this research is to take an interdisciplinary approach to understanding the factors that can affect the change in perceptions of patient-centred care over time, by integrating cognitive psychologic and epidemiologic principles in the context of family medicine. Three key psychologic themes that emerged from a review of the recall literature are that patients are susceptible to: (1) forgetting events due to the passage of time[10], (2) forgetting events due to the interference of post-event experiences[11], and (3) reconstructing the memory of events using more salient memories also linked to the event in question[12] (see Chapter 3). Therefore, testing the effects of these three themes on the change in perceptions of patient-centred care was the goal of this research. Results will benefit future studies that measure recalled patient perceptions of patient-centred care to more appropriately understand the impact of the timing of measurement on the validity of their findings.

6.2 METHODS

The study tested the following three main hypotheses: that the change (i.e. inconsistency or difference) between baseline (T1) perceptions of patient-centred care (measured immediately following the family physician visit) and recalled (T2) perceptions of the patient-centred care received at T1 (measured approximately two months after T1) increases as: (1) more time elapses between T1 and T2; (2) patients experience additional health care visits with their family physician and/or other health care providers between T1 and T2; and, (3) patients' symptom discomfort worsens between T1 and T2. A cohort design was used. Prospective data collected in 1993 from patients of the *Impact of Patient-Centred Care on Patient Outcomes in Family Practice* study[13] was the source of the patient sample. Patient-centred reports of patient-centred care were collected both following the visit and from 5 to 15 weeks after the visit using the same patient-centred care measure.

6.2.1 Setting and Participants

A two-stage cluster sampling strategy was used in the 1993 study whereby: first, a random sample of family physicians was obtained; and second, a consecutive sample of patients visiting the recruited physicians was obtained.

A random sample of physicians was generated from the list of 250 family physicians who were members of the College of Family Physicians of Canada (CFPC) London, Ontario chapter in 1993. Physicians were eligible for recruitment if they had sufficient office space to accommodate patient interviews and practiced in the London, Ontario, and the surrounding area. There were no restrictions on the number of years in practice, type of practice and location of medical school education (see Section 5.2).

A consecutive sample was obtained for patients who were over 18 years of age and presented a new or reoccurring episode prior to visiting the physician of one of a variety of common acute symptoms: abdominal, back, neck, chest or joint pain; fatigue or headache symptoms; eye or respiratory symptoms and rashes. Patients were excluded for the following reasons: too ill or disabled to respond; presented to the physician's office for chronic-related illnesses or counselling; or, were not fluent in English (see Section 5.3).

6.2.2 Data Collection and Measures

The three critical time-points, during which both physician and patient data relevant to this investigation were collected, were: (1) upon consent of physician participation (T0); (2) immediately post-visit during the in-person patient interview (T1); and (3) during the follow-up patient telephone interview 5 to 15 weeks post-visit (T2).

6.2.2.1 Change in Perceptions of Patient-Centred Care

Patient-centred care was measured at T1 and T2 using the 14-item Patient Perception of Patient-Centredness (PPPC) scale[14] which has been previously validated and was based on three of the six components of the Stewart et al. patient-centred care model[15]: (1) exploring the illness experience, (2) understanding the whole person and (3) finding common ground. Items at T1 and T2 (measured on 4-level ordinal scale) were totalled and a mean PPPC score was obtained ranging from complete patient-centred care (mean PPPC score = 1) to no patient-centred care at all (mean PPPC score = 4). See Section 5.7.1 for additional information.

6.2.2.2 Elapsed Time between T1 and T2

The first independent variable measured the time interval in weeks between the patients' visit experience (T1) and their recall of the experience (T2), and sought to explain greater inconsistency of perceptions between T1 and T2 due to forgetting as a result of increased time elapsed. The projected follow-up time was approximately 8 weeks, but actually ranged from 5 to 15 weeks between T1 and T2 (see Section 5.7.2.1).

6.2.2.3 Additional Health Care Visits between T1 and T2

The second independent variable measured patients' utilization of health services using both chart review and the modified Health Services Utilization Inventory[16] and sought to explain greater inconsistency of perceptions between T1 and T2 due to forgetting as result of increased number of post-visit health-related experiences. Patients' charts were reviewed to count the number of family physician visits between T1 and T2. As well, patients reported at T2 the number of visits since T1 with other health care providers such as: emergency room physicians, specialists, walk-in clinic physicians, and chiropractors. A total score was created to capture the total number of health care visits patients experienced from T1 to T2. (see Section 5.7.2.2).

6.2.2.4 Change in Symptom Discomfort between T1 and T2

The third main independent variable measured the change in patients' symptom discomfort by calculating a change score (T1 – T2) from the patients' visual analogue scale (VAS) scores at T1 and T2. This variable sought to explain greater inconsistency of perceptions between T1 and T2 due to the patients' reconstruction of their memory of the T1 visit using the salient and subjective nature of their change in health status, which can also be linked to seeking family physician care. Therefore, it was hypothesized that patients with large changes in their symptom discomfort had greater differences in perceptions of the patient-centredness of their visit at T1 between T1 and T2. At both time points, patients reported their current level of symptom discomfort, which corresponded to the symptom they presented as their main problem upon visiting the physician at T1, along a 100 mm horizontal line. Scores ranged from no discomfort (0 mm) to extreme discomfort (100 mm). The VAS has been tested for reliability and validity in studies of pain[17]. High positive change scores signified that the symptom improved from T1 to T2 (see Section 5.7.4).

6.2.2.5 Potential Confounders

The following variables represented potential confounders, which were identified from the review of the literature (see Section 3.2 and Table 3.1), and were self-reported: patient's age; gender; marital status; educational attainment; main presenting problem;

history of main presenting problem; presence of other health problems; duration of patient-physician relationship; anxiety at T1 (Jackson Personality Inventory Anxiety Scale[18]); coping skills (7-item Pearlin Mastery Scale[19]); emotional health status (5-item SF-20 Mental Health Scale[20]); health perceptions at T2 (5-item SF-20 Health Perceptions Scale[20]); physician's gender; years since graduation; certification status from the College of Family Physicians; region of practice; and volume of practice (i.e. average number of patients seen per day). The following potential confounder, length of visit (minutes), was abstracted from the audiotape measure analyzed elsewhere[13]. A tabulation of these variables and their corresponding data type is presented in Table 5.2.

6.2.3 Bias

The 1993 study[13] randomly selected within strata to ensure a representative sample in terms of year of graduation and geographic location. Furthermore, the potential for forced recall of the T1 visit during T1 was minimized as patients were informed that the follow-up interview at T2 would only be regarding their health in general (see Figure B.1). In addition, research assistants conducting T2 interviews were blind to patients' T1 PPPC scores.

During this investigation, the potential for recall bias was also minimized for the second independent variable as patients' recalled reports at T2 of the number of physician visits experienced between T1 and T2 were substituted with the number of physician visits abstracted from medical charts. Also found in this study were significant differences between the two patient interviewers/recruiters at T1 for the main outcome and all three main independent variables. Therefore, the patient interviewer at T1 was included as a potential confounder in the analyses to control for interviewer bias.

6.2.4 Missing Data

Records from the available sample of 315 patients in the 1993 study indicated that PPPC items were inconsistently complete for both T1 and T2 periods (see Section 5.6.1). Complete case analysis using a sample of n = 194 was considered; however, this would reduce the sample to 62% of the 1993 sample and furthermore, would represent only 40%

of the 477 eligible patients. Inspection of the 1993 reports showed that 62 of the 315 patients were missing data from 7 to 14 of the 14 PPPC items at T1 because select PPPC items were consistently not asked at T1. It was assumed that these data were missing completely at random and were excluded from this analysis. Of the 253 patients that remained, an average of one PPPC item per patient at both time points was missing for 59 patients. The following imputation methods were compared for consistency of results in an effort to handle these 59 patients with missing data: mean, median, maximum and minimum imputation (based on within patient PPPC values as opposed to across patients' PPPC values). Since all methods produced equivalent results (results not shown), results from mean imputation were analyzed. Key variables were compared between patients included in the analysis (n = 253) and those excluded (n = 62) (see Table C.1).

6.2.5 Sample

This research sought to detect a small effect size of 0.2, which has been established as clinically important in previous studies relating patient-perceived patient-centred care to health outcomes[13,21,22]. The sample consisted of 253 patients from 32 family physicians such that the average cluster size was 7.9 patients.

6.2.6 Statistical Methods

Linear regression was performed with the T2 mean PPPC score as the dependent variable controlling for the T1 mean PPPC score (i.e. extension of analysis of covariance), and elapsed time, additional visits and change in symptom discomfort as the primary independent variables (all continuous). The bivariate relationships between each of the variables listed in Section 6.2.2.5 and the T2 PPPC scores, controlling for T1 PPPC scores, were examined. The variables that met the significance level of $P < 0.1$ were: patient's age, anxiety, coping skills, T2 emotional health status, T2 health perceptions, physician's volume of practice and patient interviewer at T1. The effect of patients clustering within physician practices was controlled by using the Mixed Procedure in SAS 9.1 whereby physician Identification Code was treated as a random effect and patient-level variables were treated as fixed effects. Inspection of experimental residual diagnostic plots showed no deviation from the normal distribution. Positive regression coefficients were interpreted as a greater difference (i.e. greater inconsistency or greater change) between recalled perceptions of patient-centred care of T1 at T2 relative to perceptions of patient-centred care of T1 at T1. Statistical significance was interpreted as $P \leq 0.05$.

To test the robustness of this primary analysis, which modeled change in perceptions over time using the analysis of covariance approach on the n = 253 sample, a secondary analysis was conducted using only patients with complete PPPC data (n = 194, see Appendix D). Additionally, we conducted analyses modeling change in perceptions over time directly as a change score (T2 mean PPPC scores – T1 mean PPPC scores) as an alternative to the analysis of covariance approach for both the n = 194 and n = 253 samples (see Appendix E).

6.3 RESULTS

6.3.1 Descriptive Results

The 32 participating physicians represented 38% of the 83 eligible physicians who consented to patient data collection in 1993 (Figure 5.1). There were no significant differences between the participating and non-participating physicians in: year of graduation; practice location; and gender (Table 6.1). However, participating physicians were significantly more likely granted Certification in Family Medicine (CCFP) by the College of Family Physicians of Canada than non-participating physicians (66% and 27% respectively).

Of the 539 patients approached at the physician offices, 62 (12%) were ineligible due the following main reasons: language and hearing difficulty, no symptoms presented for the visit, and symptoms not of research interest (i.e. follow-up visit for chronic illness and psychological-related symptoms). Of the 477 eligible patients approached for consent, 132 (28%) refused. A total of 345 consented patients were available for administering the post-visit PPPC (T1) and the follow-up PPPC (T2) (Figure 5.2). Data from 315 patients were available for analysis. There were no significant differences between these respondents (n = 315) and the non-respondents (n = 162) on age, gender, marital status and main presenting problem (variables collected at T0; results not shown). Data from 253 patients were analyzed and there were no significant differences between these respondents (n = 253) and the non-respondents (n = 162) on these same patient characteristics collected at T0 (see Table 6.2). Based on the key variables in the analysis, the analytic sample (n = 253) was significantly different from the patients excluded (n = 62) on age and coping skills, such that our sample was significantly younger and had significantly stronger coping skills (see Table C.1). These 253 patients represented an overall participation rate of 53% (Figure 5.3).

Of the 157 (62%) patients who were interviewed by the first of two research assistants at T1, patient respondents were significantly younger (mean difference -4.2 years, $P = 0.03$) as compared to the non-respondents of this first research assistant. There were no significant differences between the patient respondents of the second research assistant, who interviewed 96 (38%) patient respondents, and the corresponding non-respondents.

Table 6.3 shows that over 65% of patients perceived, at both T1 and T2, their care to be completely or mostly patient-centred (i.e. mean PPPC scores ranged between 1.01-1.99 on the 4-point PPPC scale). However, Table 6.4 shows that approximately 92% of patients (the sum of these percentage figures from the third column in this table: 19.0%, 47.5%, 21.3% and 4.7%) indeed demonstrated a change between their baseline (T1) and recalled (T2) perceptions of the patient-centredness of their visit at T1, based on continuous mean patient-centred care change scores. Specifically, 66.3% of patients recalled their visit of T1 at T2 as being less patient-centred as compared to their perceptions immediately following the visit at T1, thereby scoring their physician from 1 to 25 points higher on the PPPC measure at T2 (possible total PPPC score ranged from 14 to 56 points). Additional analysis found that scores from 10 of the 14 PPPC items were also significantly higher at T2 than at T1 (see Table C.2). Table 6.5 shows that approximately 8 weeks elapsed from T1 to T2, during which 37.1% of patients (not shown in table) did not visit their physician or any other health provider and patients' symptom discomfort decreased by a mean of 27 points on the VAS. Details of additional patient characteristics are shown in Table 6.6.

6.3.2 Hypothesis Testing Results

The outcome, change in perceptions of patient-centred care from T1 to T2, was modeled as continuous variable such that the independent variables and covariates were regressed on mean patient-perceived patient-centredness scores at T2, controlling for mean patient-perceived patient-centredness scores at T1.

Unadjusted Results

Table 6.7 shows the regression results testing all three independent variables: elapsed time, total additional health care visits and change in symptom discomfort, on patient-perceived patient-centredness at T2 (controlling for T1 and the clustering of patients within practices). Elapsed time was positively and significantly related to change in perceptions (*beta* = 0.036, $P = 0.0005$). Therefore, for every week elapsed from T1 to T2, the difference between mean baseline and mean recalled perceptions of patient-centred care changed by 0.036 points (mean PPPC change scale ranges from -3 points to + 3 points due to 4-point mean PPPC scale). In this unadjusted model, the relationships among total health care visits, change in symptom discomfort and change in perceptions over time were in the hypothesized positive directions; however, they were not statistically significant.

Adjusted Results

The following covariates were adjusted in the multivariable model based on their significance of $P < 0.1$ with mean T2 PPPC scores controlling for mean T1 PPPC scores: age, anxiety, coping skills, T2 emotional status, T2 health perceptions, physician's volume of practice, and interviewer (see Table 6.8). The multivariable regression results are presented in Table 6.9. After controlling for the above-mentioned covariates, the direction of the relationships among elapsed time, change in symptom discomfort and change in patient perceptions were consistent with the unadjusted model; however, the direction of the relationship between total additional health care visits between T1 and T2 and the outcome changed, such that it was negatively related to the outcome, which is contrary to our hypothesis. Nonetheless, all three independent variables were not statistically significantly related to change in patient perceptions of the patient-centredness of patients' T1 visit.

T2 health perceptions (*beta* = -0.0028, *P* = 0.01) and anxiety at T1 (*beta* = -0.028, *P* = 0.03) were the only covariates for which a significant association with change in patient perceptions was found: the more negative the patients' general perceptions of their health at T2 and the more anxious the patient at T1, the greater the difference between mean baseline and mean recalled patient-centred care perceptions. More specifically, for every unit increase in T2 health perceptions and T1 anxiety, the difference between mean baseline and mean recalled perceptions of patient-centred care changed by 0.0028 points and 0.028 points, respectively.

Results of secondary analyses, which modelled change in perceptions using extensions of analysis of covariance on patients with complete PPPC data (n = 194), in addition to modeling change in perceptions as a change score on both n = 194 and n = 253 samples, were compatible with the findings above.

6.4 DISCUSSION

6.4.1 Key Results

The positive and significant association found between length of time elapsed between T1 and T2 and change in patient perceptions of patient-centred care of T1 between T1 and T2 (Table 6.7) suggests that on its own, it may be a statistically important factor; however, not over and above the personal characteristics of the patient. Psychologic literature on memory has established that memories of events can decay through the passage of time thereby being forgotten[23]. For this reason, many epidemiologic studies have become concerned with the time interval since exposure[9]. Previous studies investigating this effect on a variety of exposures, such as medical instruction[24], medication usage[25], and health status[26] reported that the amount of detail to recall over time also impacted change in perceptions over time. Therefore, in studies of the delivery of quality care, whereby recalling patient-physician communication is inherently detailed, it has been recommended that researchers should consider the amount of detail being recalled and over what length of period to reduce the inconsistency between perceptions over time.

Two critical results were found in the analysis of the multivariable model, presented in Table 6.9. First, patients' negative health perceptions at T2 were significantly associated with a greater change in patient perceptions between T1 and T2 of the patient-centred care received at T1. To a large extent, this finding is akin to the third hypothesis investigated in this research, whereby patients may reconstruct their T1 experience based on more salient memories also linked to their T1 experience. Whereas the variable chosen for the third hypothesis, patient-reported change in symptom discomfort measured on a VAS scale, was not significantly related to change in patient perceptions over time, patient health perceptions measured by the SF-20 was. The SF-20 assesses a more general health concept than the discomfort of a single symptom. It seems that this level of general health was more important to the outcome.

Second, patients' anxiety at T1 was significantly associated with change in perceptions over time in a negative direction i.e. the more anxious the patient at T1, the greater the change in perceptions between T1 and T2 of the patient-centredness of their T1 visit. To a certain extent, this finding is consistent with some pyschologic literature in that the more anxious the patient, the less is recalled (i.e. greater change) of medical information[27]. However, a more common finding in the psychologic literature holds that both very high and very low anxiety hamper eventual memory performance such that moderate anxiety is best[28]. A study by Sorg and Whitney[29] showed that even mildly stressful events can have very different effects on memory recall depending on the anxiety level of the subjects. Specifically, severe anxiety inhibited the retention of information due to stress-related factors, which impeded the focus of the subjects. This finding is particularly relevant to our sample, since patient visits with physicians may be regarded as stressful. Therefore, in family practice settings where patient anxiety levels are wide-ranging, studies should consider the potential for inconsistent patient perceptions over time when obtaining retrospective reports of patient-centred care.

6.4.2 Limitations

Several limitations should be noted. First, the primary analytic sample included patients with both complete (n = 194) and mean imputed (n = 59) PPPC scores at T1 and T2, as opposed to complete cases only. This increased the power of the hypothesis testing and strengthened the completeness of the data, since patients with imputed PPPC items had reported on average thirteen of the fourteen PPPC items at both T1 and T2. However, the generalizability of the patient sample was limited since patients analyzed were significantly younger and had stronger coping skills than those excluded (n = 62).

Second, there are a number of other issues that address the generalizability of the results. A relatively small change in mean patient-perceptions of patient-centred care from T1 to T2 was found (i.e. mean change in PPPC scores was 0.17 and scores ranged from -0.93 to 1.79). This may have been in part due to the PPPC Questionnaire having only a four-point scale per item. Patient-centred care surveys with more than four response categories or open-ended questions might be subject to greater change in perceptions without the use of additional cues.

Third, it is possible that the patients studied were quite familiar with their family physician (i.e. mean duration of patient-physician relationship was nine years) and were selected based on a new symptom of either a new or recurring problem. This familiarity with both the physician and the symptom may not apply to other settings such as walk-in clinics, emergency departments and even some outpatient clinics[24]. Therefore, generalizing these results should be done with caution.

Fourth, the statistically significant relationships reported in this study can only be inferred over similar elapsed time periods of around two months. Further research should investigate the impact of the amount of post-visit health care visits and change in symptom discomfort on change in patient perceptions of patient-centred care over longer periods of time, such as over six and twelve months.

6.4.3 Conclusions

This study's interdisciplinary approach to investigating the factors associated with changes in baseline and recalled patient perceptions of patient-centred care in family practice unveiled critical patient characteristics worthy of testing in future studies: patients' health perceptions at the time of recall and patients' anxiety at the time of the visit in question. Furthermore, this research demonstrates the importance of considering how psychological processes of patients participating in cohort studies impact their recalled responses and subsequently the validity of results. Researchers measuring quality of care indicators, such as patient-physician communication, should therefore, be cautious of the timing of implementing their perception measures relative to the patient-physician experience in question.

Table 6.1 Demographic Characteristics of Physician Respondents vs. Non-Respondents

Physician Variables	Participating Physicians (n = 32)	Non-Participating Physicians (n = 51)
Year of Graduation (Mean, SD)	1975 (7.4)	1972 (9.9)
Practice Location (% Rural)	31%	29%
Gender (% Male)	66%	71%
Certificant of the College of Family Physicians of Canada (% Yes)*	66%	27%

Note: *Significantly different at $P \leq 0.05$.

Table 6.2 Demographic Characteristics of Patient Respondents vs. Non-Respondents

Patient Variables	Respondents (n = 253)	Non-Respondents (n = 162)
Age (Mean, SD)*	42.1 years (15.9)	43.4 years (17.6)
Gender (% Female)	52%	54%
Main Presenting Problem: Digestive, Respiratory, Musculoskeletal, Skin, Other (Mode)[a]	Digestive (10%) Respiratory (29%) Musculoskeletal (20%) Skin (15%) Other (26%)	Digestive (13%) Respiratory (31%) Musculoskeletal (12%) Skin (6%) Other (39%)
Martial Status: Married, Other (% Married)[b]	59%	61%

Note: *Significantly different at $P \leq 0.05$.

a) Only 95 of the 162 non-respondent patients during initial consultation with the interviewer reported their main presenting problem; it is assumed that patients were not asked this question as the original archived log books did not have this question as a part of their package. b) Only 77 of the 162 non-respondent patients during initial consultation with the interviewer reported their marital status; it is assumed that patients were not asked this question as original archived log books did not have this question as part of their package.

Table 6.3 Comparison of the Distributions of the Categorized Mean Patient-Perceived Patient-Centred Scores (PPPC) at T1 and T2 based on the 4-point PPPC Scale[14] (n = 253)

Interpretation of Mean PPPC scores	Frequency of mean PPPC scores at T1 n (%)	Frequency of mean PPPC scores at T2 n (%)
Perceived Complete PCC at T1[a]	17 (6.7)	5 (1.9)
Perceived Complete to Mostly PCC at T1[b]	207 (81.2)	166 (65.6)
Perceived Mostly PCC at T1[c]	9 (3.6)	9 (3.6)
Perceived Mostly to A Little PCC at T1[d]	20 (7.9)	47 (18.6)
Perceived A Little PCC at T1[e]	-	-
Perceived A Little to Not at All PCC at T1[f]	-	3 (1.2)
Perceived Not at All PCC at T1[g]	-	-

Note: a) Perceived Complete patient-centred care represents mean PPPC scores = 1; b) Perceived Complete to Mostly patient-centred care represents mean PPPC scores ranging from 1.01 to 1.99; c) Perceived Mostly patient-centred care represents mean PPPC scores = 2; d) Perceived Mostly to A Little patient-centred care represents mean PPPC scores ranging from 2.01 to 2.99; e) Perceived A Little patient-centred care represents mean PPPC scores = 3; f) Perceived A Little to Not at all patient-centred care represents mean PPPC scores ranging from 3.01 to 3.99; g) Perceived Not At All patient-centred care represents mean PPPC scores = 4.

Table 6.4 Descriptive Results of the Patient-Perceived Patient-Centred Care (PPPC) Scores from T1 to T2 (n = 253)

Categories of Change in PPPC		Range of mean PPPC change scores	N (%)	Total number of point differences from PPPC T1 to PPPC T2 scales (%)
Patient-Perceptions of Patient-Centred Care Worsened at T2 from T1[a]	**Large positive mean PPPC change**	[0.50, 1.79]	48 (19.0)	25 (2.1) 19 (2.1) 18 (2.1) 17 (2.1) 16 (4.2) 15 (2.1) 13 (4.2) 12 (10.4) 11 (10.4) 10 (10.4) 9 (16.7) 8 (14.6) 7 (18.8)
	Small positive mean PPPC change	(0, 0.5)	120 (47.5)	6 (11.0) 5 (10.0) 4 (17.0) 3 (20.0) 2 (19.0) 1 (23.0)
No Change in Mean PPPC change score		[0]	19 (7.5)	0 (100)
Patient-Perceptions of Patient-Centred Care Improved at T2 from T1[b]	**Small negative mean PPPC change**	(0, -0.5)	54 (21.3)	1 (22.2) 2 (24.1) 3 (18.5) 4 (11.1) 5 (14.8) 6 (9.3)
	Large negative mean PPPC change	[-0.50, -0.93]	12 (4.7)	7 (33.3) 8 (17.0) 9 (8.0) 10 (27.0) 11 (8.0) 12 (8.0) 13 (8.0)

Note: Cut-offs for categories were based on frequency distribution of the continuous mean PPPC change score (mean PPPC at T2 – mean PPPC at T1); a) Positive mean PPPC change corresponds to higher PPPC scores at T2 than at T1, and therefore worsened PPPC at T2; b) Negative mean PPPC change corresponds to lower PPPC scores at T2 than at T1, and therefore improved PPPC at T1. See Section 5.7.1 for additional information regarding the dependent variable.

Table 6.5 Descriptive Results for the Key Variables (n = 253)

VARIABLES	Mean ± SD
Patient Perceptions of Patient-Centred Care at T1 (mean score from 1 - 4)	1.52 ± 0.37
Patient Perceptions of Patient-Centred Care at T2 (mean score from 1 - 4)	1.69 ± 0.44
Elapsed Time between T1, T2 (weeks) (n missing = 2)	8.54 ± 2.30
Additional Health Care Visits between T1, T2 (Total number)	2.00 ± 3.54
Symptom Discomfort of main problem at T1 (VAS score from 0 - 100)	46.07 ± 28.57
Symptom Discomfort of main problem at T2 (VAS score from 0 - 100)	19.11 ± 26.9
Change in Symptom Discomfort between T1, T2 (T1-T2 VAS score)	26.95 ± 36.8

Table 6.6 Descriptive Results of Patient Characteristics (n = 253)

VARIABLES	
Age (mean years ± std)	42.1 ± 15.9
Gender (% Female)	52.2
Marital Status (% married)	59.3
Education (%)	
Some high school or less	29.3
Completed high school	26.1
Some college/university or more	37.5
Other	7.1
Main Presenting Problems (%)	
Digestive	10.3
Musculoskeletal	20.2
Respiratory	28.5
Skin	14.9
Other	26.1
History of Problems (median days, interquartile range) (n missing = 5)	14.0 (5.0 – 90.0)
Anxiety (mean ± std) (n missing = 2)	5.5 ± 1.95
Coping Skills (mean ± std)	3.8 ± 0.69
T2 Emotional Status (mean ± std) (n missing = 3)	78.0 ±15.9
T2 Health Perceptions (mean ± std) (n missing = 4)	70.3 ± 26.3
Length of visit at T1 (mean minutes ± std) (n missing = 6)	10.0 ± 4.9
Length of Patient-Physician relationship (mean years ± std) (n missing = 2)	8.9 ± 6.7

Table 6.7 Unadjusted Regression Results of Patient Perceptions of Patient-Centredness at T2 (controlling for T1) in Relation to each of the Three Independent Variables ($n = 251^a$)

	Beta Coefficient	Standard Error	95% CI	*P*-value
Elapsed Time*	0.036	0.010	(0.016, 0.056)	0.0005
Total Health Care Visits	0.0022	0.0066	(-0.011, 0.015)	0.74
Change in Discomfort	0.0010	0.00061	(-0.0002, 0.0022)	0.10
PPPC1	0.61	0.061	(0.50, 0.73)	<0.0001

Note: Adjusted for the clustering of patients within practices; *Significant at $P \leq 0.05$.

a) Patient IDs 1501 and 2002 were excluded from analysis due to missing values for Elapsed Time.

Table 6.8 Bivariate Regression Results of Potential Confounders on T2 Perceptions of Patient-Centred Care Scores, Controlling for T1 (n = 253)

	Beta Coefficient	Standard Error	*P*-value
Main Presenting Problem			
Digestive	0.097	0.086	0.26
Musculoskeletal	-0.038	0.069	0.58
Respiratory	-0.055	0.063	0.38
Skin	-0.073	0.076	0.33
History of Main Presenting Problem (Days) (n missing = 5)	0.000020	0.000038	0.59
Other Health Problems (Yes)	-0.037	0.052	0.48
Duration of Patient-Physician Relationship (Years) (n missing = 2)	0.0040	0.0035	0.25
Age (Years)*	0.0029	0.0015	0.049
Gender (Female)	-0.024	0.047	0.61
Marital Status (Married)	-0.0018	0.048	0.97
Educational Attainment			
Complete Public School	-0.13	0.13	0.33
Incomplete High School	-0.19	0.10	0.12
Complete High School	-0.010	0.099	0.31
Community College	-0.14	0.10	0.16
University	-0.12	0.11	0.27
Anxiety* (n missing = 2)	-0.033	0.012	0.0049
Coping Skills*	-0.062	0.034	0.067
Visit Length (Minutes) (n missing = 6)	-0.0018	0.0048	0.57
T2 Emotional Status* (n missing = 3)	-0.0047	0.0015	0.001
T2 Health Perceptions* (n missing = 4)	-0.0042	0.00086	<0.0001
Physician Gender (Female)	0.00092	0.052	0.99
Years Since Graduation from Medical School	0.0019	0.0032	0.55
CCFP Status (Yes) (n missing = 7 from 1 FP)	-0.062	0.050	0.22
Region of Practice (Urban)	0.0061	0.050	0.90
Volume of Practice			
<25 patients per day*	0.13	0.074	0.07
25-49 patients per day	-0.0025	0.059	0.97
Interviewer (Interviewer 1)*	-0.096	0.048	0.047

Note: *Potential confounders of mean PPPC at T2, controlling for T1 as outcome based on $P < 0.1$ level: age, anxiety, coping skills, T2 emotional status, T2 health perceptions, physicians' volume of practice, and T1 interviewer.

Table 6.9 Adjusted Regression Results of the Multivariable Model: Test of All Three Hypotheses in a Multiple Regression on T2 Perceptions ofPatient-Centredness, Controlling for T1 and Covariates (n = 245^a)

	Beta Coefficient	Standard Error	95% CI	P-value
Elapsed Time	0.013	0.014	(-0.014, 0.039)	0.36
Total Health Care Visits	-0.0014	0.0065	(-0.014, 0.011)	0.83
Change in Discomfort	0.00065	0.00061	(-0.00055, 0.0019)	0.29
Age	0.0023	0.0015	(-0.00059, 0.0052)	0.12
Anxiety*	-0.028	0.013	(-0.054, -0.0021)	0.03
Coping Skills	-0.010	0.036	(-0.080, 0.060)	0.78
T2 Emotional Health Status	0.00017	0.0020	(-0.0038, 0.0041)	0.93
T2 Health Perceptions*	-0.0028	0.0011	(-0.0049, -0.00064)	0.01
Volume of Practice	-0.11	0.059	(-0.23, 0.0025)	0.06
Interviewer	-0.058	0.048	(-0.15, 0.038)	0.23
PPPC1	0.61	0.061	(0.49, 0.73)	<0.0001

Note: Adjusted for the clustering of patients within practices; *Significant at $P \leq 0.05$.

a) Patient IDs 1501, 1803, 2002, 2303, 3108, 3404, 3410 and 3709 (n = 8) were excluded from analysis for the following reasons: ID 1501 missing value for Elapsed Time; ID 1803 missing value for Anxiety; ID 2002 missing values for T2 Emotional Health Status, T2 Health Perceptions, and Elapsed Time; ID 2303 missing values for T2 Emotional Health Status and T2 Health Perceptions; ID 3108 missing value for T2 Emotional Health Status; ID 3404 missing value for T2 Health Perceptions; ID 3410 missing value for Anxiety; ID 3709 missing value for T2 Health Perceptions.

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CHAPTER SEVEN
DISCUSSION OF THESIS

7.1 INTEGRATING KEY RESULTS TO THE CONCEPTUAL FRAMEWORK

The amount of time elapsed, the number of health care visits experienced, and the change in symptom discomfort between T1 and T2 represented the three main hypothesized factors affecting the change in of patients' perceptions of their patient-centred care received at T1 from T1 to T2. These variables were chosen to represent three concepts from the psychologic literature: (1) forgetting events due to the passage of time; (2) forgetting events due to the interference of post-event experiences; and, (3) reconstructing the memory of events using more salient memories also linked to the event in question. In the primary analysis, these main effects were not significantly related to change in perceptions; however, other patient factors, including patients' health perceptions at T2 and anxiety at T1, were significantly related. The following subsections (Sections 7.1.1 and 7.1.2) seek to explain the primary and secondary findings of this thesis in relation to the conceptual framework, based on the two ways in which change in perceptions of patient-centred care was modeled (i.e. using the analysis of covariance and change score approach) for both patient sample sizes (i.e. n = 253 and n = 194).

7.1.1 Discussion of Effects in Relation to the Theories

Multivariable analyses of patients with complete PPPC scores (n=194)[i] and patients with complete and mean imputed PPPC scores (n=253)[ii] revealed similar magnitudes of effect and non-significant relationships between the three hypothesized independent variables and covariates with change in perceptions (see Tables D.3 and 6.9 respectively).

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[i] n=194 model controlled for the following six covariates: age, anxiety, T2 emotional status, T2 health perceptions, physicians' volume of practice, and interviewer at T1.

[ii] n=253 model controlled for the following seven covariates: age, anxiety, coping skills, T2 emotional status, T2 health perceptions, physicians' volume of practice, and interviewer at T1.

Analyses of elapsed time, the first effect of interest, did not support our hypothesis. This factor was based on the theory initially proposed by Ebbinghaus[1] that patients forget the memory of their T1 experience as more time passes from T1 to T2. Some literature on patient-physician interactions supports this theory, as in the case of the Wright and colleagues study where patients remembered proportionately less medical information after one month[2]. Also, a survey of forgetting research reported that the rate at which we forget information usually conforms to a power law[3]: we forget a lot at first, but over time the rate of forgetting diminishes. However, our result may not support this theory of forgetting for various reasons. First, the time period between T1 and T2 was relatively short, around two months, for the change or difference in perceptions of the patient-centred care received at T1 between T1 and T2 to increase due to time. Second, the non-technical nature of patient-physician communication, unlike medical information, is identifiable among all types of patients such that its recollection may be less of challenge over time. Therefore, our finding suggests that the difference between patients' baseline and recalled perceptions of patient-centred care is not significantly related to the amount of time elapsed since the T1 visit.

Similarly, our analyses found that change in perceptions over time was not significantly related to the amount of health visits experienced between T1 and T2, the second effect of interest. This factor was based on the theory that patients' recollection of events can be altered by subsequent related experiences[4]. Support of this theory can be found in the medical literature, which reports on the recency of medical events and the volume of physician visits in relation to recall accuracy[5,6]. However, these positive findings were based in hospital settings and not in family practices, which may challenge this theory. Furthermore, it is quite possible that patients simply did not experience a large enough number of visits within this time period to produce a statistically and clinically meaningful effect i.e. there was not a strong enough dose. Another explanation may be that the T1 visit was more salient than other post-T1 visits due to patients' active participation in the study at T1. Therefore, in future studies, one could test whether there is greater potential for the memory of post-T1 health care visits (i.e. more recent visits) to interfere with the memory of an ordinary physician visit versus a visit in which patients are involved as study subjects.

Change in patients' symptom discomfort between T1 and T2, the third effect of interest, was hypothesized to affect the retrieval of the memory of the T1 visit experience, and therefore, the consistency of perceptions of patient-centred care. The theory of reconstructive and inferential memory postulates that for individuals who cannot retrieve an earlier memory they experienced but can retrieve other memories that are more salient to them that are also linked to the T1 experience (i.e. how much change in their symptoms they experienced between T1 and T2 as a result of the T1 experience) may use such memories to reconstruct or infer what the original memory must have been. Implicit theories relating to memory recall have been previously investigated in the psychologic literature. Ross contends that at the time of memory retrieval, respondents may not recall the exact answer provided at T1, but may infer that the response they gave followed from their state at the time and invoke an implicit theory of change[7]. Furthermore, findings from Spranger and Shwartz also elaborate that such perceived changes in health over time may potentiate changes in the internal standards of patients thereby inducing a response shift in their perceived quality of life[8]. Therefore, recall of a prior response, or in this case recall of perceptions of patient-centred care, is of concern when patients' have perceived their health states to have changed and are inappropriately used to infer their prior response. It is possible that this calculated change in health status alone, deduced from subjective VAS scores at T1 and T2, was too technical and indirect a measure and would not have produced the same results if patients implicitly deduced how much change in their health they experienced between T1 and T2.

Supporting this interpretation, was the result of the test of the hypothesis that patients' health perceptions at T2 would affect the retrieval of patients' memory of T1 and in turn directly affect change in perceptions. Our findings suggest that the more worse the self-perceptions of patients' health at T2, the greater degree of inconsistency or change between baseline and recalled perceptions of patient-centred care. This finding supports the concept that recall involves an active and constructive process influenced by self-perceptions. Therefore, current health measured by self-perceived health at T2 may be more useful than the VAS difference score measuring change in symptoms, either because the VAS change score was too indirect or the perception measure was more personal.

Anxiety was hypothesized to affect the acquisition or encoding of the memory of the T1 visit experience, which can directly and indirectly affect change in perceptions of patient-centred care. It is one aspect of personality which has been extensively studied with regard to its effect on memory. Some research[9] has demonstrated that high levels of anxiety are related to lower memory performance (i.e. greater inconsistency between baseline and recalled reports), which is parallel to our results. It has been explained elsewhere[10] that highly anxious subjects at the time of testing (i.e. at T1) may exhibit self-preoccupation with task-irrelevant material such that less information is processed and is encoded in a more superficial manner (i.e. less elaboration). Therefore, the outcome would be a reduction in the range of attention at T1 and furthermore, the reduction in accurately retrieving the memory of T1 at a later time. This point is highly relevant to our study since it is possible that patients who reported high levels of anxiety at T1 were preoccupied with their health concerns such that evaluating patient-physician communication during their visit may not have taken precedence.

Although the positive association between age and change in perceptions was significant for only one of two models, it is nonetheless, a factor worth discussing. Although some psychologic research contends that there is no consistent relationship between age and memory recall for skills or general semantic information[11], literature on the memory for specific events, however, reports on the susceptibility to age-related recall impairment[12,13].

7.1.2 Comparison of Results between Two Methods for Modeling Change in Perceptions

As stated in Section 5.9, comparing results between analyses that modelled change in perceptions of patient-centred care using the analysis of covariance (ANCOVA) approach (see Chapter 6 for n = 253 and Appendix D for n = 194 results) versus the change score approach (see Appendix E for both n = 253 and n = 194 results) was an additional goal of the thesis. It has been reported that using change scores as dependent variables in regression analysis is not uncommon in social epidemiology, particularly when the outcome pertains to accuracy. However, this change score method has been criticized for its purported unreliability and sensitivity to regression toward the mean[14]. Allison contends that there should be no automatic preference for either model and that the only proper basis for a choice is careful consideration of each empirical application[14]. For this reason, both models of the outcome were analyzed for both samples of patients with complete PPPC scores (n =1 94) and patients with complete and mean imputed PPPC scores (n = 253).

In both samples of n = 194 and n = 253 patients, ANCOVA and change score methods yielded similar results in the multivariable models such that the three hypothesized main effects were not statistically significantly related to change in perceptions, in the same direction and magnitude, after controlling for the appropriate covariates[iii,iv,v,vi] (see Tables 6.9 and E.5). However, additional covariates for which a statistically significant relationship was found was not as consistent. ANCOVA results for both samples yielded T2 health perceptions and T1 anxiety as significant covariates. However, change score results for both samples yielded age and T1 anxiety as significant covariates, such that the older and the more anxious the patient at T1, the greater the

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[iii] ANCOVA method (n=253) controlled for the following seven covariates: age, anxiety, coping skills, T2 emotional status, T2 health perceptions, physicians' volume of practice, and interviewer at T1.

[iv] Change score method (n=253) controlled for the following six covariates: age, anxiety, T2 emotional status, T2 health perceptions, physicians' volume of practice, and interviewer at T1.

[v] ANCOVA method (n=194) controlled for the following six covariates: age, anxiety, T2 emotional status, T2 health perceptions, physicians' volume of practice, and interviewer at T1.

[vi] Change score method (n=194) controlled for the following five covariates: age, anxiety, T2 health perceptions, physicians' volume of practice, and T1 interviewer.

change in perceptions of patient-centred care. Therefore, only T1 anxiety was consistently significantly related in the negative direction to the outcome in these models.

In summary then, although there were minor differences between the significant relationships of covariates and change in perceptions of patient-centred care, modelled using ANCOVA and change score methods, the relationships between the main effects were nonetheless consistently non-significant, in the same direction and magnitude within the n = 253 and n = 194 samples. Therefore, to a certain extent, both methods reported similar results for both samples and the unreliability of change scores may not pose a problem here. Despite this, the ANCOVA method is generally preferred, because it is more powerful since it properly controls for baseline imbalance. In addition, results from the n = 253 sample provided more power for testing our hypotheses, relative to n = 194. The consistency in the multivariable regression results between the four methods of PPPC imputation in the n = 253 sample (i.e. mean, median, minimum and maximum values imputed), which imputed values based on the patient's own scores rather than across all patients' scores, further strengthened the credibility of interpreting results from the n = 253 sample over the complete case n = 194 sample. Therefore, Chapter 6 results, which modelled change in perceptions using ANCOVA using the n = 253 sample, hold as the analyses of choice.

7.2 SUMMARY AND FUTURE DIRECTIONS

The potential threat to the validity of studies due to the timing of measurement in current studies of self-reported patient-centred care is under-reported, as evident from the systematic review of the literature relating patient-centred care to health outcomes presented in this thesis (Chapter 2 and discussed in Section 3.1). Therefore, the goal of this thesis was to elucidate potential factors affecting change in patient perceptions between baseline and recalled perceptions patient-centred communication as a result of implementing a patient-centred care measure approximately two months after a family physician visit in question. The results of this thesis demonstrated how the validity of results of retrospective studies may be in question when factors, such as, patients' perceptions of their health at T2 and their anxiety at T1, are ignored. Although the three main hypothesized factors (elapsed time, additional health visits and change in health status) were not statistically significantly associated with change in perceptions, their link to the principles of forgetting and reconstructing memories are still conceptually important to recall and therefore, changes in patient perceptions over time.

Since the main hypothesized effects represent conceptually important factors, their relationships should be further tested in future studies. First, future studies should vary the time periods between the time of experiencing a visit and its recollection, such as over six and twelve month periods. Second, future research should also pay attention to the measurement of the factors since this thesis found differences in the significance of associations with change in patient perceptions based on the two ways patient-perceived health was measured. Third, future research should also consider investigating additional factors, such as those listed in Table 3.1, as they too theoretically relate to change in patient perceptions. Of particular importance would be investigating patients' expectations of patient-centred care and to what degree these expectations were met during the visit. Literature has shown that patient's expectations may influence their perceptions of quality of care and similarly, of what is recalled[15]. Exploring these suggestions in future research will further add to the thesis' preliminary significant relationships between T2 health perceptions, T1 anxiety and change in perceptions over time. These significant factors demonstrate the point that researchers cannot assume that patients are objective reporters when recalling the quality of care they received at an earlier time. Therefore, the timing of measurement is of critical importance for studies using patient reports of patient-centred care in order to maintain high methodologic quality and valid results.

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APPENDICES A - E

THE PATIENT-CENTERED CLINICAL MODEL

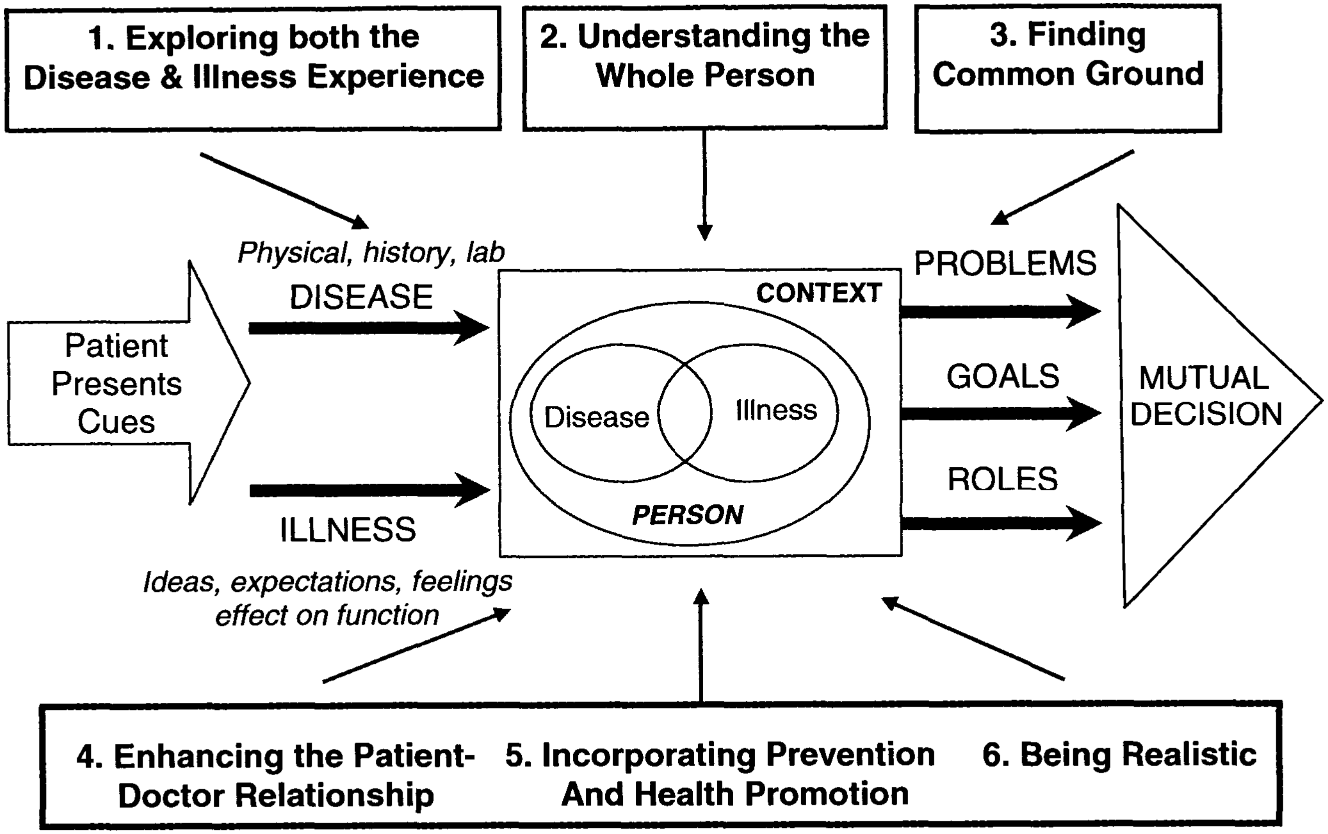

Figure A.1 The Patient-Centred Care Clinical Model as defined by Stewart M, Brown JB, Weston W, et al. Patient-Centred Medicine: Transforming the Clinical Method 2nd ed. Radcliffe Medical Press; United Kingdom: 2003

APPENDIX B

ADDITIONAL SUPPORTING INFORMATION AND DATA FOR CHAPTER FIVE

> Dear Patient:
>
> We are looking at how to help family physicians communicate more effectively with their patients. In order to achieve this we need to have a better understanding of the components of doctor-patient communication.
>
> As part of this study your visit today with your doctor will be audiotaped. At the completion of your visit with your doctor, the researcher will ask you questions regarding the visit. The interview will take approximately 20 minutes. You may refuse to answer any questions. A photocopy of your chart spanning the year prior to this visit and the year following will be reviewed by the research team. The chart review will examine four areas: number of visits over the 2 years; number and kinds of tests ordered; the number and kind of prescriptions, and the number and kind of referrals. All identifying information will be removed from the record and replaced with a code number to ensure confidentiality. *The researcher will be calling you at your home in two months time to inquire about your health.* This telephone interview will take 5 minutes and you may refuse to answer any questions.
>
> The interview with your doctor and the interviews with the researcher will be kept confidential and all research data will be place in a locked file. You may withdraw from the study at anytime without jeopardy to your future care. Refusal to participate in this study will in no way affect the medical care you receive from your doctor.

***Figure B.1 Original Letter of Information provided to patients in the Impact of Patient Centred Care on Health Outcomes Study*[1]**

Italicized section confirms that patients were not informed that upon follow-up, they would be asked to recall their perceptions of the patient-centred care they received at T1.

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[1] Stewart M, Brown JB, Donner A, et al. The Impact of Patient-Centred Care on Outcomes. *The Journal of Family Practice* 2000;49(9):796-804.

Table B.1 Cross-tabulation of Family Physician Diagnosis (abstracted from original patient records) and Patient Perception of Main Presenting Problem according to the Classification System of the International Classification of Primary Care

		General and Unspecified	Blood	Eye	Ear	Circula-tory	Musculo-skeletal	Neurolo-gical	Psycho-logical	Respira-tory	Skin	Endo-crine	Uro-logy	Female Genital	Male Genital	Total
Patient Perception of Main Presenting Problem	General and Unspecified	2							1	2				1		6
	Digestive		13							1						14
	Eye			4							1					5
	Ear				9					2	1					12
	Circulatory		1			1			1							3
	Musculo-skeletal						28				1	1		1		31
	Neurolo-gical		2		1			3	1	3						10
	Psychol-ogical											1				1
	Respira-tory					2	1	1	1	47				1		53
	Skin						1			1	28					30
	Endocrine		1									1				2
	Urology												6		1	7
	Female Genital													2		2
	Male Genital														1	1
Total		2	17	4	10	3	30	4	4	56	31	3	6	5	2	177

Table B.2 Comparison of Key Variables between Patients with Complete PPPC Data (n = 194) and Mean Imputed PPPC Data (n = 59)

	Patients Included in Analysis (n = 253)	
	Patients with complete T1 and T2 PPPC data (n = 194)	**Patients with mean ~ 1 PPPC item missing either T1 and/or T2 (n = 59) [mean imputed]**
Independent Variables		
Elapsed Time [weeks] (mean ± sd)	8.4 ± 2.2	9.1 ± 2.6
Total visits (mean ± sd)	1.8 ± 2.9	2.7 ± 5.0
Change in Discomfort (Difference in VAS scale from T2 –T1) (mean ± sd)	-28.60 ±35.8	-21.5 ± 39.6
Confounders and Covariates		
Age (mean ± sd)	40.6 ±15.8	47.2 ± 15.1*
Anxiety [1 item scale 1-9; low is high anxiety] (mean ± sd)	5.6 ± 1.9	5.2 ± 2.0
Coping [Average of 7-item scale 1-5; low is poor coping] (mean ± sd)	3.9 ± 0.7	3.7 ± 0.6*
T2 Emotional Status [5-item MH SF-20 tranformed to scale 0-100] (mean ± sd)	79.4 ± 14.2	73.6 ± 20.0*
T2 Health Perceptions [5-item HP SF-20 tranformed to scale 0-100] (mean ± sd)	73.3 ± 24.9	60.2 ± 28.5*
Physician Practice Volume [# patients seen per day] (%)	< 25 (22%) 25-49 (60%) 50+ (18%)	< 25 (10%) 25-49 (62%) 50+ (28 %)
Interviewer (%)	#1 (67%) #2 (33%)	#1 (46%)* #2 (54%)

Note: * Signifies that the variable is significantly different from n = 194 at $P \leq 0.05$.

APPENDIX C

ADDITIONAL RESULTS SUPPORTING CHAPTER SIX

Table C.1 Comparison of Key Variables between Patients Included (n = 253) and Excluded from Analysis (n = 62)

	Patients with complete (n = 194) and imputed items (n = 59) (Total n = 253)	**Patients with ≥ 7 items missing either T1 and/or T2 PPPC data (n = 62) [excluded from analysis]**
Independent Variables		
Elapsed Time [weeks] (mean ± sd)	8.5 ± 2.3	8.9 ± 2.5
Total visits (mean ± sd)	2.0 ± 3.5	1.4 ± 2.6
Change in Discomfort (Difference in VAS scale from T2 -T1) (mean ± sd)	-27.0 ± 36.8	-18.4 ± 38.2
Confounders and Covariates		
Age (mean ± sd)	42.1 ± 15.9	48.0 ± 18.2*
Anxiety [1 item scale 1-9; low is high anxiety] (mean ± sd)	5.5 ± 2.0	5.0 ± 2.2
Coping [Average of 7-item scale 1-5; low is poor coping] (mean ± sd)	3.8 ± 0.7	3.6 ± 0.7*
T2 Emotional Status [5-item MH SF-20 tranformed to scale 0-100] (mean ± sd)	78.0 ± 15.9	74.3 ± 20.5
T2 Health Perceptions [5-item HP SF-20 tranformed to scale 0-100] (mean ± sd)	70.3 ± 26.3	65.6 ± 28.0
Physician Practice Volume [number of patients seen per day] (%)	< 25 (19%) 25-49 (61%) 50+ (21%)	< 25 (27%) 25-49 (61%) 50+ (11%)
Interviewer (%)	#1 (62%) #2 (38%)	#1 (97%)* #2 (3%)

Note: * significant differences at $P \leq 0.05$ were: age and coping skills.

Table C.2 Comparison of Paired Differences of PPPC items between T1 and T2 (n = 253)

PCC	PPPC Paired Item	Mean Difference*	*P*-value
I	**"To what extent was the main problem discussed"**	-0.196	0.000
I	"Did the doctor know that this was one of your reason for coming"	-0.046	0.171
I	**"To what extent did the doctor understand the importance of your reason"**	-0.103	0.007
I	**"How well do you think the doctor understood you"**	-0.196	0.000
III	**"How satisfied were you with the discussion of your problem"**	-0.242	0.000
III	**"To what extent did the doctor explain this problem to you"**	-0.119	0.038
III	**"To what extent did you agree with the doctor's opinion about the problem"**	-0.289	0.000
III	"How much opportunity did you have to ask your questions"	-0.077	0.092
III	"To what extent did the doctor ask about your goals for treatment"	-0.103	0.290
III	**"To what extent did the doctor explain treatment"**	-0.242	0.001
III	"To what extent did the doctor explain how manageable this treatment would be for you"	-0.077	0.392
III	**"To what extent did you and the doctor discuss your respective roles"**	-0.180	0.057
III	**"To what extent did the doctor encourage you to take the role you wanted in your own care"**	-0.211	0.003
III	**"How much would you say the doctor cares about you as a person"**	-0.129	0.003

Note: PCC = Patient-centred care components of the Stewart et al. Patient-Centred Care Clinical Model (I: patients' perceptions that their illness experience had been explored; III: patients' perceptions that the patient and doctor had found common ground); * negative mean difference values signify a decrease or weakened perceptions of patient-centred care from T1 to T2. *Significant at $P \leq 0.05$.

APPENDIX D

RESULTS OF ANALYSES USING CASES WITH COMPLETE T1 AND T2 PATIENT-PERCEPTION OF PATIENT-CENTRED CARE SCORES (N = 194)

Table D.1 Unadjusted Regression Results of Patient Perceptions of Patient-Centred Care at T2 (controlling for T1) in Relation to Each of the Three Independent Variables (n = 192[a])

	Beta Coefficient	**Standard Error**	**95% CI**	***P*-value**
Elapsed Time* (n missing = 2)	0.025	0.012	(0.0015,0.0048)	0.04
Total Health Care Visits	0.0021	0.0087	(-0.015,0.019)	0.81
Change in Discomfort	0.00043	0.00071	(-0.00096,0.0018)	0.54
PPPC1	0.56	0.072	(0.42, 0.71)	<0.0001

Note: Adjusted for the clustering of patients within practices; *Significant at $P \leq 0.05$.

a) Patient IDs 1501 and 2002 were excluded from analysis due to missing values for Elapsed Time.

Table D.2 Bivariate Regression Results of Potential Confounders on T2 Perceptions of Patient-Centred Care Scores, Controlling for T1 (n = 194)

	Beta Coefficient	Standard Error	*P*-value
Main Presenting Problem			
Digestive	0.21	0.45	0.59
Musculoskeletal	0.036	0.085	0.66
Respiratory	0.043	0.077	0.57
Skin	0.074	0.078	0.34
History of Main Presenting Problem (Days) (n missing = 2)	0.0099	0.0088	0.27
Other Health Problems (Yes)	0.033	0.059	0.57
Duration of Patient-Physician Relationship (Years) (n missing = 2)	0.0042	0.0039	0.28
Age*	0.0031	0.0016	0.05
Gender (Female)	0.025	0.051	0.62
Marital Status (Married)	0.0058	0.052	0.91
Educational Attainment			
Incomplete High School	-0.15	0.14	0.28
Complete High School	-0.081	0.14	0.54
Community College	-0.15	0.14	0.27
University	-0.14	0.14	0.31
Other	-0.16	0.16	0.32
Anxiety* (n missing = 1)	0.028	0.013	0.03
Coping Skills	-0.055	0.036	0.13
Visit Length (Minutes) (n missing = 6)	-0.0025	0.0052	0.62
T2 Emotional Status* (n missing = 2)	-0.0033	0.0018	0.06
T2 Health Perceptions* (n missing = 3)	-0.0033	0.001	0.001
Physician Gender (Female)	0.024	0.055	0.65
Years since Graduation from Medical School	0.0027	0.0034	0.42
CCFP status (Yes) (n missing = 3 from 1 FP)	-0.066	0.054	0.21
Region of Practice (Urban)	-0.038	0.056	0.49
Volume of Practice			
<25 patients per day*	0.22	0.083	0.01
25-49 patients per day	0.079	0.068	0.25
Interviewer (Interviewer 1)*	0.13	0.053	0.01

Note: *Potential confounders based on $P < 0.1$ level: age, anxiety, T2 emotional status, T2 health perceptions, physicians' volume of practice, and interviewer at T1.

Table D.3 Adjusted Regression Results of the Multivariable Model: Test of All Three Hypotheses in a Multiple Regression on T2 Perceptions of Patient-Centredness, Controlling T1 and Covariates (n = 189[a])

	Beta Coefficient	**Standard Error**	**95% CI**	**P-value**
Elapsed Time	0.0021	0.015	(-0.03, 0.03)	0.88
Total Health Care Visits	-0.0011	0.0084	(-0.018, 0.015)	0.90
Change in Discomfort	-0.00010	0.00070	(-0.0015, 0.0013)	0.88
Age*	0.0030	0.0016	(-0.00006, 0.006)	0.05
Anxiety*	-0.027	0.014	(-0.056, 0.0006)	0.05
T2 Emotional Health Status	0.00047	0.0023	(-0.0040, 0.005)	0.84
T2 Health Perceptions*	-0.0024	0.0013	(-0.0048, -0.00004)	0.04
Volume of Practice	-0.11	0.063	(-0.24, 0.013)	0.07
Interviewer	-0.090	0.056	(-0.20, 0.021)	0.11
PPPC1	0.56	0.073	(0.45, 0.74)	<0.0001

Note: Adjusted for the clustering of patients within practices; *Significant at $P \leq 0.05$.

a) Patient IDs 1501, 1803, 2002, 2303, and 3404 (n = 5) were excluded from analysis for the following reasons: ID 1501 missing value for Elapsed Time; ID 1803 missing value for Anxiety; ID 2002 missing values for T2 Emotional Health Status, T2 Health Perceptions, and Elapsed Time; ID 2303 missing values for T2 Emotional Health Status and T2 Health Perceptions; ID 3404 missing value for T2 Health Perceptions.

APPENDIX E

RESULTS OF ANALYSES MODELING RECALL THE OUTCOME AS CHANGE SCORE

Table E.1 Unadjusted Regression Results of Change in Patient Perceptions of Patient-Centred Care from T1 to T2 in Relation to Each of the Three Independent Variables (n = 251[a])

	Beta Coefficient	Standard Error	95% CI	*P*-value
Elapsed Time*	0.035	0.011	(0.014, 0.057)	0.002
Total Health Care Visits	-0.00047	0.0071	(-0.014, 0.014)	0.95
Change in Discomfort	0.00089	0.00067	(-0.000041, 0.0022)	0.18

Note: Adjusted for the clustering of patients within practices;*Significant at $P \leq 0.05$.
a) Patient IDs 1501 and 2002 were excluded from analysis due to missing values for Elapsed Time.

Table E.2 Unadjusted Regression Results of Change in Patient Perceptions of Patient-Centred Care from T1 to T2 in Relation to Each of the Three Independent Variables (n = 192[a])

	Beta Coefficient	Standard Error	95% CI	*P*-value
Elapsed Time*	0.030	0.013	(0.0044, 0.054)	0.02
Total Health Care Visits	0.0019	0.0094	(-0.017, 0.021)	0.84
Change in Discomfort	0.00033	0.00077	(-0.0012, 0.0018)	0.66

Note: Adjusted for the clustering of patients within practices;*Significant at $P \leq 0.05$.
a) Patient IDs 1501 and 2002 were excluded from analysis due to missing values for Elapsed Time.

Table E.3 Bivariate Regression Results of Potential Confounders on Change Scores of Patient Perceptions of Patient-Centred Care (n = 253)

	Beta Coefficient	**Standard Error**	***P*-value**
Main Presenting Problem			
Digestive	0.11	0.091	0.21
Musculoskeletal	-0.025	0.073	0.73
Respiratory	-0.043	0.067	0.52
Skin	-0.050	0.080	0.54
History of Main Presenting Problem (Days) (n missing = 5)	0.000012	0.000040	0.77
Other Health Problems (Yes)	-0.020	0.055	0.72
Duration of Patient-Physician Relationship (Years) (n missing = 2)	0.0041	0.0038	0.28
Age (Years)*	0.0036	0.0016	0.02
Gender (Female)	-0.027	0.050	0.58
Marital Status (Married)	-0.023	0.050	0.65
Educational Attainment			
Complete Public School	-0.11	0.14	0.44
Incomplete High School	-0.17	0.11	0.11
Complete High School	-0.088	0.10	0.40
Community College	-0.14	0.11	0.17
University	-0.077	0.11	0.50
Anxiety* (n missing = 2)	-0.033	0.013	0.01
Coping Skills*	-0.044	0.036	0.22
Visit Length (Minutes) (n missing = 6)	-0.0014	0.0051	0.79
T2 Emotional Status* (n missing = 3)	-0.0034	0.0016	0.03
T2 Health Perceptions* (n missing = 4)	-0.0036	0.00092	0.0001
Physician Gender (Female)	-0.016	0.056	0.78
Years Since Graduation from Medical School	0.00058	0.0034	0.87
CCFP Status (Yes) (n missing = 7 from 1 FP)	0.054	0.055	0.33
Region of Practice (Urban)	0.011	0.055	0.84
Volume of Practice*			
<25 patients per day*	0.17	0.080	0.03
25-49 patients per day	0.014	0.063	0.83
Interviewer (Interviewer 1)*	-0.13	0.050	0.012

Note: *Potential confounders of mean PPPC change score as outcome based on $P < 0.1$ level: age, anxiety, T2 emotional status, T2 health perceptions, physicians' volume of practice, and T1 interviewer.

Table E.4 Bivariate Regression Results of Potential Confounders on Change Scores of Patient-Perceptions of Patient-Centred Care (n = 194)

	Beta Coefficient	Standard Error	*P*-value
Main Presenting Problem			
Digestive	0.20	0.32	0.37
Musculoskeletal	0.066	0.093	0.48
Respiratory	0.039	0.085	0.65
Skin	0.064	0.086	0.45
History of Main Presenting Problem (Days) (n missing = 2)	0.013	0.0096	0.20
Other Health Problems (Yes)	0.033	0.065	0.61
Duration of Patient-Physician Relationship (Years) (n missing = 2)	0.0018	0.0043	0.67
Age*	0.0047	0.0017	0.007
Gender (Female)	0.046	0.055	0.41
Marital Status (Married)	0.023	0.057	0.68
Educational Attainment			
Incomplete High School	-0.16	0.15	0.28
Complete High School	-0.11	0.15	0.42
Community College	-0.18	0.15	0.22
University	-0.14	0.16	0.37
Other	-0.16	0.18	0.39
Anxiety* (n missing = 1)	0.032	0.014	0.02
Coping Skills	-0.041	0.039	0.30
Visit Length (Minutes) (n missing = 6)	0.00023	0.0057	0.97
T2 Emotional Status* (n missing = 2)	-0.0025	0.0019	0.21
T2 Health Perceptions* (n missing = 3)	-0.0032	0.0011	0.004
Physician Gender (Female)	0.035	0.063	0.57
Years since Graduation from Medical School	0.0011	0.0039	0.76
CCFP status (Yes) (n missing = 3 from 1 FP)	-0.071	0.061	0.26
Region of Practice (Urban)	-0.0037	0.065	0.95
Volume of Practice			
<25 patients per day*	0.24	0.088	0.008
25-49 patients per day	0.077	0.074	0.29
Interviewer (Interviewer 1)*	0.16	0.058	0.005

Note: *Potential confounders of mean PPPC change score as outcome based on $P < 0.1$ level: age, anxiety, T2 health perceptions, physicians' volume of practice, and T1 interviewer.

Table E.5 Adjusted Regression Results of the Multivariable Model: Test of All Three Hypotheses in a Multiple Regression on Change in Patient Perceptions of Patient-Centered Care from T1 to T2, Controlling for Covariates (n = 245[a])

	Beta Coefficient	**Standard Error**	**95% CI**	***P*-value**
Elapsed Time	0.020	0.015	(-0.0087, 0.049)	0.17
Total Health Care Visits	-0.0038	0.0070	(-0.018, 0.0099)	0.59
Change in Discomfort	0.00053	0.00066	(-0.00078, 0.0018)	0.43
Age*	0.0031	0.0015	(0.00011, 0.0062)	0.04
Anxiety*	-0.0031	0.0015	(-0.059, -0.0054)	0.02
T2 Emotional Health Status	0.0016	0.0021	(-0.0025, 0.0058)	0.44
T2 Health Perceptions	-0.0022	0.0012	(-0.0045, 0.000065)	0.06
Volume of Practice	-0.13	0.064	(-0.26, 0.0044)	0.08
Interviewer	-0.089	0.052	(-0.19, 0.014)	0.09

Note: Adjusted for the clustering of patients within practices;*Significant at $P \leq 0.05$.

a) Patient IDs 1501, 1803, 2002, 2303, 3108, 3404, 3410 and 3709 (n = 8) were excluded from analysis for the following reasons: ID 1501 missing value for Elapsed Time; ID 1803 missing value for Anxiety; ID 2002 missing values for T2 Emotional Health Status, T2 Health Perceptions, and Elapsed Time; ID 2303 missing values for T2 Emotional Health Status and T2 Health Perceptions; ID 3108 missing value for T2 Emotional Health Status; ID 3404 missing value for T2 Health Perceptions; ID 3410 missing value for Anxiety; ID 3709 missing value for T2 Health Perceptions.

Table E.6 Adjusted Regression Results of the Multivariable Model: Test of All Three Hypotheses in a Multiple Regression on Change in Patient Perceptions of Patient-Centered Care from T1 to T2, Controlling for Covariates (n = 189[a])

	Beta Coefficient	**Standard Error**	**95% CI**	***P*-value**
Elapsed Time	0.0077	0.015	(-0.022, 0.037)	0.61
Total Health Care Visits	-0.0011	0.0091	(-0.019, 0.016)	0.91
Change in Discomfort	-0.00026	0.00076	(-0.0017, 0.0012)	0.73
Age*	0.0047	0.0017	(0.0014, 0.0080)	0.01
Anxiety*	-0.030	0.014	(-0.058, -0.0020)	0.04
T2 Health Perceptions	-0.0018	0.0013	(-0.0044, 0.00075)	0.16
Volume of Practice	-0.12	0.0013	(-0.26, 0.011)	0.07
Interviewer	-0.11	0.061	(-0.23, 0.012)	0.08

Note: Adjusted for the clustering of patients within practices;*Significant at $P \leq 0.05$.

a) Patient IDs 1501, 1803, 2002, 2303, and 3404 (n = 5) were excluded from analysis for the following reasons: ID 1501 missing value for Elapsed Time; ID 1803 missing value for Anxiety; ID 2002 missing values for T2 Emotional Health Status, T2 Health Perceptions, and Elapsed Time; ID 2303 missing values for T2 Emotional Health Status and T2 Health Perceptions; ID 3404 missing value for T2 Health Perceptions.