MENTAL HEALTH AND ILLNESS RESEARCH FUNDING IN THE CANADIAN INSTITUTES OF HEALTH RESEARCH- THE FIRST 10 YEARS: A QUANTITATIVE ANALYSIS

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Mental Health and Illness Research Funding

in the

Canadian Institutes of Health Research – The First 10 Years:

A Quantitative Analysis

by

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ABSTRACT

> But does it necessarily follow, that his task is to take possession of existing science to bring it to increasing degrees of generality, and to proceed, from condensation to condensation, to what has been called the unification of knowledge?
>
> Henri Bergson, 1911

The main objective of this research is an examination of the funded research database of the Canadian Institutes of Health Research (CIHR) to determine, and graphically illustrate, funding levels of mental health and illness research (MHIR) at CIHR as compared to other health research, and relative funding allocations within the MHIR set of research projects. As our main federally funded health research body, CIHR's funding allocations can be used as an indicator of Canada's health research priorities. This research objective is pursued with a three-part research question: (i) what proportion of health research funded by CIHR from 1999 to 2009 was allocated for MHIR; (ii) how much of this can be considered mental health research versus mental illness research; and (iii) how much of this is neuroscientific research versus non-neuroscientific research?

This is an in-depth analysis of CIHR's funded research database; in particular, a scrutiny of the abstracts of all projects funded by the Institute of Neurosciences, Mental Health and Addiction at CIHR in its first 10 years, and of all neuroscientific, mental health/illness and addiction related research funded in other virtual institutes and programs of CIHR over the same period. Detailed data sets with information on all relevant research projects are studied; dollar value, program type and research classification of each project are recorded; and each is categorized according to its

research objective(s). Pursuit of the present study's research objective demands a methodological design driven primarily by analysis of the data itself. This heuristic process unfolds according to what is found, and produces results on multiple levels with tabular and graphic illustrations when necessary. A clear and practicable distinction between mental health research and mental illness research is employed, and the implications of this distinction for the study's research method are explored.

The results point to one overriding conclusion: Ostensibly, MHIR as a whole is adequately funded at CIHR, but there is ample evidence that allocations within MHIR may not satisfactorily address all the concerns falling under its extensive mandate. In particular, mental illnesses may well be under-funded and under-researched. Thus closer scrutiny of CIHR's funding allocations within its MHIR, both quantitative and qualitative, is required on a number of levels. Based on the extensive but nevertheless preliminary nature of the present study, further research could ultimately call into question the perceived sufficiency of CIHR's overall funding of MHIR.

Recommendations for future research are derived from two principal sources: 1) the methodological challenges met in the course of the analysis and its results; and 2) the unexpected limitations discovered in generating the results. The value of the findings for mental health/illness advocacy and for CIHR itself is discussed, as well as the influence of CIHR's funding allocation policies, or lack thereof, on the quality and quantity of the MHIR it conducts. This leads to consideration of Canada's level of commitment to this research area, particularly in light of the burden and prevalence of mental illness in Canada, and the fundamental importance of mental health.

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TABLE OF CONTENTS

Abstract.....ii

List of Tables.....viii

List of Figures.....ix

Chapter 1: Introduction.....1

1.1: *Rationale and Purpose*.....1

1.2: *Why the Canadian Institutes of Health Research?*.....3

1.3: *Ethical Considerations*.....5

1.4: *Assumptions and Limitations*.....6

1.5: *Definition of Terms*.....8

1.5.1: *Health vs. Illness: A Crucial Distinction*.....9

1.5.2: *The Dominance of Neuroscience: A Related Issue*.....14

1.6: *Outline*.....16

Chapter 2: Literature Review.....18

2.1: *Historical and Global Background*.....18

2.2: *Mental Health and Illness Issues in Canada*.....27

2.3: *CIHR: A New Era in Canadian Health Research*.....36

2.4: *Mental Health and Illness Research: The Prevailing Wisdom*.....42

Chapter 3: Preliminary Methodological Considerations.....48

3.1: *Database Approaches and Secondary Data Collection*.....48

3.2: *A 'Process' Method*.....59

3.2.1: *Scientific Research Methods: The Usual Suspects*.....59

3.2.2: *From Data Collection to a Method of Analysis*.....61

Chapter 4: The Method: Analysis as Primary Data Generation.....66

4.1: *Analysis of CIHR's Funded Research Database*.....66

4.1.1: *Categorical Preparations*.....67

4.1.2: *Typology Creation*.....69

4.1.3: *Initiating Analysis*.....72

4.1.4: *Data Generation*.....74

4.2: *Adjustments*.....80

4.2.1: *Quantity Control: 'Cleaning' the Data Sets*.....80

4.2.2: *Quality Control: 'Method Correction*.....81

Chapter 5: Results and Conclusions.....86

5.1: *On the Preliminary Analysis and Findings*.....86

5.1.1: *Results*.....86

5.1.2: *Conclusions*.....89

5.2: *Mental Health and Illness Research – Proportion*.....92

5.2.1: *Results*.....92

5.2.2: *Conclusions*.....95

5.3: *Mental Health vs. Mental Illness Research*.....99

5.3.1: *Results*.....99

5.3.2: *Conclusions*.....101

5.4: *Neuroscientific Research vs. Other Research*.....101

5.4.1: *Results*.....101

5.4.2: *Conclusions*.....103

5.5: *Summary and Interpretation of the Conclusions*.....105

Chapter 6: Recommendations and Discussion.....107

6.1: *Analysis and Results*.....108

6.2: *Results Generation and New Limitations*.....111

6.3: *CIHR, Research and the Health of Canadians*.....115

6.4: *Closing Thoughts*.....120

References.....124

Appendix A: *CIHR 'Depression' Research by Institute*

Appendix B: *CIHR 'Mental' Research by Institute*

Appendix C: *CIHR Internal Search Keywords*

Appendix D: *Original Data Sets from CIHR (in three portions)*

Appendix E: *Working Copy of the Data Sets from CIHR (in two portions)*

Appendix F: *Primary Sub-Categorical Designations: Mental Illness*

Appendix G: *Primary Sub-Categorical Designations: Mental Health*

Appendix H: *Secondary and Tertiary Sub-Categorical Designations*

LIST OF TABLES

Table 1: Distribution of Health Research 2004-2005 (Estimation).....4

Table 2: CIHR Breakdown by Institute – 1999-2008 (in millions of $).....51

Table 3: CIHR Breakdown by Program Family – 1999-2008 (in millions of $).....53

Table 4: CIHR Research Funding by Country (1999-2008).....54

Table 5: CIHR Research Funding by "Unknown" Country (1999-2008) 54

Table 6: CIHR Funding, No Institute Applicable/Specified, by Country (1999-2008)...55

Table 7: CIHR Mental Health/Illness Research Projects by Institute (1999-2009).....66

Table 8: CIHR vs. MHIR – Total Budget w/ Proportional Percentages (1999-2009)....93

Table 9: CIHR vs. MHIR: Percent Growth Rate (PGR) in Funding (2000-2009).....94

Table 10: Mental Health vs. Mental Illness Research: Funding Dollars with Proportional Percentages (1999-2009).....99

Table 11: Neuroscientific vs. Non-Neuroscientific MHIR: Funding Dollars with Proportional Percentages (1999-2009).....102

LIST OF FIGURES

Figure 1: CIHR Breakdown by Institute – 1999-2008 (in millions of $).....52

Figure 2: CIHR Breakdown by Program Family – 1999-2008 (in millions of $).....53

Figure 3: CIHR Mental Health/Illness Research Projects by Institute (1999-2009).....67

Figure 4: CIHR's Proportional Funding of Research Pillars (1999-2009).....87

Figure 5: CIHR Total Budget vs. MHIR Total Budget (1999-2009).....93

Figure 6: CIHR vs. MHIR: Percent Growth Rate (PGR) in Funding (2000-2009).....95

Figure 7: Mental Health Research vs. Mental Illness Research:

Funding Dollars (1999-2009).....100

Figure 8: Mental Health Research vs. Mental Illness Research:

Proportional Percentage of Total MHIR (1999-2009).....100

Figure 9: Neuroscientific vs. Non-Neuroscientific MHIR:

Funding Dollars (1999-2009).....102

Figure 10: Neuroscientific vs. Non-Neuroscientific MHIR:

Proportional Percentage of Total MHIR (1999-2009).....103

CHAPTER 1: INTRODUCTION

1.1: Rationale and Purpose

Until late in the 20th century, the chronic failure to address mental health and illness issues was manifested in a pervading stigma regarding mental illnesses and those who suffer from them, and a lack of appreciation for the central importance of mental health. In recent years, however, public awareness and political consciousness concerning these issues have been raised significantly, both in Canada and globally. From this more enlightened perspective a more compassionate view has emerged, and we now take a more caring approach to those coping with mental health and illness problems.

Inevitably, the fundamental re-conceptualization of how we address mental health and illness issues exposes many outdated, inadequate, and even inhumane policies and practices. In Newfoundland and Labrador, for example, the shooting deaths of two mentally ill men by police in 2000 (in separate standoffs), and the Reid/Power inquiry that followed in 2003, revealed serious deficiencies in provincial police policy regarding mentally ill people. These tragic incidents, a persistent failure to consider the needs of mentally ill individuals who run afoul of the law, and the provincial justice system's lack of mental health related policies and procedures in general, led to the new Mental Health Care and Treatment Act (Government of Newfoundland and Labrador, 2006) and the Mental Health Care and Treatment Review Board in 2006 (Department of Health and Community Services, Government of Newfoundland and Labrador, 2008). The Newfoundland and Labrador Division of the Canadian Mental Health Association has also been a consistent force for mental health/illness education and advocacy, introducing many important initiatives including a call for a provincial mental health policy

(Newfoundland and Labrador Division of the Canadian Mental Health Association (2001) for Gov. of Newfoundland and Labrador).

On the national level, unacceptable circumstances and distressing incidents surrounding mental health and illness are coming to light more frequently, prompting calls for the reform of related policies and practices in Canada. This shift in the discourse on mental health and illness was the central theme of a substantial, eight-day series of articles in the Globe and Mail newspaper published in 2008 (Abraham et al., 2008). This series has been hailed as a turning point in terms of the mental health and illness issues in the media (Bacic, 2008b), and the Globe and Mail continues to feature extensive, high quality articles on mental health and illness (Grant, 2009). The movement toward redress of these issues shows the Canadian public is becoming better educated regarding these matters, and the growing appreciation for and sensitivity to the problem of stigma associated with mental illness is an indication of this heightened awareness. However, it will take time and continuing education for this healthier attitude to deepen in the individual and collective consciousness of Canadians.

Another significant official step taken to address mental health and illness in Canada was the creation of the Mental Health Commission of Canada (MHCC) in 2007 (Government of Canada, 2007). The MHCC has established several well-defined endeavours early in its 10-year mandate, including a campaign to address stigma (Kirby, 2008a), and the identification of the mental health of Canadian children as a priority (Kirby, 2008b). The MHCC was also recently awarded $110 million for research into the mental health and illness needs of homeless Canadians (Government of Canada, 2008).

Positive changes are taking place, but if it has taken until the turn of the 21st century for a public mental illness issue like stigma to be addressed, we need to ask how less public matters are faring. The level and relative allocations of federal funding for mental health and illness research (MHIR) in Canada is just such an issue, and a review of the literature shows there has been little or no research in this area. Logically, funding levels and allocations in researching a given health issue has an impact on short and long term efforts to address that issue – positive or negative, depending on how adequate the funding levels and allocations are in relation to the extent and complexity of the matter.

This research examines and quantifies federal funding levels and allocations for MHIR; specifically, MHIR funded by CIHR, the chief, federally funded health research body in Canada. The study is a rigorous analysis of the funded research database of CIHR to measure the proportions and composition of its MHIR over its first ten years of operation; the objective is to ascertain and illustrate the extent to which the federal government is funding MHIR in Canada, and the relative distribution of this funding. A series of conclusions is drawn, and recommendations are generated based on the findings.

1.2: Why the Canadian Institutes of Health Research?

For the last 10 years, CIHR has been the dominant federally funded health research entity in Canada. Created in 1999 as successor to the Medical Research Council of Canada (MRCC), CIHR was the centerpiece of a new era in Canadian health research – a demonstration of the federal government's renewed health research priorities and commitment to a cutting-edge health research agenda (W. Kondro, 1999). Every year

CIHR consistently receives 55-60% of the federal government's health research budget. In the funding year 2004-2005, for example, the breakdown was as follows:

Table 1: Distribution of Health Research 2004-2005 (Estimation)

Funding Source	**% Distribution**
Canadian Institutes of Health Research (CIHR)	58.9
Canada Foundation for Innovation	9.0
Natural Sciences and Engineering Research Council (NSERC)	7.5
National Research Council	5.9
Health Canada	4.8
Genome Canada	4.7
Social Sciences and Humanities Research Council (SSHRC)	1.2
Canadian Health Services Research Foundation	0.8
Canadian Institute for Health Information	0.2
Indirect Costs	6.8
Total	**100.0**

The figure given in Table 1 for CIHR includes: (1) its funding of investigator-driven research projects; (2) funding of its strategic initiatives that target specific health research issues; and (3) its contribution to the Canada Research Chairs (CRC), Canada Graduate Scholarships (CGS) and Networks of Centres of Excellence (NCE) programs, which are

administered in partnership with Industry Canada, the Social Sciences and Humanities Research Council (SSHRC), and the Natural Sciences and Engineering Research Council (NSERC) (Government of Canada, 2006). To produce a comprehensive set of results, this study identifies and quantifies CIHR's funding of programs related to mental health and illness in all three of these areas for inclusion in the data collection and analysis.

CIHR is, by far, the premier body for health research mandated for Canadians by their government. Therefore, CIHR's funding levels, the relative composition of CIHR's funding allocations to each of its 13 virtual institutes, and the allocations within each institute, may be seen as representative of our relative health research priorities in Canada. However, before we can gauge these priorities, and their implications for the funding of federally mandated MHIR in the context of a national health research agenda, an in-depth analysis of CIHR's first 10 years of MHIR funding levels and allocations as found in its funded research database is required.

1.3: Ethical Considerations

This study received verbal approval by the Human Investigation Committee (HIC) of the Faculty of Medicine at Memorial University. Inasmuch as the research does not involve human subjects, a formal ethics approval process was not required by HIC. The research relied upon administrative personnel at the Canadian Institutes of Health Research (CIHR), but the role of these individuals was only to assist with data extraction and collection. Secondary data were retrieved with the assistance of personnel contacted, but these persons were not interviewed as research subjects. Aside from a commitment to reliable, evidence-based quantification, this study has no other ethical considerations.

1.4: Assumptions and Limitations

This research rests on four basic assumptions: 1) a nation's health research priorities are reflected in the comprehensiveness and diversity of its health research agenda; 2) health research funding levels and allocations are indicative of these priorities, and they are fundamental, seminal components of a comprehensive health care system; 3) it is important to ascertain the range and depth of these priorities to determine if our health research agenda is balanced, and ensure specific health research areas such as MHIR are not neglected; and 4) the chief federally funded health research body in Canada, CIHR, is the optimum site for evaluation of Canadian health research priorities in general, and our MHIR priorities in particular. These are reasonable suppositions, and the need to know levels and relative allocations of federal health research funding is the impetus for the present study.

With respect to research method, the study's limitations are self-imposed by strict adherence to the research objective, a steadfast pursuit of the research question, and an exclusive focus on the object of the research – detailed data sets extracted from CIHR's funded research database. This is not the sampling of a population of health research projects to obtain a statistical estimate of the proportion of MHIR therein – it is the scrutiny of the abstracts for *every* project in a population of MHIR projects, thereby determining the actual proportion and relative allocations of funding they constitute. Moreover, the method is governed by examination of the data itself. Research procedures and findings are based on what is found in CIHR's database, in the details of the abstracts of the projects identified as MHIR. There are no externally conceived evaluation tools or

research methods brought in and adapted for use here. The method is nothing more than the self-unfolding process of an abstract-by-abstract analysis; results are, for all intents and purposes, inseparable from the method used. A study methodologically conceived and executed in this way must nevertheless account for the researcher's role in the process (i.e. reflexivity), as will be explained further in Chapters Three and Four.

As important as it is to know our national health research priorities as reflected in the government's relative allocation of funding for a range of health research objectives, it must be acknowledged that federally funded health research constitutes just a fraction of all health research conducted in Canada. To some extent, this may be seen as a limitation in terms of the value of the present study's findings; this issue is revisited in Chapter Seven where its implications for efforts to influence health research agendas in Canada, and the significance of achieving the present study's research objective, are more thoroughly discussed. A pair of unanticipated limitations that arose during the generation of the results is also addressed.

Another conceivable limitation of this study revolves around the 'politics' of funding, and the impact of such considerations on research studies and the abstracts written to justify funding for them. When investigators apply for health research funding, they respond to calls for abstracts based on funding parameters that indicate the kinds of studies they will be funding. Experienced researchers know that, in many cases (how many is a matter of pure speculation without further research), the abstract written and the study ultimately conducted do not perfectly correspond; that is, the investigator's abstract was as much or more concerned with securing funding than with having the

abstract faithfully represent the form the study would ultimately take. When using project abstracts to research health research funding, this limitation comes with the territory, so to speak, and further discussion of its implications is given in the concluding chapters.

The analysis is designed to generate reliable results constituting a scientifically valid circumscription and quantification of CIHR's funding levels and allocations for MHIR, leading to further study into MHIR funding in Canada. Speculative discussion on the adequacy of funding levels and effectiveness of relative funding allocations revealed by the study is confined to the study's conclusions and recommendations.

1.5: Definition of Terms

Technical terms used in this thesis not readily understood by a layperson outside the fields of health research and health research funding are defined when they appear in the text. The terms in the typology of research objectives and study features that emerged from the abstracts over the course of the research as a set of sub-categories is extensive; they are not involved in the pursuit of the present study's research objective, and so they are included in the appendices for readers interested in this data.

However, the distinction between *mental health research* and *mental illness research* is such a pivotal feature of the study that it requires special consideration. The value of the results depends on a clear definition of these concepts and their relation to one another at the outset, and a strict maintenance of the distinction throughout the analysis. Therefore, to provide the reader with an understanding of how and why these terms are applied as they are in the study, both terms are defined here.

1.5.1: Health vs. Illness: A Crucial Distinction

In everyday discussion, stakeholders and members of the general public routinely refer to 'mental health and illness issues', without feeling they need to overtly discern between the two – the difference and mutual dependence of these two concepts as two parts of a whole is tacitly considered a given. In this context, 'mental health issues' refers to challenges to an otherwise healthy brain and mind, and which could lead to a need for some degree of medical attention. The phrase 'mental illness issues' refers to diseases or disorders afflicting the brain and mind, severe enough to be considered matters of illness as opposed to matters of health, and requiring considered medical attention.

However, when one begins to explore the realm of health research in general, and evaluate the adequacy and/or effectiveness of health research funding and allocations in particular, the merits of maintaining a sharper distinction between health research and illness research comes to the fore, and this is no less true for the specific area of MHIR. Similarly, I have just employed the phrase "brain and mind" to make a point; but for those exploring the realm of philosophy or psychology, it becomes very important to discern between what we mean by 'brain' as opposed to what we mean by 'mind' – entirely due to the perspective required in the particular field in which they are working.

In terms of a national health research agenda, the questions this study asks in pursuing the second and third part of its three-part research question are: How concerned are we about the suffering of mentally ill Canadians? Are we putting so much emphasis on researching mental health we are neglecting mental illness to some degree, is the opposite the case, or are we achieving an appropriate balance of the two? Given the

extensive mandate of CIHR's Institute of Neurosciences, Mental Health and Addiction, and the varied neuroscientific, mental health and addiction centered research funded by CIHR as a whole, this study also asks: In the context of such a wide-ranging mandate, how dedicated are we to addressing this or that mental illness specifically, and how effective are we in doing so? To account for this, and to provide the multiple levels of data analysis it would permit, this research makes a clear distinction between mental health research and mental illness research.

CIHR clearly acknowledges this distinction; it is built into its statements of intent and policy, with words and phrases carefully selected to delineate its varied interests and involvements. The mission of INMHA is concerned with differentiating between the two:

> To foster excellence in innovative, ethically responsible research that increases our knowledge of the functioning and disorders of the brain and the mind, the spinal cord, the sensory and motor systems, and mental health, mental illness and all forms of addictions(Canadian Institutes of Health Research, 2009g).

A great deal of thought goes into the wording of these official statements, and making a distinction between mental health research and mental illness research is obviously an important consideration for CIHR.

For the present study, research seeking to better understand how a healthy brain works and what will keep it healthy, in and of itself, in the context of whole body health, is considered mental health research. Research seeking a better understanding of how the brain of a person with a specific mental illness works, or to design medications and treatments for specific mental illnesses or classes of mental illness, is mental illness research. Poor nutrition can result in an illness like scurvy, but nutrition research is not

scurvy research, and can only be considered such indirectly. By extension, any research designed to better understand and preserve mental health is no more research into a given mental illness like depression, than research designed to better understand and preserve physical health is research into a given physical illness like scurvy. Illness research, as opposed to health research, must have a specific focus on one or more illnesses.

Examples of how this distinction is applied throughout the analysis are given in the next chapter, but as each abstract is reviewed the distinction is made based on the study's research objective(s). If the abstract contains a clearly stated, direct intention to target one or more mental illnesses or class of illnesses, conceivably directly improving the lives of those suffering from these affliction(s), it is deemed mental illness research; if the research objective(s) does not target one or more specific illnesses, and the research only benefits the mentally ill indirectly, it is deemed mental health research; and if a study involves a mental health research objective *and* mental illness research objective (e.g. stress in diabetes patients), it is categorized as a mental illness study.

For these reasons, the keywords for each project could only be used as a last resort. For example, a project claiming it "may open up new areas of research into schizophrenia" will have 'schizophrenia' listed among its keywords, whereas such a project could not be considered schizophrenia research in this study. This is why all keyword searches for specific details in the abstracts are inherently flawed, making the method of analysis a necessarily unique approach to data in this form. Almost all abstracts were accommodating in terms of making the distinction, as a clear statement of research objectives in the abstract is always a prerequisite for achieving research funding.

But parallels between the dichotomies of 'illness/health' and 'direct/indirect' may not hold in every case, so each abstract had to be read carefully for research objectives requiring special consideration. Therefore, wariness with respect to an abstract's facilitation of the distinction was a consideration throughout the analysis.

In any event, it would be impossible to pursue and achieve the present study's objective without making this distinction. It is the linchpin of the study, and rests on determination of each project's research objective(s) as either directly or indirectly targeting specific mental illnesses or groupings of mental illnesses. Across the complete set of abstracts analyzed, projects deemed to be mental *illness* research projects addressed mental illness issues explicitly and directly with their stated research objectives, targeting one or more mental illnesses, with etiology and/or treatment of the targeted illness as its main goal. Research objectives of projects classified as mental *health* research invariably targeted something other than a mental illness, such as a neuroscientific study of normal brain function which "may have implications" for research into mental illness. Research studies designed to study Phenomenon 'A' may make future research studies designed to study Phenomenon 'B' more possible, but can only be said to be indirectly related to researching Phenomenon 'B'. Similarly, the successful achievement of the present study's research objective may make research studies on health funding allocation policies more possible, but it could only be considered health funding allocation policy research (which for the most part requires a qualitative approach) indirectly.

From the perspective of population health, we wish to help alleviate the suffering of Canadians with mental illnesses, and to maintain and enhance the mental health of all.

In this study, research projects with objectives designed to address the former are considered mental illness research, and projects with objectives designed to address the latter are considered mental health research. The two do often overlap and support each other, and success in either sphere does mean indirect benefit to the other; but their difference is an important point when determining how balanced and effective our health research agenda is in terms of helping the mentally ill versus fostering mental health.

One of the clearest distinctions between health and illness can be found in *Valuing Mental Health*, an excellent document put forth by the Government of Newfoundland and Labrador in 2001. Based on consultations with key stakeholders, it represents a collective effort to explore policy directions in the mental health system. The paper defines mental health as the everyday efforts of an individual to cope with the challenges of life, with or without abuse, support networks, financial security, adequate housing, education and/or employment. It defines mental illness as a medically diagnosable disorder that impairs thought, mood and behaviour; essentially, the presence or absence of symptoms of disorder. However, the paper also argues that the phenomena of mental health and mental illness are two interrelated continuums, whereby a person whose everyday circumstances are good (mentally healthy) may nevertheless be suffering from a mental illness, and the everyday circumstances of a person free of mental illness may be unfortunate enough as to make the person mentally unhealthy (pp. 7-9). In terms of the present study, if the two concepts are distinct *and* interrelated in the human condition, and we wish to sufficiently address both with health care and community health initiatives, it follows that MHIR will be more effective if it is mindful of this distinction and dynamic. Therefore, funding

levels and funding allocations for MHIR must do the same.

Application of this distinction in the present research focuses the research, giving the results more significance. It is a distinction the study must make if imbalances and inadequacies in our relative funding allocations are to be identified. Illness research is a subset of health research, just as we find in the full set of health research projects funded by CIHR. Health research cannot be a subset of illness research in a system so ordered, particularly if we wish to draw useful conclusions from an analysis of that system. Any conflation of 'health' and 'illness' in this study would undermine its value, and confuse satisfaction of the second part of its research objective – to ascertain how much research funding is dedicated to study specific mental illnesses in the context of CIHR's global health research budget and, specifically in its MHIR.

1.5.2: The Dominance of Neuroscience: A Related Issue

We are concerned with MHIR funded by CIHR from 1999 to 2009 by quantifying this set of research projects in several ways. CIHR's MHIR efforts have a finite budget with which to address the range of research objectives covered by its broad mandate, as with CIHR as a whole. Over-emphasis on one or more research areas within MHIR would make it much more possible for certain areas to be under-researched or neglected; the same is true if one scientific approach is stressed more than any other – such as neuroscience.

The titular primacy of 'neuroscience' in the name of the institute charged with guiding mental health and illness research at CIHR (INMHA) reflects its predominance

in psychiatric research in recent years. This issue has become contentious in Canadian psychiatric circles, and this is addressed with the third part of the present study's research question. It has given rise to a heated debate in the literature, and the theme of a recent edition of the *Canadian Journal of Psychiatry* wherein Dr. Joel Paris (2009) expresses well the fear that this phenomenon threatens to 'reduce' the field of psychiatric research to neuroscience:

> A reductionistic approach cannot account for emergent phenomena occurring at the level of mind...Mental disorders cannot be reduced to abnormalities in neuronal activity; psychiatric symptoms need to be understood at multiple levels (p.513)

Paris is concerned about a narrowing of the scope and effectiveness of psychiatric research, and the redefinition of psychiatry as applied neuroscience would "...limit psychosocial influences to a role as precipitants of disorder."

Dr. Paris' concerns are valid. Narrowing the scope of this field at a time when we are coming to understand the multiple levels of attention mental illness and MHIR requires is, at best, counterintuitive; neuroscientific dominance will deemphasize qualitative research and mixed methods, just as the value and utility of these research methods are being realized. A position statement by the Canadian Alliance on Mental Illness and Mental Health (2000) explains why those of us concerned with making a clear distinction between the concepts of health and illness in research feel called to serious consideration of the issue of neuroscientific supremacy in psychiatric research:

> A separate research institute for mental illness and mental health is needed to set the research priorities in this field without competing with the many neuroscience priorities for a host of other neurological disorders. A distinct institute for mental

> illness and mental health is necessary because research in mental illness generally has a lower priority than research on neurological diseases, such as Alzheimer's disease or Huntington's disease. With neurological diseases the pathology is known and the sites of disease can be pinpointed, but this is not the case for mental illnesses. Because the causes of mental illnesses are multi-factoral and complex, mental illness projects are usually less focussed (sic) about the causes, diagnostic criteria, and treatments. As a result, the severe competition for limited research funds ends up with gross underfunding for mental illness research projects (para. 6).

Even though the distinction between neuroscientific research and non-neuroscientific research does not parallel the distinction between health research and illness research, we may see that neuroscientific domination in the field of MHIR can have a detrimental effect not unlike that of an overemphasis on mental health research – there is a very real danger of under-researching specific mental illnesses. Therefore, the third part of the present study's research objective provides a quantitative evaluation of neuroscientific versus non-neuroscientific research in the MHIR funded and performed at CIHR.

1.6: Outline

The remainder of the thesis is structured as follows: Chapter Two contains the formal literature review divided into four parts, moving the discourse concentrically inward from the historical and global backgrounds of the research to the focus of the study. Chapter Three discusses two major methodological considerations: (i) the practical matter of identifying an efficient way to extract the required data from CIHR's funded research database; and (ii) the merits of the data-driven, self-unfolding process the study adopts as its method, and its utility for data collection, analysis, and the ultimate value of the results.

Chapter Four uses a series of examples to deliver an account of the research proper: a comprehensive, in-depth analysis of detailed data sets from CIHR's funded research database, and the categorization of each research project according to what is found in its abstract. This chapter demonstrates how the information in each abstract is recorded and quantified, and describes how the process progressively generates data as it builds a typology of research categories and sub-categories. It elucidates the process of deleting extraneous data from the data sets, and the various ways the method turns back on itself to correct itself after the initial review is completed.

Chapter Five provides analysis of the results to answer the study's three-part research question regarding: (i) the proportion of all health research funded at CIHR from 1999 to 2009 that can be deemed MHIR; (ii) how much of this can be considered mental health research versus mental illness research; and (iii) how much is neuroscientific research. This chapter also offers conclusions that may be drawn from the results. Finally, Chapter Six puts forth recommendations regarding: who may value the findings, and how may they be used; future research based on the study; how funding allocations at CIHR compare with epidemiological data on the health of Canadians; and the study's implications for researching health research.

CHAPTER 2: LITERATURE REVIEW

The purpose of a literature review is to capture what has been established and published by researchers on the topic of interest as framed in a given study's thesis – to justify the need for the study. The review should identify gaps in the research, areas of controversy, and convey what is and is not known about the topic. Sometimes, however, a study poses a thesis question that has not been adequately asked or answered, and the research must move into previously unexplored areas. When the thesis question is truly novel, the literature review presents a special challenge; with no previous research of the question to assess, the problem must be circumscribed in a different way. Such is the case with the present study, as research of this kind on the funded research database of CIHR has not been conducted previously.

The literature covered in this review is grouped into four categories: (i) relevant literature up to the turn of the 21st century, to provide an historical and global context for the research; (ii) relevant literature on the history of mental health and illness issues in Canada, and the funding of MHIR in particular; (iii) the developing story of CIHR from its inception in 1999; and (iv) the current thinking on MHIR, highlighting the potential contribution of the present study and its findings.

2.1: Historical and Global Background

Neglect of mental health and illness issues has not been confined to any specific period of time or particular country. Throughout history and around the world there has been a consistent disregard of these issues, and emergence of a more heightened

awareness is a recent phenomenon. A thorough literature review reveals that published recognition of this neglect as a serious problem is scant before 1960s, and it is not until the second half of the 20th century that we find substantial evidence of this.

The World Health Organization (WHO) estimates mental illness constitutes 13-14% of the global burden of diseases, and this percentage is rising. In response, it initiated the Project Atlas in 2000 to track individual nations' progress on mental health issues, culminating in the first edition of the Mental Health Atlas in 2001. WHO devoted its World Health Report in 2001 to mental health, insisting mental health and illness issues have indeed been neglected historically and globally, and calling for more research (World Health Organization, 2001). Four years later, in the online introduction to the second edition of the Atlas (WHO, 2005), Dr. Benedetto Saraceno, Director of WHO's Department of Mental Health and Substance Abuse, indicates that consideration of mental health and illness matters in public, political and scientific spheres of concern continues to lag far behind the attention given other serious social and medical issues:

> The new Atlas findings reflect the ongoing reality that the world still considers mental health care as a low priority within public health. There are enough scientific and ethical reasons to change this attitude and to invest more in mental health…Public health planners and decision-makers need to take the mental health needs of their populations more seriously.(World Health Organization, 2005)

A one-page fact sheet available online, entitled: "Mental Health, Human Rights and Legislation: WHO's Framework" (2006) underlines the consequences of the problem with a troubling litany of current human rights abuses of people with mental disorders: "In one country, people…are continuously shackled and routinely beaten"; "Children

[are] tied to their beds, lying in soiled beds or clothing..."; "Countries continue to lock up patients in 'caged beds' for hours, days, weeks, or sometimes even months or years...". The release also offers pertinent statistical facts to reveal the socio-political roots of the problem: "32% of countries have no community care facilities..."; 30% of countries don't have a specified budget for mental health. Of those that do, 20% spend less than 1% of their total health budget on mental health."; and 64% of countries do not have any mental health legislation or have legislation that is more than 10 years old.

Early in the 21st century efforts to improve the quality of life in developing countries still betray this unfortunate sense of health research priorities. Miller (2006) conveys the scope of the problem, and is particularly damning in terms of the neglect of the problem on the international level:

> The imbalance is staggering. The majority of the world's 450 million people who suffer from neuropsychiatric disorders live in developing countries, but the World Health Organization (WHO) estimates that fewer than 10% have access to treatment...The United Nations Millennium Development Goals make no mention of mental health, nor do the Bill and Melinda Gates Foundation's Grand Challenges in Global Health...In sub-Saharan Africa, many countries have one psychiatrist--if that--for every million people, compared to 137 per million in the United States. (p.458)

Horton (2007) echoes these sentiments with an indictment of the more prominent global organizations in his introduction of Lancet's series on global mental health:

> WHO is not the only institution with a responsibility to strengthen mental health services. The World Bank, country donors (such as the USA, UK, and European Union), foundations (such as the Gates and Rockefeller Foundations), research funding bodies (e.g. the US National Institutes of Health), and professional associations all share a duty to make mental health a central theme of their strategies and financial flows. For the most part, these organisations have done far too little, if anything at all. (p. 806)

Of all the published research uncovered in this review, a particular series of recent studies have taken a methodological approach not unlike the analysis in the present study, showing the extent of the problem from a uniquely different perspective. Concentrating on MHIR publications on low and middle-income countries, Saxena et al. (2004) looked at the titles, abstracts and keywords from four health research publication databases over a two year period (1999-2001) to determine if they "address issues that are likely to influence public mental health" (p. 127). They found that less than 1% of the publications evaluated any of the economic issues involved in delivering public mental health, and many specific mental disorders were considered under-researched. A similar study of international medical journals by Rochon et al. (2004) found that less than 2.5% of all clinical trials targeting the 25 leading contributors to the global burden of diseases were on mental disorders. Two years later, Saxena et al. came back with a comprehensive 10-year study of the ISI Web of Science database and discovered that "...out of 3,288,252 health-related publications available in the ISI database, only 117,449 (3.57%) were related to mental health" (p. 81); and this percentage only fluctuated between 3% and 4% over the 10-year period (Saxena, Paraje, Sharan, Karam, & Sadana, 2006).

The matter of whether we are conducting enough research is one among many neglected issues in the realm of mental health and illness, but I found in this review that the fundamental role research plays in advancing knowledge and providing impetus for action was a common theme among scholars concerned with the global disregard of these issues. In a report from the Institute of Medicine, National Academy of Sciences to the U.S. government calling for a doubling of the budget for research on mental and

addictive disorders, Barchas et al. (1985) highlighted the prevalence and burden of disease of mental illness and concluded: "Perhaps the ultimate stigma for those with mental illness and addictive disorders has been the failure to appropriately fund research dealing with their problems." (p. 839).

Stressing the need for collaboration, Shore (1989) listed obstacles to joint efforts for MHIR in the United States, impediments that continue to frustrate such efforts everywhere: "inadequate resources, lack of effective conjoint planning, irrelevant research questions, interdisciplinary tensions, ivory-tower isolation..."(p. 333).
An elaborate American study by Ridge et al. (1989) looked at four major influences on state funding of MHIR – factors commonly identified in the literature for the last 30 years: "total expenditures by state mental health authorities, existing research resources, the political environment, and characteristics of leaders both inside and outside of state governments." (p.378). The situation in the United States has improved to some extent in recent years, but this 1989 study found that of 49 states responding to a 50-state survey, only 28 funded MHIR at all; and of those that did, MHIR received only 0.3% of their total expenditures on mental health.

American researcher H. A. Pincus emerged in the mid-1980s as a strong critic of underfunding of MHIR in the United States. Writing in 1986 he stated: "...whether one looks at dollars or grants, there has not been real growth in the funding of mental health research" (p. 307). Pincus and Fine (1992) undertook a study of MHIR funding in the U.S. in1988; they contacted federal funding agencies directly, governmental and non-governmental, and gathered data from a range of secondary sources. They concluded:

"Overall research support for mental illness and substance abuse is extremely limited and disproportionate to the overall costs to society represented by these disorders." (p.575). The next year, Pincus et al. (1993) analyzed two psychiatric journals (the American Journal of Psychiatry and Archives of General Psychiatry) to identify research trends from 1969 to 1990, and they found MHIR output and funding had seen a modest increase over that period. More to the point for the present study, however, they recommended analyses of this kind be performed regularly:

> Systematic analysis of trends in psychiatric research and other forms of research on research can be useful approaches to assessing the growth and utilization of knowledge in the field, to planning how to most effectively use limited research resources, and to increasing public support for research. (p. 135)

Three studies published in the British Journal of Psychiatry in the late 1990s shifted the focus to evidence-based medicine, the quality of MHIR, and the debate thereof. On one hand, Geddes and Harrison (1997) studied translation of research into practice, enjoining psychiatrists to embrace evidence-based medicine as the best way to achieve an efficient exchange between high quality research and everyday psychiatric practice; Geddes et al. (1997) hailed the arrival of *Evidence-Based Mental Health*, a new journal encouraging the application of evidence-based medicine in the mental health services to close the research-practice gap: "...an approach that, firstly, acknowledges mental health services should be fundamentally evidence based and, secondly, helps define what constitutes the best available evidence should clarify decision-making."(pp. 1483-1484). On the other hand, Blue and Harpham (1998) were critical of reports released by WHO and the World Bank in the mid-1990s. They complained the reports

emphasized the need for mental health services research and development, without sufficient attention to the need for research into risk factors for mental illness that arise from socio-economic and political conditions in low to middle-income countries. Blue and Harpham were also disappointed multi-disciplinary approaches were not even mentioned in the WHO report, and they called for more qualitative, community-based interventions.

Eight years later, with qualitative and mixed methods gaining more acceptance in evidence-based medicine, Garland, Plemmons and Koontz (2006) brought research and practice together with a qualitative account of a working research-practice partnership. Their study, titled "Practice and Research: Advancing Collaboration", reviewed previous partnership models and found "...the consistent theme is the need for systematic attention to the development of collaborative relationships between researchers and other community stakeholders, notably practitioners." (p. 518) They referred to the well-documented tensions between researchers and practitioners, and identified the reason: "The issue driving the wedge of the conflict is the implementation of evidence-based treatments in practice." – with researchers in favour, and practitioners against it (p.518). Seeing the need for better models of research-practice partnerships, they described a symbiotic relationship of "reciprocal knowledge exchange" among practitioners and researchers in a youth psychotherapy out-patient clinic (p. 519). They took "lessons" from participants' perceptions with interviews later – answering calls for collaboration, community-based interventions and interdisciplinary approaches in MHIR, even as they studied the application of evidence-based research in practice.

An excellent study by Sturgeon (2006), arguing that mental health should be given appropriate attention in the realm of health promotion, provided more examples of interdisciplinary cooperation in the provision of evidence-based mental health services. As with the previous study by Garland, Plemmons and Koontz, Sturgeon demonstrated how evidence-based medicine is becoming more comfortable working with qualitative and interdisciplinary research strategies. Both studies are examples of how a good research project builds on previous research to solve a problem; but in the sequential context of the present study's literature review, they also show this building only begins after the problem has been identified, quantified, and given sufficient attention by researchers, practitioners, and society in general.

At the turn of the 21st century, urgent calls for increased investment in MHIR appeared more frequently in the literature, and more studies were being conducted in a wider range of research areas. However, due to the sheer volume of under-researched mental health and illness concerns, many research questions still required further study and gaps in the research persisted, especially in the poorer countries where the vast majority of people live. Several research projects studied the role of research institutions in addressing this issue. Saraceno and Saxena (2004) asked individual, independent research institutions to achieve "a shared vision of the urgent needs" (p.3), and affirmed a nation's MHIR policies should be integral to its national mental health care strategy. Saxena, Sharan and Saraceno (2004) published an extensive study on the gap between the burden of mental diseases and mental health resources in low and middle-income countries, reporting that these countries contain 90% of the population, but contribute

only about 6% of the articles in leading psychiatric journals. The study highlighted "Research for Change", an initiative of WHO's Mental Health: Global Action Program featuring a joint statement from WHO and 25 editors of the foremost MHIR journals; it outlined the role and responsibilities of research institutions, and generated a detailed "catalogue of ideas" for setting research objectives and strategies to address the problem (pp. 66-72).

The long-awaited recognition of the central importance of mental health, and MHIR, is taking hold in more and more countries. This increase in research activity has motivated some researchers to develop methods to evaluate MHIR. Inasmuch as a sufficient volume of research output is needed for the formulation and application of such methods, this could be taken as an indication of progress. Tracking Australian MHIR using information from two international research journal databases (ISI's Highly Cited Researchers and ISI's Web of Science), Hickie et al. (2005) found Australia's output was lower than in countries like New Zealand and Canada; inside the country the best research was performed by select research teams. Again, assessment of the status quo was necessary to identify problems before trying to affect solution.

Under the auspices of WHO's Mental Health Atlas, mapping and monitoring research in low and middle-income countries, Mari et al. (2006) did a wide-ranging, four-year (1998-2002) descriptive study of Brazil's MHIR activity. Brazil had revamped its MHIR agenda and increased funding in recent years, and the researchers wanted to gauge the country's progress. Again the ISI Web of Science database was chosen as the source of information for this study, and the results indicated Brazil had indeed increased its

research output. Researchers expressed guarded optimism regarding the future of Brazil's national research programs, provided the current level of investment was maintained.

Finally, Fiestas et al. (2008) looked at the challenges confronting MHIR in Latin American countries, with an eye to increasing research capacity. In a series of interviews with key informants in 13 nations, they found a lack of resources and/or government support for MHIR in these countries meant low levels of research, very few policies or programs were generated as a result. In some cases the little research that was conducted was carried out at the researcher's own expense. This indicates how many developing countries still struggle with basic issues that have been overcome in industrialized countries. Once again, when comparing research agendas and outputs of different countries, we find a country's relative prosperity in the global context has been, and still is, the determining factor.

2.2: Mental Health and Illness Issues in Canada

We have seen that mental health and illness issues were chronically neglected around the world until late in the 20th century, and the story in Canada has not been much different. A study of psychiatric services published by the Canadian Mental Health Association in 1963 gave a brutally honest account of the situation:

> In no other field, except perhaps leprosy, has there been as much confusion, misdirection and discrimination against the patient, as in mental illness. Down through the ages, they have been estranged by society and cast out to wander in the wilderness. Mental illness, even today, is all too often considered a crime to be punished, a sin to be expiated, a possessing demon to be exorcised, a disgrace to be hushed up, a personality weakness to be deplored or a welfare problem to be handled as cheaply as possible. (p.1)

Cleghorn (1984) documented the major milestones and turning points in the history of Canadian psychiatric research up to 1964, but concluded: "Systematic developments in psychiatry came later than in modern medicine, in Canada as elsewhere"(p.189).

Then in 1974 a working paper by the Minister of National Health and Welfare, Marc Lalonde, titled "A New Perspective on the Health of Canadians" represented the first stirrings of a population health movement that has raised the health-consciousness of Canadians significantly over the years. A global expression of this movement came with the Ottawa Charter for Health Promotion in 1986. With its community orientation and broad set of health determinants, population health has redefined and deepened our concepts of health and illness. It brought about a fundamental shift in the way we think about and practice health care, and over time Canadians gained a better awareness and understanding of mental health and illness issues from this new perspective on health.

Population health notwithstanding, translation of awareness into research has been a slow process for mental health and illness issues in Canada, and sometimes the absence of awareness is striking. For example, although the subsequent Ottawa Charter defines 'health' in its first paragraph as "a complete state of mental and physical well-being", this is the only reference to mental health in the entire document. This indicates that even as late as the 1980s Canadian politicians and scientists alike failed to give mental illness appropriate standing in the context of medical concerns in general, and they were far from an adequate appreciation of the central importance of mental health to the human condition.

Toward the end of the 20th century, the population health movement was bringing

attention to the need for more health research in Canada. This led to the closing of the Medical Research Council of Canada (MRCC), the legislative creation of CIHR in 1999, and its formal establishment in 2000. The invigoration of the Canadian health research agenda was certainly welcome, but those concerned with mental health knew this did not necessarily mean an increase in attention to and/or funding of MHIR. Years before, Lam and el-Guebaly (1994) drew attention to this kind of incongruity with an analysis of the MRCC's Reference List of Health Research in Canada. Before being phased out, the MRCC published an annual report containing detailed data on peer-reviewed biomedical research grants from 48 major funding agencies, including most federal and provincial government funding bodies (i.e. MRCC, BC Health Research Foundation), and most federal and provincial private research funding agencies (i.e. Muscular Dystrophy Association of Canada, Alzheimer's Society of Canada). Focusing on the 1990-1991 funding year, they found only 3.7% of all health research funding dispersed in that period went to MHIR, reaching a familiar conclusion: "Research funding for mental illness remains disproportionately low relative to other medical illnesses." (p.141)

In the same study, Lam and el-Guebaly devised a clever way to quantify and illustrate this disproportion, with astonishing results. Using data from two other studies and the 1991 Canadian Patient Data Registry Report, they calculated how much money was spent in Canada researching a given mental illness per person suffering with that illness (including Schizophrenia, mood disorders and anxiety disorders; not including dementia and phobias). They then compared this with figures calculated in the same way for cystic fibrosis and muscular dystrophy. Lam and el-Guebaly found that in 1991

Canada spent $2150 on cystic fibrosis research per person afflicted with cystic fibrosis, a disease with approximately 0.01% prevalence. Muscular dystrophy, another disease with approximately 0.01% prevalence, received $819 of research funding per person afflicted with the disease. But mental disorders, with a prevalence approaching 20%, only received approximately $3.90 of research funding per person afflicted. Though comparing mental disorders to other kinds of diseases with higher prevalence would be better, Lam and el-Guebaly nevertheless observed: "These sobering statistics provide some perspective of the discrepancies between research funding of psychiatric disorders and other medical diseases." (p. 145).

Lam and el-Guebaly examined only one funding year, and their determination of the research objectives was made without the benefit of project abstracts (titles only). Their study focused on biomedical research exclusively, and they did not include research themes important to comprehensive study of mental health and illness (i.e. socio-cultural, qualitative research). Despite these limitations, this study stands as the first serious effort to comprehensively evaluate the status quo in terms of our national MHIR priorities. This pioneering study is referenced variously in arguments for MHIR in the reformulation of Canada's health research agenda (see below).

As at the international level, the turn of the 21st century brought more awareness of the need for MHIR in Canada, and more studies of mental health and illness issues generally. In terms of scientific awareness, Paris (2000) used articles from 50 years of the *Canadian Journal of Psychiatry* to study the evolution of psychiatric practice in Canada, and to trace what he calls the "positive development" in its approach – from clinical

inference (based purely on doctors' interaction with patients) to the "stronger biological orientations" of evidence-based medicine (pp. 34-38). Moreover, the launch of CIHR (see next section) as successor to the Medical Research Council meant unprecedented growth in all fields of medical research, and the beginning of a new era in Canadian science.

In terms of political awareness, the establishment of CIHR was hailed as an example of a renewed political will; a federal financial commitment to the future of health research, and an essential ingredient in the government's new strategic plan for national health reform. The literature also shows individual provinces were taking more responsibility and becoming more involved at this time. Berland (2001) reported on the progress of a successful 7-year plan (started in 1998) for reform of British Columbia's mental health system, making the important point that truly successful reform "...is not a function of new funding alone, but of balancing the iron triangle of accountability, innovation and equity." (p. 93). Responding to the challenges of these developments, Berland (2003) used his personal experience working on health care reform in the B.C. Ministry of Health to help develop a complex model for change management.

With CIHR revitalizing health research, "A Call for Action", released by the Canadian Alliance on Mental Illness and Mental Health (CAMIMH) in 2000, helped establish a profile for mental health and illness concerns. Health Canada's "A Report on Mental Illnesses in Canada" (2002), was designed to raise awareness across the country, and provide a more complete picture of mental health and illness issues than ever before. With data from Statistics Canada and the Canadian Institute for Health Information, and drawing on expertise in mental health related associations (e.g. Schizophrenia Society of

Canada, Canadian Mental Health Association) and national bodies (e.g. CIHR, National Network for Mental Health), it delivered the latest figures on incidence, prevalence and burden of disease for mental illnesses. In addition the report highlighted five major disorders, and discussed in detail major issues such as prevention, stigma and treatment.

Two other influential documents were published in 2002, and the healthy debates they initiated may have done as much for health care reform and the cause of Canadian mental health and illness as the documents themselves: "Building on Values", the final report of Roy Romanow's Commission on the Future of Health Care in Canada; and "The Health of Canadians – The Federal Role", the final report of Michael Kirby's Standing Senate Committee on Social Affairs, Science and Technology. The former may be characterized as primarily an ambitious, progressive political document. Compiled from public consultations the Commission held across the country, it was released to inform the public in detail that the federal government knew what was wrong with health care. Kirby's Committee took almost three years to deliver six volumes of critical analysis of the state of Canadian health care and the government's track record in managing it to date, and it delivered a strong set of recommendations regarding what the government should do about it. Both reports were lengthy; both addressed many of the same topics (i.e. medicare, prescription drugs, hospital costs, insurance, home care, etc.); and both served to generate healthy discussion in the media and literature.

Alan Bernstein (2002), then CIHR's President, praised Romanow's agreement with Kirby on the importance of "...recognizing the need for increased and sustained investment in health research as a means to ensuring a sustainable and evidence-based

healthcare system." (p.1). But not all stakeholders shared this optimistic view. Lynch (2002), a presenter to the Commission, saw this as a lost opportunity to lead on reform: "Mr. Romanow's conclusion that only public employees know how to deliver health services is a reflection of leadership by opinion poll..." (p. 9). On the other hand, the labour-based Canadian Health Coalition (2002) warned Kirby's report would lead to commercialization and privatization of health care in Canada. Indeed, this group dogged Kirby for the next four years, claiming his shares in a private health care company while chairing the Committee put him in a conflict of interest. Nevertheless, calls for an investigation went unheeded (Canadian Health Coalition, 2006). Browne (2004) and others were concerned Romanow's plan for paying for health care reform could lead to a two-tiered system – one for the rich, and one for the poor.

The reports of Romanow and Kirby did much to spur debate and bring about action on health care reform in Canada, which could only help efforts to reform mental health in the process; but the most beneficial product of this debate for mental health and illness issues in Canada may be Kirby himself. In an interview following release of the Committee's final report, Kirby (2002) intimated that some areas (such as home care) were particularly complex and problematic, and the Committee would need to take a closer look at them. The state of mental health in Canada soon emerged as one of these special areas, and over the course of the next few years Kirby became more and more committed to addressing mental health and illness issues in a substantial way. Finally, the Committee tabled a proposal in 2005 to establish a Canadian Mental Health Commission. The first in a list of factors leading to this recommendation was a pithy summary of what needed to be done and why:

> Although the Committee's work and, importantly, recent actions by provincial governments have begun to focus a much-needed spotlight on mental health, it remains a fact that the whole complex, pervasive problem of mental illness and addiction in Canadian society has been neglected for many years. The Canadian Mental Health Commission will provide a much needed national (*not federal*) focal point that will keep mental health issues in the mainstream of public policy debates in Canada until effective solutions are developed and implemented. (emphasis in the original document) (p. 6)

The proposal announced that the Committee's final report on mental health, mental illness and addiction in Canada, "Out of the Shadows at Last" (2006), would recommend such a commission be created. It is very detailed and includes a proposed budget for the future commission.

Michael Kirby resigned as a senator in the fall of 2006 to give his full attention to the vocation he had taken on, and in August of 2007, Prime Minister Harper launched the Mental Health Commission of Canada with Kirby as Chair. The Commission has been given a 10-year mandate, substantial funding with which to carry it out, and have begun work on five initiatives: 1) a national mental health strategy; 2) a comprehensive anti-stigma campaign; 3) a major research project on homelessness and mental illness; 4) creation of a knowledge exchange centre; and 5) Partners for Mental Health, a grass-roots program to develop a national network of people dedicated to implementing the initiatives of the Commission (Mental Health Commission of Canada, 2009).

Because the field of mental health and illness was historically neglected, there are still many areas we have yet to research. For example, the efficient translation of MHIR findings into best practices and better mental health services is still a work in progress. Vingilis et al. (2003) affirmed that community-based knowledge diffusion (or transfer) and utilization (KDU) is key to improving our efforts in this area. They qualitatively

studied and described a case study of the Consortium for Applied Research and Evaluation in Mental Health (CAREMH) wherein KDU and practice were integrated. This resulted in CAREMH's adoption of a new set of operational principles, including an approach to research as a means not an end, and location of the researcher in the community to perform interdisciplinary research using participatory methods. Vingilis et al. found involvement of knowledge users in research improves its utilization and, of particular interest to the present study, demonstrates the need to reconsider our approaches to research funding (p. 468). It is also important to note that development of knowledge transfer as a distinct discipline, and its application in MHIR, indicates significant progress in recent years.

Whatever the approach to funding, it seems reasonable that research priorities should be a fundamental consideration. Gnam (2004) studied research on management of mental disability in the workplace, prioritizing research objectives by evaluating previous research. As to improving how we deal with mental illness in the workplace, Gnam said research indicates interventions to enhance treatment have had little or no impact once the individual returns to work. Workplace interventions have been more efficacious; therefore, funding research on workplace interventions should be given a higher priority.

From Lalonde in 1974 to Romanow in 2002, almost thirty years of editorials, research studies and government commissions have paved the way for the advances we see unfolding today. Given the progress he has made, it may be argued that Michael Kirby has done more to further the cause of mental health and illness than any individual in Canadian history. Be that as it may, the federal government must be credited for finally

recognizing and seriously addressing the state of mental health, as they have brightened the future of mental health in this country with two historic commitments – the Mental Health Commission of Canada and the Canadian Institutes of Health Research.

2.3: CIHR: A New Era in Canadian Health Research

The Medical Research Council of Canada (2000) opens the report from its last meeting quoting its final formal motion:

> In anticipation of the imminent arrival of the Canadian Institutes of Health Research, the Medical Research Council sends greeting to members of the Governing Council. The Medical Research Council extends to the President and Governing Council of the CIHR its best wishes for success in developing health research in Canada, and for ensuring internationally competitive funding levels for all Canadian health researchers. The knowledge generated by these investments will benefit the health of all Canadians and the national economy. (p.4)

Appropriately enough, the report is titled: "The Road Ahead: Adieu MRC, Welcome CIHR". Population health had given Canada a fresh and fulsome health research agenda, and a better-funded, more diverse, all-encompassing institution was now required.

The establishment of CIHR was two years in the making. In 1998, a National Task Force on Health Research reported to parliament that there was an opportunity to develop an integrated, comprehensive national health research program. The government announced the creation of CIHR in its 1999 budget, and an Interim Governing Council was assembled (Canadian Institutes of Health Research, 2009c). As Canada approached the 21st century, appeals for a more substantial federal commitment to health research from stakeholders became more plentiful in the literature; when it was finally confirmed

there would indeed be such a commitment, researchers from all health research fields began lobbying for their fair share of funding.

The initial proposal for CIHR conceived of a structure consisting of multiple institutes, and it recommended the establishment of an institute for Neurosciences and Mental Health as one of them. On behalf of the Canadian Psychiatric Association, Addington et al. (1999) claimed the mental health needs of Canada warranted a huge dedication of funding for MHIR. They also called for research on addictions, but the CIHR proposal had placed addictions research under public and population health. They pressed the interim governing council for the inclusion of addictions research in the body of CIHR's MHIR (p.1049). Eventually, that body became the Institute of Neurosciences, Mental Health and Addictions (INMHA).

In April of 2000, based on recommendations of the Interim Governing Council, CIHR was created with the CIHR Act (Government of Canada, 2000). The new funding agency included 13 interactive virtual institutes, each with a scientific director and an advisory board receiving guidance from both the Governing Council and a Scientific Council. CIHR officially opened June 7, 2000, with a mandate to "excel, according to internationally accepted standards of scientific excellence, in the creation of new knowledge and its translation into improved health for Canadians, more effective health services and products and a strengthened Canadian health-care system."(Canadian Institutes of Health Research, 2009i).

Of the 13 virtual institutes at CIHR, INMHA is most important for the present study. Some MHIR is conducted in other institutes, as researchers sometimes need to

study the mental consequences of physical disorders (e.g. depression in people with AIDS), and some MHIR is highly specialized (e.g. genetic etiology of schizophrenia). Nevertheless, INMHA funds almost half of all MHIR at CIHR. As is evident in its title, INMHA has a very wide sphere of concern, and in every funding year it has received more than any other institute.

Remi Quirion (2002), INMHA's first Scientific Director, argues the institute's three different areas of concentration are more interrelated than one might think, underlining the trans-disciplinary strengths of CIHR:

> Another key feature of the INMHA is a deliberate attempt to promote interaction between neuroscientists and experts in mental health and addiction research...For example, a better understanding of the functional organization of dopaminergic synapses has impacts not only on the treatment of neurological disorders like Parkinson's disease and mental illnesses such as schizophrenia, but also on our knowledge of mechanisms involved in various forms of addiction. (p. 268)

The interconnectedness of these three areas notwithstanding, the present study is concerned with a quantitative determination of the funding for each, in whatever institutes such research takes place.

Considering the scope of the undertaking, and demands and expectations it faced at the outset, the conception, creation and early organization of CIHR from 1998 to the end of 2000 (its first full year of operation) was a remarkable achievement. Compared to the level and pace of health research previously, Canada's health research agenda was now truly competitive internationally, addressing the health needs of Canadians more thoroughly and on a much grander scale. In a report of research achievements in the 2001-2002 funding year (2002), CIHR President Alan Bernstein was upbeat: "At no time

has the potential of research been so clear, and the time for discovery been so great." By 2003, however, he was forced to announce the cancellation of CIHR's Investigator and Senior Investigator Awards and other program reductions due to budgetary restraints; this in spite of a significant increase in the number of grants funded, an increase of more than 25% in the value of operating grants, a 16-fold increase in health services research, a six-fold increase in population health research, and the fact that CIHR's research funding budget ($580 million) had already grown to more than twice that of the Medical Research Council in its last year of operation ($275 million). Stakeholders weighed in on the issue, some in support of CIHR (Gandey, 2003), and some critical (Phillipson, 2003). Citing the uncertain timing of the next federal budget, Bernstein (2003) went on the defensive:

> This problem is not a result of the formation of the CIHR, the launch of our strategic research initiatives or the amount of the increase to our budget this past year. It occurs because CIHR is financed by the federal government through "lapsing annual appropriations," which means that we know our budget only 1 year at a time, and carrying over of funds from 1 year to the next is not allowed. (p. 567)

With a new federal government, CIHR's budgetary situation began to slowly improve. "Finding a Balance in Federal Health Research Funding" (2004), which had come out following consultation with stakeholders, presented an overview of the distribution of health research funding among all federal agencies, and it supported CIHR's new four-year plan, "Investing in Canada's Future: CIHR's Blueprint for Health Research and Innovation" (2004). These two documents justified and solidified CIHR's primacy in federally funded health research on into the future. As Kondro (2004) put it:

"Is the best defence a good offence? Canadian Institutes of Health Research president Alan Bernstein seems to be banking on it." (p. 777). By the next funding year (2005-2006) CIHR's global budget exceeded $800 million (Canadian Institutes of Health Research, 2006a), and today it is approaching $1 billion (Canadian Institutes of Health Research, 2009b).

As a demonstration of accountability and transparency, after five years of operation, in 2005 CIHR invited an independent panel of eminent scientists and academics from around the world to objectively evaluate its operation. The 27-member International Review Panel (IRP) studied CIHR's operation as a whole, and each institute individually; they assessed corporate structure, the quality and quantity of the research, funding allocation policies, financial history and projections, administrative management and governance, and they did so by conducting interviews and examining all internal evaluations, annual reports, financial statements, and any other documents they needed to complete their evaluation(Canadian Institutes of Health Research, 2006b).

In 2006, the IRP released a constructive, detailed report praising CIHR for all it had achieved, and the energy and dedication of its personnel; they qualified the results, however, saying conclusive judgments could not be made without objective outputs for sufficient evaluation. The panel said CIHR was at a crossroads after five years, as its success and rapid growth had made it a more complex operation; this would require organizational adjustments in its management strategy and governance, and on-going evaluation methods and mechanisms put in place to monitor the effectiveness of CIHR as a model of health research funding. In summary, the panel's recommendations included:

- to review the process and structure of the panel system
- to reinforce accountability and transparency at all levels
- to give the Scientific Directors of the institutes more authority, control and oversight, as well as participation in a central committee
- to more clearly define knowledge transfer, and provide leadership in the commercialization of technology
- to increase emphasis on research in ethics
- to require end-of-grant reports from all grant holders as a means of objective data for the next review
- to enhance communication on all levels

The panel also approved of the functionality in all the individual institutes, commending the respective Scientific Directors for their leadership. Particularly important for the present study, the Institute of Neurosciences, Mental Health and Addiction (INMHA) was considered excellent overall, but found lacking in terms of fully realizing strategic opportunities, primarily due to "insufficient funds" (i.e. imbalance between research capacity and resources)" (p. 60), and they recommended INMHA's funding be increased.

Reaction to the IRP report was mixed but, for the most part, positive. Kondro (2006) commended CIHR President Alan Bernstein for having the courage to call for the review, and in general concurred with the IRP's recommendations, especially the need for evaluation mechanisms: "Overall, the science is fine, although it's premature to legitimately judge the success of the great experiment…". For his part, Bernstein (2006) was gracious:

> This Review is a landmark for CIHR and for Canada - in the manner in which it was carried out, in the promise it brings to all those who have helped build this unique organization over the past five years, and in its constructive advice and observations regarding our future. (paragraph 14)

Problems at CIHR identified by the IRP, specifically the need for more efficient organization and better evaluation methods, support the objectives of the present research. If CIHR lacks effective and efficient internal organizational structure, and the means to evaluate its performance are insufficient, we have cause for concern.

2.4: Mental Health and Illness Research: The Prevailing Wisdom

In recent years we have witnessed what seems to be a genuine change for the better in public awareness and opinion with respect to mental health and illness in Canada, and to a lesser extent internationally. Stigma still persists in too many levels of society, and human nature assures us it always will to some degree. However, these issues appear to be receiving more media exposure in the early years of this century, and I believe the average Canadian is more comfortable thinking and talking about mental health and illness matters these days. The political will and commitment of Canadian governments, federal and provincial, is reflected in the annual growth of investment in this area, from the clearer, more expensive public service messages, to the updated health research agenda embodied in CIHR.

Awareness of these issues, whether public or political, permits a more conscious appreciation of mental health as a concept, and its central importance to overall health. This evokes a more considered dedication of resources to MHIR. Internationally, mental health and illness services in the third world still pose serious challenges, and low levels

of MHIR funding in the poorer countries persist. Citing this stubborn deficiency, the Lancet Global Mental Health Group (2007) called for a redoubling of international efforts on all levels to "scale-up" coverage of services and research and move quickly to protect the human rights of the mentally ill; furthermore, Lancet wants to play an active role in reform:

> They must press for the reforms that are urgently needed if people with mental disorders in low-income and middle-income countries are to receive the basic care that is effective, affordable and, above all, morally justified... we understand better why the necessary reforms have not been implemented; and we have a clear and consistent call for action to scale up services and the strategies needed to guide action in response to this call. (p. 1250)

Hampton (2006) advised that we should take a closer look at the numbers; she discovered that while U.S. financial investment in health research is ostensibly going up, research funding levels are actually shrinking as a proportion of overall health spending. Similarly, Kingdon (2006) found estimates of disability adjusted life years (DALYs) for neurological disabilities and mental health disabilities were combined in a clinical research graph from the U.K., giving the impression funding for both roughly equate in proportion, hiding the fact that funding of mental health is much lower than it should be. Notably, the findings of these two studies informed analysis of the present study's results.

Marchildon (2005) authored the World Health Organization's 2005 report card on the state of health care in Canada from WHO's "Health Systems in Transition" series of country-centered profiles. It praises Canada for its medicare and universal health care system, and states that health care for most Canadians is improving. In terms of mental health, however, it chides Canada for leaving psychological services out of the "insured

services" under the Canada Health Act, points to a dramatic increase in deaths from mental disorders from 1970 to 2001, and says that Canada falls short in terms of mental illness: "Mental disorders and diseases appear to be growing throughout the OECD, yet all countries, including Canada, are not adequately addressing this challenge...". But for all its insistence that mental health be given its due in the context of overall health, incredibly, WHO devotes just one half page to the topic in this 150-page report that claims to assess the entire Canadian health system, published just five years ago (p. 101).

In Canada, a frequently cited paper by Goldner (2005) bids us to remember the basic components that are involved when reforming mental health: human resources, relevance of the research, sufficient funding, measuring performance, improving quality; and that all these elements should be integrated into a national strategy. "The Human Face of Mental Health and Mental Illness in Canada" (2006), a thoughtful and influential publication released by the federal government with the endorsement of leading non-governmental mental health advocacy groups (e.g. Mood Disorders Society of Canada, etc.), updated and expanded on CAMIMH's "Call for Action" in 2000 (see p. 29) and helped Canadians maintain an awareness of mental health issues in the early 21st century. The publication also conveyed to all Canadians the everyday reality of a mentally ill person's life, from the subjective feelings symptomatic of particular mental disorders to the socio-economic disadvantage faced by the average Canadian living with mental illness (Government of Canada, 2006).

Clark, McGrath and MacDonald (2007) conducted a survey of members of parliament to gauge their knowledge and attitudes regarding health research and funding,

and the results were yet another sign of how much work still needs to be done in terms of political awareness. Of 101 participants in the survey, 32% knew nothing about the role of CIHR, yet 78% felt the percentage of government's budget spent on health research was too low. The researchers' interpretation of the results is another indicator:

> Our results highlight significant knowledge gaps among Members of Parliament regarding health research. Many of these knowledge gaps will need to be addressed if health research is to become a priority (p. 1045).

Cote (2008) finds that among developed nations, Canada spends less on treatment of mental illness than most, while Spurgeon (2008) insists that mental health stigma in Canada is a "national embarrassment"(Spurgeon, 2008).

Clearly, many glaring inequities currently remain in Canada amid signs of real progress; again, this is due to a pervasive neglect of these issues for too long. Even so, there is much to be encouraged about, and the Canadian Psychiatric Association (CPA) has published many articles of late that confirm we are on the right course. Two articles by Bacic (2008) indicate a lively contemporary ethic of reform in Canadian mental health circles, and healthy lines of communication between two of the major players: the CPA and the Canadian Medical Association (CMA). In response to recent revelations regarding stigma and discrimination against the mentally ill in the medical profession, the CPA promptly called on the CMA to address the problem. The CMA responded favourably by pledging to encourage its members to "work together to transform patient care for people with mental illnesses (Bacic, 2008a). Moreover, Bacic (2009) heralds a new mental health charity jointly established by the CPA and MHCC.

Meanwhile, Michael Kirby and the MHCC continue to widen their sphere of influence and encourage Canadians to get involved. Bacic (2009) highlights the long-awaited national mental health strategy from the MHCC following cross-country consultations and focus groups with stakeholders. Particularly heartening is the emphasis on mental illness *and* mental health built into the strategy; and Howard Chodos, director of the new MHCC initiative, encapsulates the spirit of reform felt across the country in recent years:

> Judging by the many signs of growing public interest in mental health issues, the momentum for change is building. Working together, we will be able to transform our current mental health system and enhance the mental health and well-being of all Canadians.(Bacic, 2009)

Ten years on, CIHR continues to work on improvements to its operation with frequent consultations (Canadian Institutes of Health Research, 2009h), further enhancing its central role in Canada's health research agenda with its new five-year strategic plan: "Health Research Roadmap: Creating innovative research for better health and health care" (Canadian Institutes of Health Research, 2009f). CIHR's current president, Dr. Alain Beaudet, believes the organization is finally fulfilling its mission, particularly with respect to translating research into practice:

> At the bedside, we should be better at translating the results of that evaluation into systematic reviews, guidelines, integration into care, integration into our health care system and, basically, improve our health care system. (W. Kondro, 2009)

In the process of unpacking the full set of neglected mental health and illness issues, we unpack a set of neglected research objectives, opening up new fields of

research; however, some research objectives cannot be pursued until more foundational research projects have been conducted. With CIHR, the federal government has been plying a new, comprehensive research agenda, funding a panoply of studies in a renewed effort to meet the health needs of Canadians. For decades, the call for more MHIR in Canada went out and, for the most part, went unheeded; for 10 years, amid a full range of demands for health research, CIHR has attempted to respond to the call. Here the basic research question of the present study emerges: In quantitative terms, how has CIHR been responding to the call for more MHIR? The question of 'how' must be answered before we can ask 'how well'.

CHAPTER 3: PRELIMINARY METHODOLOGICAL CONSIDERATIONS

Before the analysis, three preliminary considerations needed to be addressed in terms of the orientation of the research: (1) how to identify and extract all relevant data from the funded research database of CIHR; (2) the determination of a method for the research based on the conclusions from the first consideration; and (3) an explication of the utility and value of maintaining a clear distinction between mental *health* research and mental *illness* research in the study. Pursuit of these considerations set the tone for the study, anticipated and identified problems that could be encountered along the way, and reduced the possibility of a methodological 'false start'. The third consideration was sufficiently addressed in the introduction; we now address the first two.

3.1: Database Approaches and Secondary Data Collection

After identifying the funded research database of CIHR as a good site for evaluating Canada's health research priorities with respect to MHIR, the first part of the study's three-part research question was formulated: to ascertain what proportion of CIHR's global health research budget goes to MHIR. It followed that an effective way to capture and rigorously examine all MHIR projects funded by CIHR would be required; and CIHR's health research funding would have to be evaluated over a period of time sufficient to deliver results that would be reliable and useful. It also seemed reasonable to take full advantage of such an opportunity to learn as much as possible about the relative composition of CIHR's body of MHIR as a whole in terms of research objectives.

A preliminary literature review revealed this research could well generate new

and valuable data in this area, and initial hopes for the study became convictions. In any event, a detailed quantitative examination of CIHR's past funding allocation practices would be needed to form a solid foundation for any future qualitative evaluations of its funding allocations; but if the study is to produce reliable, valuable results, the period of time covered in the evaluation of CIHR's past research funding allocations would have to be maximized to ten years (1999-2009). Therefore, finding a dependable approach for accessing, analyzing and exploiting CIHR's funded research database became of paramount importance for this research, and the first methodological consideration for successful achievement of the research objective.

In the preliminary search for relevant sources of information, the CIHR website was accessed and a good deal of general information about CIHR's expenditures and funding allocations was found. According to the website, 94 cents of every research dollar spent at CIHR goes to fund research, with the rest going to cover administrative costs. Each year, CIHR spends approximately 70% of its health research funding budget on "investigator-driven" research – essentially, the sum total of all health research studies applied for by researchers across Canada and ultimately approved and funded by CIHR in that year (Canadian Institutes of Health Research, 2009i). The remaining 30% funds CIHR's strategic initiatives, and co-funding of Canada Research Chairs (CRC), Canada Graduate Scholarships (CGS), and Networks of Centres of Excellence (NCE) (Canadian Institutes of Health Research, 2009e). In these cases, CIHR decides which researchers and research objectives to support. If the present study is to be comprehensive, it would need to include the funding figures from all investigator-driven MHIR, and all CIHR's

mental health and illness related special programs and strategic initiatives, from each year. All projects and programs of interest are conveniently included in CIHR's funded research database, so all data needed for the research could come from one source.

The online version of CIHR's funded research database presented itself as a user-friendly tool for data extraction (Canadian Institutes of Health Research, 2009d). Pulling specific information from CIHR's online database is a fairly straightforward procedure. To determine if the online database was capable of yielding sufficient results for the present study's purposes, and to gain a degree of facility with its search engine, a series of searches was run to collect preliminary data. Each funding year from 1999- 2000 to 2006-2007 was searched using 'depression' as the search term, for all 13 virtual institutes and the set of research projects for which an institute was "Not Applicable/Specified", and then created a table to display the results (see Appendix A). This search was not very complicated, and any projects using the term 'depression' in other ways (e.g. "depression of respiratory function") were easily identified and eliminated, so the results were fairly comprehensive.

Next, the search term 'mental' was used, but this proved more difficult. Some institutes were amenable, providing ostensibly reliable data on what could be classified as mental illness projects (i.e. targeting a specific disease/disorder or set of disorders), and projects that could be considered mental health research (i.e. studying healthy brain development). Most institutes, however, (e.g. 'Institute of Genetics', 'Institute of Nutrition, Metabolism and Diabetes') returned countless items having nothing whatever to do with mental health or mental illness, as the search captured all projects with details

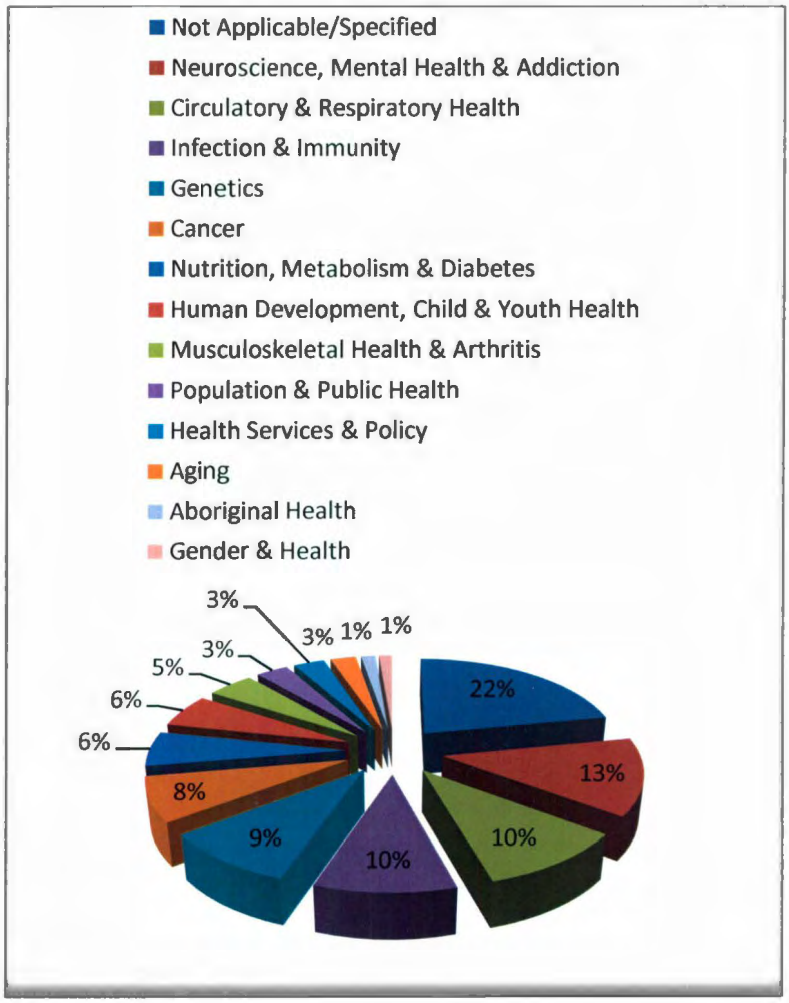
containing 'mental' as part of a bigger word (e.g. fundamental). These were so numerous that only the first two years could be reviewed, the average percentage of dollars going to mental health and illness studies for those years was determined, and then that percentage was applied to all funding years (see Appendix B). Given these findings were not nearly as precise as those of the 'depression' search, they raised serious doubts regarding the merits of using CIHR's online funded research database and search engine for this study, and the integrity of any results it was capable of delivering.

For the next round of exploratory searches, the period of interest was expanded to include data for 2008 that had become available. This period was broken down according to individual institutes, in descending order of funding share, with their proportional percentages of CIHR's total health research funding budget. The results are contained in the following table and pie chart:

Table 2: CIHR Breakdown by Institute – 1999-2008 (in millions of $)

Institute	Total	% of CIHR Total
Not Applicable/Specified	1209.4	22.00%
Neuroscience, Mental Health & Addiction	729.7	13.25%
Circulatory & Respiratory Health	573.6	10.41%
Infection & Immunity	533.7	9.69%
Genetics	522.3	9.48%
Cancer	417.6	7.58%
Nutrition, Metabolism & Diabetes	328.9	5.97%
Human Development, Child & Youth Health	317.1	5.75%
Musculoskeletal Health & Arthritis	250.6	4.55%
Population & Public Health	171.7	3.12%
Health Services & Policy	166.1	3.01%
Aging	137.6	2.50%
Aboriginal Health	77.5	1.41%
Gender & Health	72.7	1.32%
Total	**5508.3**	**100%**

Figure 1: CIHR Breakdown by Institute – 1999-2008

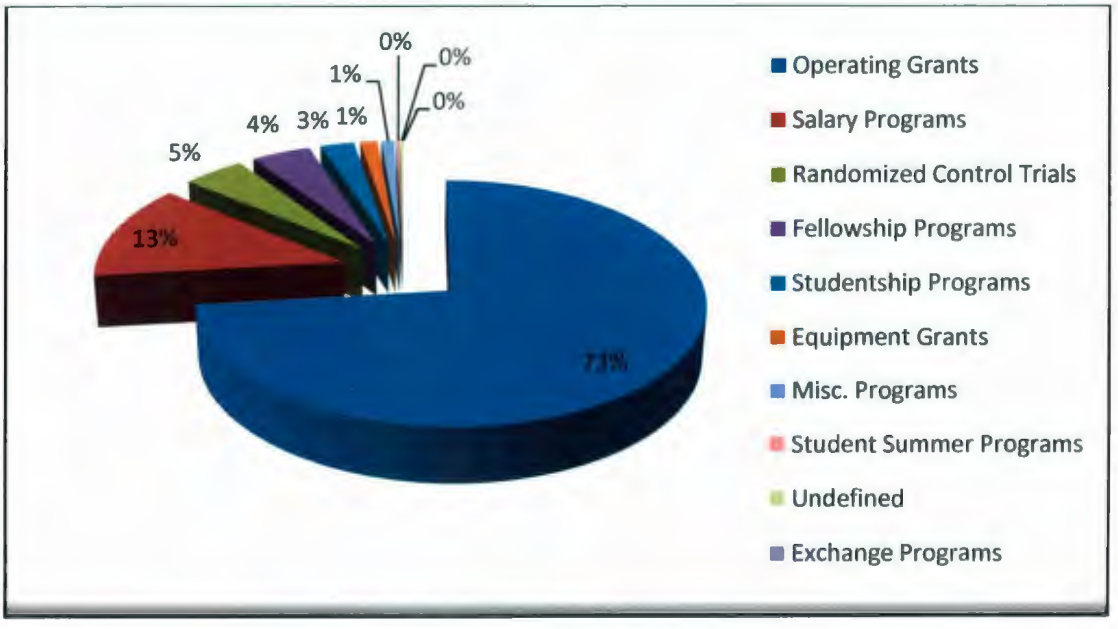


CIHR has 10 "program families", and the online database permits searches based on these categories. These "families" represent the type of funding program applied to the project, determined by what is being funded. "Operating Grants" take almost three quarters of the total funding dollars in most of CIHR's virtual institutes, as this is the basic funding vehicle for the average research project; "Salary Programs" are second with almost 13%. The nine-year period broken down according to program family is illustrated in the following table and pie chart:

Table 3: CIHR Breakdown by Program Family – 1999-2008 (in millions of $)

Program Family	Total	% of CIHR Total
Operating Grants	4079.38	73.22%
Salary Programs	712.24	12.78%
Randomized Control Trials	252.09	4.52%
Fellowship Programs	242.66	4.36%
Studentship Programs	138.09	2.48%
Equipment Grants	69.54	1.25%
Misc. Programs	54.23	0.97%
Student Summer Programs	12.19	0.22%
Undefined	10.04	0.18%
Exchange Programs	1.15	0.02%
Total	**5571.623**	**100%**

Figure 2: CIHR Breakdown by Program Family – 1999-2008 (in millions of $)



As stated, the online database offers a breakdown in terms of the country in which the funding was spent, as some of CIHR's research is in partnerships with international

organizations. Searches in terms of 'country' yield results for Canada and other nations, but a category titled "Unknown" also appears, as in the following table:

Table 4: CIHR Research Funding by Country (1999-2008)

CIHR FUNDING 1999-2008	# of Projects	% of Budget	Amount (millions)
Canada	22099	98%	5401.351
United States	684	1.10%	58.645
United Kingdom	48	0.10%	3.881
27 Other Countries	129	0.10%	8.062
Unknown	257	0.70%	38.083
TOTALS	**23217**	**100%**	**5510.022**

A search was also performed in terms of 'country' from 1999 to 2008, to ascertain how much falls under "Unknown"; these 'unknowns' were broken down in terms of institute:

Table 5: CIHR Research Funding by "Unknown" Country (1999-2008)

"UNKNOWNS" 1999-2008	# of Projects	Amount (millions)
Institute of Circulatory & Respiratory Health	6	0.286
Institute of Cancer Research	2	0.011
Institute of Infection & Immunity	2	0.033
Institute of Neurosciences, Mental Health & Addiction	1	0.06
Other 9 Institutes	0	0
Not Applicable/Specified	246	37.693
TOTALS	**257**	**38.083**

Next, the institute category "Not Applicable/Specified" was also broken down in terms of 'country/unknown':

Table 6: CIHR Funding, No Institute Applicable/Specified, by Country (1999-2008)

INSTITUTE NOT APPL./SPEC. 1999-2008	# of Projects	Amount (millions)	% of Total Budget
Canada	6647	1155.721	20.98%
United States	224	13.816	0.25%
12 Other Countries	50	2.07	0.04%
Unknown	246	37.693	0.68%
TOTALS	**7167**	**1209.3**	**21.95%**

Finally, the database was queried regarding CIHR's four research pillars (nowadays termed "themes"), defined in CIHR's Grants and Awards Guide (Canadian Institutes of Health Research, 2009a) to represent four thematic categories of health research: 1) *bio-medical*, 2) *clinical*, 3) *health systems/services*, and 4) *social/cultural/ environmental/ population health*. CIHR defines *bio-medical health research* as:

> ...research with the goal of understanding normal and abnormal human functioning, at the molecular, cellular, organ system and whole body levels, including development of tools and techniques to be applied for this purpose; developing new therapies or devices that improve health or the quality of life of individuals, up to the point where they are tested on human subjects...studies on human subjects that do not have a diagnostic or therapeutic orientation.

CIHR defines *clinical health research* as:

> ...research with the goal of improving the diagnosis, and treatment (including rehabilitation and palliation), of disease and injury; improving the health and quality of life of individuals as they pass through normal life stages. Research on, or for the treatment of, patients.

CIHR defines *health systems/services health research* as:

> ...research with the goal of improving the efficiency and effectiveness of health professionals and the health care system, through changes to practice and policy...a multidisciplinary field of scientific investigation that studies how social factors, financing systems, organizational structures and processes, health technologies, and personal behaviours affect access to health care, the quality and cost of health care, and, ultimately, Canadians' health and well-being.

CIHR defines *social/cultural/environmental/population health research* as:

> ...research with the goal of "improving the health of the Canadian population, or of defined sub-populations, through a better understanding of the ways in which social, cultural, environmental, occupational and economic factors determine health status.

Looking at a breakdown for the Institute of Neurosciences, Mental Health and addiction (INMHA) in terms of CIHR's research pillars would be interesting, but it would not tell us very much about the relative distribution of health research funding by CIHR across the 13 virtual institutes based on these pillars, or about what this means for INMHA, relatively speaking. Nevertheless, there are a few points worth noting. The bio-medical research pillar gets almost 55% of all research funding across CIHR, and the relative proportion of all four pillars has been consistently maintained over the years; but not all virtual institutes favour the bio-medical research pillar to this extent, or at all. Some institutes concentrate on bio-medical research (i.e. Institute of Genetics), while some devote a significant portion to clinical research (i.e. Institute of Circulatory and Respiratory Health).

These preliminary findings revealed much about CIHR as a whole, and uncovered a number of specific issues that needed to be pursued for clarification and/or verification. The findings also raised doubts about the process by which the results were obtained –

namely, CIHR's online funded research database and search engine. At this point, communication with CIHR experts was clearly necessary before going further, and then a final decision as to an effective mode of data extraction and collection would have to be made.

It is necessary to point out here that breakdowns for individual institutes may be of interest to researchers in addressing a wide range of research objectives in the future, and generating them was certainly helpful in terms of becoming familiarized with the database and search engine. But, strictly speaking, an institute-by-institute approach to the data cannot significantly contribute to fulfillment of the present study's objectives, and we raise this point now as a way to restate the research objectives.

This study takes together all MHIR projects at CIHR, regardless of institute, as a subset of CIHR's overall health research funding allocations. Data collection is the accurate circumscription and extraction of all MHIR from CIHR's funded research database. Whatever mode of data extraction is selected to capture all MHIR conducted at CIHR, inside and outside INMHA, it must permit breakdown into clear, distinct research categories (e.g. 'neuroscientific', 'addictions'), and a further breakdown into sharply defined research sub-categories (e.g. 'depression', 'stress').

After the analysis, and the categorization and sub-categorization according to the detailed content of each research project abstract (Chapter 4), we are concerned with two main tasks with the results: 1) to determine the proportion of CIHR's total health research funding that is MHIR, using the data as a whole; and 2) to determine the relative composition of this MHIR data in terms of mental health research versus mental illness

research, and neuroscientific research versus all other types of research. Essentially, we are researching research here – deriving potentially seminal new data from the mining of secondary data. Delving into CIHR's website and online database, it is not long before one realizes MHIR has a very broad mandate, wherever it is conducted at CIHR.

The main purpose of communicating with CIHR personnel was to verify that the online database was being used properly. The Institute Project Officer with CIHR's Institute of Neurosciences, Mental Health and Addiction (INMHA) was contacted in late November, 2008, given a thumbnail sketch of this project; and she was asked for advice on how best to use the online search engine for the funded research database, to ensure that difficulty in obtaining clear results in some cases (e.g. search using 'mental' as the keyword) was not due to inexperience. She said that CIHR fills a steady stream of data requests for a variety of interests; she could make a data request for the present study, and their internal database search would capture what was needed. The online search returns good, detailed results, and it is a valuable public portal to exploration of the database; but for formal research requiring a scientifically reliable circumscription and extraction of large and/or highly specific data sets, the internal search is more precise and thorough.

This meant most issues that arose during the preliminary analysis were due to the limitations of the online search engine; more importantly, CIHR's efficient and accurate internal mode of data extraction would meet the study's data collection needs, and deliver clear-cut, comprehensive data for analysis. After the search had been completed she sent the results in the form of Microsoft Excel spreadsheets – the data sets the study needed to answer the three-fold research question. A Data Production Specialist with CIHR gave

his assurance that the data for all MHIR research projects, whether investigator-driven, strategic initiatives or special programs, are included in the data sets CIHR had provided.

3.2: A 'Process' Method

As alluded earlier, the nature of the data to be examined in this study, and the research objective and question formulated to guide the investigation, presented methodological challenges requiring special consideration. Determination of the best method of data collection had revealed that these challenges demanded a method of analysis uniquely designed by and for this study. This method is characterized here as 'process'. A brief review of the basic elements of scientific research methodologies will serve as a prelude to an explanation of the unusual features of this study, its special methodological demands, and how determination of the mode of data collection revealed the problem and provided the solution.

3.2.1: Scientific Research Methods: The Usual Suspects

All standard scientific studies set out to measure or evaluate something of interest. If the study is a quantitative study, it will measure something that lends itself to clear empirical measurement (e.g. counts, distances, frequencies); if it is qualitative, it will evaluate something less amenable to precise, empirical measurement (e.g. people's opinions, experiences, perceptions). Either study method may involve a statistical representation/interpretation of the results. If mixed methods are employed, we find both a quantitative element to the study (e.g. measuring levels of toxin in the bloodstream of

people living near a chemical plant), and a significant qualitative element (e.g. evaluating the quality of life of people living near the same chemical plant); and if mixed methods are selected for a study, it is thought that the use of both will deliver a more complete understanding of what is taking place – more than if only one method was used.

Whether quantitative or qualitative, the measurement or evaluation in any study will be performed using some kind of tool(s) or instrument(s). Quantitative measurement requires a tool that delivers precise, empirically verifiable data (e.g. ph-meter, weighing scale, electro-encephalogram); and qualitative evaluation will require tools that permit application to phenomena that cannot be measured in a precise, strictly scientific way (e.g. ethnography, survey, interview). In either case, the tool selected is usually external to the research, as it is not a feature or component of the phenomenon being studied. It must nevertheless be the most appropriate tool for assessing the matter, for no matter how well the other aspects of the study are designed and implemented, the suitability, effectiveness and reliability of the chosen tool to measure the phenomenon of interest will have much to say about the utility and value of the research findings.

Sometimes the phenomenon studied, and/or the research objectives formulated to investigate it, preclude clear methodological demarcation of quantitative and qualitative aspects of the study. Research may move into scientifically uncharted territory due to the unique nature of the phenomenon, or under-researched areas may present new issues for researchers to consider. The methodological approach in such cases demands a research road less travelled. These were the special considerations in the current study, and they called for an equally special method to successfully address them.

3.2.2: From Data Collection to a Method of Analysis

Given the research question, the study needed to use the CIHR database to make a quantitative determination of the proportion of MHIR funded by CIHR in the context of its total health research funding budget, from 1999 to 2009; and, if possible, make further quantitative determinations with respect to MHIR for the same period. This research is necessary to evaluate MHIR priorities as reflected in CIHR's overall health research funding allocations, but the methodological approach to analysis of data would revolve around determination of an effective means of extracting and collecting data. The research objective, the nature of the data, and the research question formulated to keep the analysis and its method focused throughout, demanded this.

The CIHR funded research database is simply a collector of data on each of the specific research projects it has funded. These individual pieces of detailed data (26,472 for the period from 1999 to 2009) are categorized as either "neuroscience" or "mental health" research studies, and sub-categorized in other ways for more specific designations and cross-referencing (e.g. program families, research pillars, institution, funding year, etc.). The categories of "neuroscience" and "mental health" are too broad and vague to tell us much about the research objectives of these individual projects, and 'research objective' is not one of the sub-categories the database uses. To query the CIHR database regarding specific research objectives, some kind of keyword search would be necessary, as the information regarding the research objectives of each study can only be found in its abstract, and the details in the abstracts do not lend themselves to the sub-categorization and sorting possible with designations like 'program family' or 'research pillar'.

As described above, the performance of keyword searches for specific research objectives with the online search engine left something to be desired in terms of the discernment necessary for a surgical extraction of data. The advent of CIHR's internal search capacity for data requests was a promising development for the research, but it would also be restricted to using keyword searches for specifics like research objectives, and subject to the same shortcomings as the online search engine, only less so. Only careful reading of each abstract could provide all the details of each project, and permit analysis, categorization and sub-categorization of specific aspects necessary for achievement of this study's research objective.

Even though CIHR's internal keyword searches for specific details are less erroneous than searches using the online database, there may still be an unacceptable risk of error. Confronted with this, it was decided that the limited capabilities of CIHR's internal keyword search may be better suited to generalities than specifics. Keyword searches may not be good for extraction of the specifics on which this study would eventually need to focus, but they may suffice for the initial stage of data collection under the broad category of 'mental health and illness research'. As found later in exchanges with CIHR personnel, any broad-themed search they perform uses a host of keywords – essentially, a list of every term that could conceivably fall under the general category that is the subject of the search. If it is a thorough medical science search, common and uncommon names of specific illnesses and related terms may be included in the master list of keywords, as well as any common abbreviations and variations in spelling, in English and French. Such was the case when CIHR performed an internal search for all

its "mental health and illness research" (see Appendix C).

Instead of trying unsuccessfully to capture all the particular research interests individually, we cast a wide net using the particulars to circumscribe a set of interests, promising a reasonable expectation of success in the quest for truly comprehensive data collection. It would not be necessary to scrutinize the abstracts of all 26,471 research projects in CIHR's database to achieve the study's objective – just all MHIR project abstracts. This could be accomplished, allowing precise categorization and sub-categorization of projects based on the details found in their abstracts – specifically, and primarily, their research objectives. With a detailed data request to CIHR, valid data extraction and collection could be achieved with CIHR's internal keyword search.

The mode of data collection for the present study was determined when CIHR's internal database search became available; however, the study's method and its necessarily unique 'process' nature first emerged when working with the online version of the database. After formulating the study's objective and research question and completing the literature review, the research proceeded in four successive stages, representing efforts to meet four successive methodological challenges. First, a way to accurately capture the abstracts of all MHIR funded by CIHR from 1999 to 2009 had to be found to facilitate extraction/collection of secondary data; second, a way to record, categorize and sub-categorize the new data that would be generated by analysis of the abstracts would be needed; third, many weeks of painstaking analysis of well over 5000 individual abstracts in the data sets was required; and, fourth, tables, charts and/or graphs to illustrate the findings would have to be created.

The first stage has been addressed above, and the fourth stage would have to await completion of the other three; but the relationship between the second and third stages presented unique challenges, ultimately dictating the methodological approach to the analysis of the data sets and generation of new data. Initial forays into CIHR's online version of its funded research database provided an opportunity to engage this dual methodological problem, and to begin considering how to solve it without compromising the integrity of the research and its findings. Even as preparations were being made to initiate the first search with the online database using the keyword 'depression', the matter of what to do with information the search returned immediately presented itself. For the valid, precise quantitative measurement this study needs, it would have to concern itself with a systematic, faithful reporting of the facts found in the abstracts; and, occasionally, this would prove difficult when discerning between mental health research and mental illness research.

Before performing any formal searches on the database, a cursory review of 450 randomly chosen abstracts provided a good sense of the specific aspects of each research project that could be found and objectively recorded with the analysis, and it offered an opportunity to experiment with different methodological approaches to the systematic recording of these specifics. Not surprisingly, the research objective(s) was the feature of each project easiest to glean from a close reading of the abstract, as the main function of any research abstract is to justify funding for a study by extolling the scientific virtues of its research objective(s) in some detail.

These fledgling efforts to devise a method for the study's analysis gave rise to a

typology of research objectives and study features from the information found in the abstracts, which grew progressively until analysis of the last abstract in the data sets. A closer look at this evolving, heuristic method comes in the next chapter, but it is an appropriate methodological choice because the method is necessarily bound up with, and binds together, the research question of this study, the data studied, and the analysis itself.

CHAPTER 4: THE METHOD: ANALYSIS AS PRIMARY DATA GENERATION

4.1: Analysis of CIHR's Funded Research Database

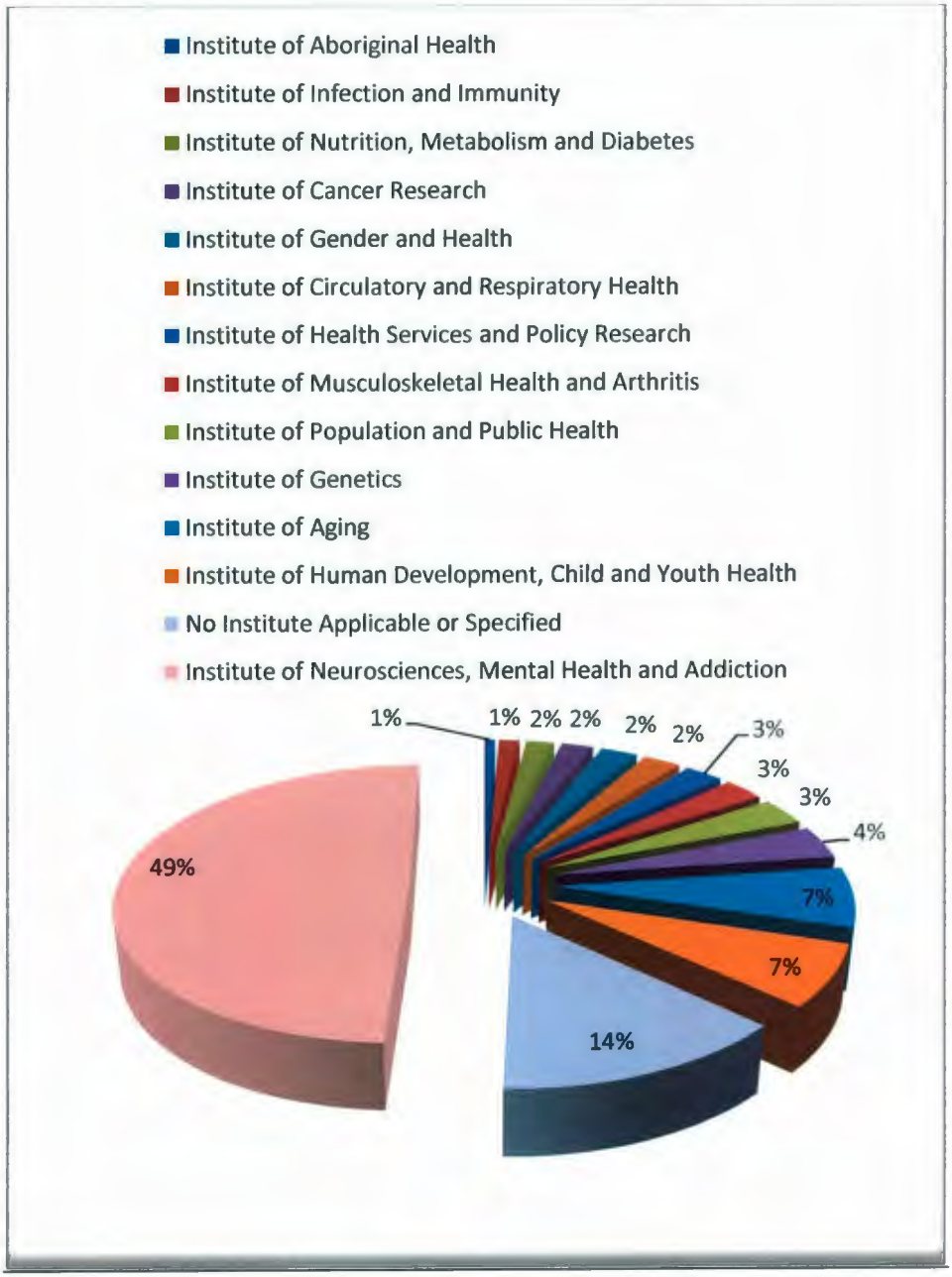
CIHR's internal searches delivered excellent data sets in the form of Microsoft Excel spreadsheets, with separate sheets for MHIR in each of the 13 virtual institutes from 1999 to 2009, and for which no institute was applicable/specified. The importance of having all relevant data in Excel spreadsheets cannot be overstated. Working with the data was efficient and consistent; it lent itself to the categorical and sub-categorical scheme needed to answer the three-part research question, and provided assurance that the data sets used are a comprehensive collection of all relevant data required.

As illustrated in this table and pie chart, the spreadsheets came with the following distribution of mental health and illness research studies in the 14 institute categories:

Table 7: CIHR Mental Health/Illness Research Projects by Institute (1999-2009)

Institute	# of Projects
Institute of Aboriginal Health	36
Institute of Infection and Immunity	71
Institute of Nutrition, Metabolism and Diabetes	96
Institute of Cancer Research	108
Institute of Gender and Health	125
Institute of Circulatory and Respiratory Health	127
Institute of Health Services and Policy Research	130
Institute of Musculoskeletal Health and Arthritis	138
Institute of Population and Public Health	166
Institute of Genetics	198
Institute of Aging	362
Institute of Human Development, Child and Youth Health	365
No Institute Applicable or Specified	713
Institute of Neurosciences, Mental Health and Addiction	2569
Total	**5204**

Figure 3: CIHR Mental Health/Illness Research Projects by Institute (1999-2009)



4.1.1: Categorical Preparations

Each sheet in the original data sets from CIHR had 38 columns (see Appendix D). To reduce the sheets to a workable size, the value of each column of data in terms of its

utility for the present study was carefully considered. In preparation for the analysis, two new columns were created in the working copy: one labeled "Category", to record broad categorical designations; and another labeled "Target Health/Illness", for the more specific sub-categorical scheme that would be used to record projects' research objectives (see Appendix E).

The column in the original data sets titled "Related to Neuroscience (1) or Mental Health (2)" only classifies projects as either neuroscientific or mental health related. The special status modern medicine has given neuroscience, reflected in INMHA's full name, would have to be preserved in the categorical/sub-categorical scheme. A purposeful expansion of this column could provide the means to begin making the desired distinction between mental health research and mental illness research, and the distinction between neuroscientific research and non-neuroscientific research, supported by more specific sub-categorical determinations.

The data sets from CIHR show at a glance which projects were and were not neuroscientific in nature, and this was used to formulate five designations for the general classification of new data generated by the analysis. As they were analyzed, research projects were classified in the newly created "Category" column as either neuroscientific mental health research (NMH), neuroscientific mental illness research (NMI), mental health research (MH), mental illness research (MI), or addiction research (ADD).

During the preliminary review, when a medical term appeared that was unknown or not completely understood, a Google search for encyclopedic medical dictionaries available online was performed. The choice was narrowed to the best five and, based on

their detail, clarity and user friendliness, two were selected for use during the full analysis: MedlinePlus, a health information website provided by the U.S. National Library of Medicine and the National Institutes of Health (National Library of Medicine, 2009); and MedicineNet.com, an equally reliable website maintained by a healthcare media publishing company called WebMD (WebMD, 2009). Both websites were important tools in terms of the study's quest for accuracy, but especially in the process method's efforts to discover each abstract's true 'voice' with the analysis, unencumbered by unfamiliarity with or ignorance of many highly specialized medical concepts.

4.1.2: Typology Creation

The preliminary review of 450 randomly chosen abstracts from CIHR's data sets provided an opportunity to explore ideas for the sub-categorical designation of research objectives found in the abstracts. The most important feature in any project's abstract is its research objective(s); no other detail brings the current study closer to the successful fulfillment of its own research objective. Therefore, the designations created for the sub-categorization of research objectives during analysis, whether for mental health research projects or mental illness research projects, may be termed *primary* designations in the sub-categorical scheme.

Preliminary review of abstracts generated a short list of primary designations for mental illness research objectives based on various mental illnesses of interest found in the abstracts, and systematic analysis and classification of all abstracts in the data sets uncovered and captured their respective subject matters, producing a complete list of 55

primary designations (see Appendix F). Most of these do not require definition, as they simply signify the mental illness/condition of interest. For sub-categorization of addiction research (ADD), which this study deems mental illness research, a list of five primary designations emerged from analysis of the abstracts (see Appendix F). When the first abstract appeared in the preliminary review that indicated the general category to which it belonged was mental health related (i.e. NMH or MH), a short list for mental health research objectives was created; and systematic analysis of all mental health research project abstracts in the data sets uncovered and captured their research objectives in another complete list of 17 primary designations (see Appendix G).

The abstracts also provided several study features were less significant for the present study than the projects' research objectives, but which nevertheless appeared to be valuable: use of neuroscientific equipment and/or techniques (e.g. MRI, ultrasound); a significant qualitative or psycho-social component in the study; and the development of a prosthetic/rehabilitative device. To register such observations, the typology would have to include two more classes of designations: "mental illness research descriptors" and "mental health research descriptors"; and a set of cross-category designations (see Appendix H). Strictly speaking, these features do not contribute to fulfillment of the present study's research objective; but if the research involves reading 5204 abstracts to record the details they contain, and if this is the only way to overcome the questionable accuracy of keyword searches for details, it seemed reasonable to record details that could conceivably be of value for future research. Compared to the primary designations for research objectives, both sets of descriptors are less important to the present study,

and so may be termed *secondary* designations (totaling six); even further removed, the cross-category designations may be termed *tertiary* designations (totaling three). The complete lists of secondary and tertiary sub-categorical designations are provided in Appendix H.

These three sets of primary designations (totaling 77) signify research objectives of mental health related studies, mental illness related studies, and addiction studies; but if the methodological issues associated with working with them could be overcome, they could conceivably facilitate a more nuanced differentiation of mental health research from mental illness research than could have been achieved by general categorization alone. All sub-categorical designations (primary, secondary and tertiary) were recorded in the column "Target Health/Illness". A project has only one categorical designation (NMH, NMI, MH, MI or ADD), but could conceivably have many sub-categorical designations. Therefore, the total number of categorical designations will equal the total number of projects categorized, but the total number of sub-categorical designations will necessarily exceed the number of projects sub-categorized.

The process method employed in the analysis of the CIHR data sets was governed by three normative principles: 1) to create a systematic scheme of categorization and sub-categorization to capture data generated by the process, which simultaneously generates the scheme's signifiers; 2) to clearly signify and faithfully record all relevant details in each project's title, abstract and, if necessary, keywords; and 3) to consistently apply a distinction between mental health research and mental illness research throughout analysis. The first two are practical considerations for the method, but the third principle

was an overarching methodological rule that modeled the research objective for the analysis during the process, keeping it on task at all times.

The goal here was to allow the research projects' abstracts to determine what kind of data would be generated by the analysis, in so far as this was possible, and the process nature of the method was essential to achieving this. All research projects in the data sets were categorized and sub-categorized by their titles, abstracts and, if necessary, keywords, and represented in the most straightforward manner possible. The objective was to record nothing more or less than the stated intentions and methodological approach of each project. The progressive movement of the process method through analysis of the abstracts built the typology, with designations created as new research objectives and study features were discovered. Similar to the process used to conduct a literature review, we are harvesting quantitative data from qualitative sources. This is what needs to be done when researching research and, again, it dictates the method used.

4.1.3: Initiating Analysis

With fourteen institute-specific pages in the spreadsheet, the analysis started with the institute that funded the least number of MHIR projects, the Institute of Aboriginal Health (IAH), and ascended up through the institutes to the one that funds MHIR exclusively – the Institute of Neurosciences, Mental Health and Addictions (INMHA) (See Table 7, p. 66). With a total of 5204 projects in the data sets, an abstract-by-abstract account of the method employed in this study was not possible, so key examples had to be selected to illustrate the procedure of categorization and sub-categorization in analysis.

We begin, however, by looking at the first two projects in the IAH sheet, as they brought out two important issues that had to be addressed in the analysis: abstracts given in French, and projects with no abstract provided.

The first abstract in the IAH sheet was in French, so a reliable method of translating the data for these projects was needed. Google's translator did well enough to be adopted as the translation tool for analysis, performing well throughout the study and facilitating comprehension of French titles, abstracts and keywords. It provided as close to a complete translation of words with syntax and grammar as could be expected, permitting the analysis to generate categorical and sub-categorical designations based on details. Approximately one in fifteen projects in the data sets were in French, so having complete and relatively accurate translations was important.

The second project in the IAH data sheet came without an abstract. In such cases, only the title and keywords could be used to make the required categorical and sub-categorical designations. The project, awarded $10,208 in the 2008-2009 funding year, was titled "Relationships Between Cultural Continuity and Addictive Behaviours Among Urban Aboriginal Women", indicating it should be categorized as an addiction study (ADD). The keywords given were "Health Behavioural; Psycho-social; Nicotine; Behaviour; Alcohol; Add"; most of these don't appear in the title, so they were deemed to have been taken from the missing abstract. Based on this, it was determined that the research objectives in the study were formulated to address addiction to alcohol (ADDA) and addiction to nicotine (ADDN). Therefore, this project was categorized and sub-categorized as "ADD/ADDA; ADDN". Less than one percent of projects came without

an abstract, and the titles and keywords for these projects provided enough information during analysis to maintain the scientific integrity of the present study and its findings.

As with categorical designations, the sub-categorical designations were not independently conceived or applied. The designations used in the sub-categorization of each project (i.e. for a given project's research objectives, study descriptors, and/or additional cross-category observations) were determined by the data undergoing analysis – the project's title, abstract, and keywords (if necessary). The above examples, and those that follow in the next section, demonstrate that details found in the abstracts could and would be recorded with a process method of analysis and the typology of designations it generates – recorded as faithfully as single person coding can permit. In fact, short of using error-prone keyword searches, details in the abstracts must be signified and recorded in this way. In some cases, the abstracts were challenging with respect to the assignment of designations to record relatively obscure or technical research objectives and study features, but the analyses of these more challenging abstracts are believed to have achieved a level of reliability commensurate with that of the more straightforward, accessible data found in most abstracts.

4.1.4: Data Generation

The foregoing examples convey a general sense of how the analysis proceeded from abstract to abstract, and how abstracts in French and projects without abstracts were addressed. But we need a more particular set of examples to achieve a more perspicacious understanding of this process, its creation of a typology, and how it dealt with other

challenges while successfully fulfilling the study's research objective.

Definitions of the five categorical designations (NMH, NMI, MH, MI and ADD) are given above, and here we look at examples of their application during the analysis. The general categorization of research projects using these five broad designations, previous to the sub-categorization based on research objectives and study features, proved to be very straightforward. They were defined and coded in the following ways:

- **NMH** – neuroscientific research studying healthy brain, spinal cord and/or central nervous system functions, etc.; or the neurological aspects of physical disorders.
- **NMI** – neuroscientific research explicitly targeting a specific mental illness, class of mental illnesses, or injury/disorder of the brain, spinal cord and/or central nervous system.
- **MH** – non-neuroscientific research studying healthy brain, spinal cord and/or central nervous system functions, etc.; or studying physical disorders.
- **MI** – non-neuroscientific research explicitly targeting a specific mental illness, class of mental illnesses, or injury/disorder of the brain, spinal cord and/or central nervous system.
- **ADD** – research of any kind that targets addiction and related concepts.

These are not arbitrary designations, but rather formulated on the basis of widely accepted, well-defined human concepts and common sense. They are sharply defined, and a given research project will only be coded with one of these general designations

under "Category". All addiction related research projects are given their own category here, as in recent years this area has been given particular significance as a medical concern in Canada; as with neuroscience, this special status is reflected in INMHA's full name. For the purposes of the intended distinction between mental health research and mental illness research, addiction research is considered mental illness research, which is also consistent with accepted medico-scientific and societal norms.

Sub-categorical designations for various study descriptors and features (given in Appendices F, G and H) are not included in the examples given here, as they would detract from fulfillment of the research objective in this thesis. All designations, whether categorical or sub-categorical, were created according to what was found in the abstracts, but governed by the broad application of the 'health research vs. illness research' distinction so crucial to the achievement of the research objective. Researchers interested in the sub-categorical designations should know they appear in the spreadsheets of the completed data analysis, and they are available on request.

The reader is strongly encouraged to use the four examples below to try to adopt the researcher's perspective in the analysis, referring to the list of categories above, as this will help the reader gain a sufficient understanding of how the process method of reading abstracts and applying designations worked.

Consider the following example:

> Project Title (Institute): Sleep and circadian rhythms in the middle years of life. (Institute of Aging)
>
> Abstract: The current overwhelming evidence that aging is associated with a significant increase in sleep-wake cycle complaints has important individual, social and economical consequences. Multiple factors,

including health problems, side effects of medications and specific sleep disorders, account for this age-related increase in sleep difficulties. However, critical changes in the sleep-wake cycle are also observed in optimal aging, i.e., when people do not suffer from medical, psychiatric or specific sleep disorders. These age-related changes occur as early as the middle years of life. Between the ages of 20 and 60, increasing age is associated with less time asleep, more awakenings during sleep, less deep sleep, and more lighter stages of sleep. With increasing age, sleep is also more vulnerable to challenges such as jet-lag or shift-work. The long term goal of our research program is to understand the mechanisms that underlie age-related modifications of the sleep-wake cycle. In this proposal, we will use innovative brain imaging techniques to evaluate if age-related changes in brain morphology and activity may explain age-related changes in the sleep-wake cycle. The sleep of young (20-39 y.o.) and middle-aged subjects (40-60 y.o.) will studied under habitual and sleep deprivation conditions. This research should provide important answers on how aging impacts sleep oscillations in their role to protect sleep and how age-related changes in the brain during sleep oscillations may underlie changes in vigilance and cognition. The long-term goal of our research program is to develop preventive and therapeutic strategies for the older population based on the mechanisms underlying age-related changes of the sleep-wake cycle.

Categorical Designation Used: NMH

Consider categorization of an addiction research project in the following example:

Project Title (Institute): The role of injection drug use and hepatitis C infection on tolerability of highly active antiretroviral therapy and HIV-1 treatment outcomes. (Institute of Population and Public Health)

Abstract: HIV infection is increasing among injection drug users and this population is frequently co-infected with Hepatitis C. This may have an effect on how such patients tolerate antiretroviral therapy that can be toxic to the liver and we know very little about these patients tolerate these medications. The results of studies have been conflicting. One study showed that Hepatitis C affects HIV disease progression whereas another study did not find this. Given the challenges of adherence to HIV treatment among drug users, we want to understand the magnitude of treatment interruptions due to

liver side effects and due to ongoing illicit drug use The results will enable health care providers to develop interventions that will improve the delivery of antiretroviral therapy to this vulnerable populations.

Categorical Designation Used: ADD

Consider that the project in the following example was deemed mental health research:

Project Title (Institute): Initial effects of diverse contexts and channels of a physical activity campaign: An evaluation of health Canada's guide to healthy active living (Institute of Public and Population Health).

Abstract: It has been well documented that physical activity has several short- and long-term health benefits but less than half of Canadians are active enough to reap these benefits. Promotion efforts are therefore needed to improve the physical activity levels of Canadians. Research on physical activity promotion has typically focused on the messaging. No research has compared different settings in which promotion messages are presented. The proposed study will be the first to evaluate traditional and novel contexts for physical activity promotion while holding the intervention messaging constant (i.e., Canada¿s Physical Activity Guide to Healthy Active Living). Specifically, we will evaluate settings of: 1) home, 2) physician¿s office, 3) beauty salon/barbershop, and 4) airplane on awareness, message persuasiveness, and physical activity motivation using Canada¿s Physical Activity Guide to Healthy Active Living. This includes standard settings (home, physician¿s office) and novel settings (beauty salon/barber shop, airplane). Standard settings may be convenient for dissemination, but the novel settings may be better for message exposure and persuasion because they represent places where people are often waiting for long periods of time with need for distraction. Our study will provide important information about the initial impact that the context and channel of promotion messaging may have on message attention and physical activity motivation using a real world (i.e., not in a lab) design.

Categorical Designation Used: MH

Finally, consider the mental illness categorization of the project in the following example:

Project Title (institute): AutismCONNECTS: Building a virtual community of autism spectrum stakeholders (Institute of Neurosciences, Mental Health and Addiction).

Abstract: Autism Spectrum Disorders (ASDs) are characterized by impairments in communication and social interaction with repetitive behaviours & stereotypies, and affect about 1/150-1/250 people. Since social networks are highly dependent on social interaction and communication, individuals with ASDs frequently lack the social supports that many of us take for granted, making them among the most marginalized individuals in society, with family members struggling to provide the necessary support. Members of ASD-CARC, Autism Society Ontario, GRIDS and the Centre for Research on Stress, Coping and Well-Being have established a Knowledge Translation Program aimed at disseminating research findings and fostering communication among ASD stakeholders (persons with ASDs and their families, volunteers, agencies, advocacy groups, researchers and policy makers). Consortium members have created a specialized virtual community, AutismConnects, as a catalyst for knowledge translation (by providing a vehicle for researchers to disseminate their findings) and a means for maximizing the impact of the knowledge translation, by bringing together all other stakeholders to share their information, experience and expertise and to collaborate on the deployment of best practices. AutismConnects members can share ideas, concerns, and solutions, such as the availability of special programs, services, volunteer opportunities, housing, and transportation through collaborative media such as forums, discussion groups and blogs, displaying information, such as a region¿s need for speech-language pathologists or the location of specific workshops. This project will track the use of AutismConnects among stakeholders, evaluate user satisfaction and changes in the extent of social networks and quality of life, and make adjustments to the system to ensure the development of an interactive virtual community for AS stakeholders.

Categorical Designation Used: MI

The process method of reading each individual research project's abstract, creating designations for the various pieces of information they contained, and the classification of each project according to the content of its abstract continued until all 5204 abstracts in

the data sets provided by CIHR had been analyzed and classified, producing a complete typology of categorical and sub-categorical designations, and comprehensive sets of new primary data.

4.2: Adjustments

Before proceeding with generating results, the data sets provided by CIHR required various kinds of 'cleaning' to remove project records found inappropriate for one reason or another. Given the limitations of single person coding of data, certain method evaluation measures need to be taken to verify the accuracy and consistency of the analysis. Some of this took place before analysis, some during, and some after, but these procedures were necessary for the enhancement and preservation of the scientific integrity of the research and its findings.

4.2.1: Quantity Control: 'Cleaning' the Data Sets

Once the data sets from CIHR were prepared for analysis (i.e. columns hidden, column titles shortened, columns added, etc.), the records of certain projects had to be deleted from the working data sets for three reasons. First, all projects with funding earmarked for future research (beyond 2009), but which had not been funded in any previous years, were deleted because they fell outside the funding period of interest (1999-2009). This eliminated 75 project records from the data sets.

At around the midpoint of the analysis, it was realized that the data sets may inadvertently contain duplicates, so a search for duplicates in the "Funding ID" column of

the data sets was conducted, as each project has a unique funding ID number. Excel's "Duplicate Values" function produced 153 highlighted pairs; but after reviewing the first ten pairs it was determined that they were not actually duplicates. Each pair represented a study funded for one period, then renewed for another period, generating a second record. For example, one project had been funded from 2002 to 2004, and then funding was approved for an extension to the project from 2004 to 2006, producing two records of the same study. This was so for all 153 pairs; the two funding periods of each pair never overlapped, and the titles, abstracts and keywords were always identical. Addressing the 'duplicate' pairs was a simple matter of transferring figures from the funding period in one record to the blank cells for the same funding period in the other record, then deleting it, leaving one record of the project record with one long funding period. This 'cleaning' procedure eliminated 153 more research project records from the original data sets.

During the analysis, only one inappropriate project record. Somehow, CIHR's keyword search had captured a study designed to investigate the ergonomic advantages of different types of lighting in a given workplace, and so was not related to mental health or illness research. This eliminated one more project from the data sets, bringing the total number of project records deleted to 229, leaving a total of 4975 projects out of 5204.

4.2.2: Quality Control: 'Method Correction'

All human endeavour is prone to human error, so no matter how consistently the process method of the analysis was followed in terms of trying to comprehend, represent and faithfully record no more or less than what was actually contained in the abstracts, a

certain margin of error was not only possible – it was entirely probable. Over the course of examining the first few hundred abstracts in the data sets, a small lexicon of terminology was created that guided the analysis of the thousands abstracts that were eventually reviewed. But as the 500 mark was approached, some of these new terms evoked the feeling something may have been missed in abstracts previously analyzed. As these terms arose, awareness that hundreds of abstracts had been analyzed without the benefit of knowing the full meaning of these newly comprehended terms began to grow. As the analysis progressed, it became more and more likely that some information in the abstracts had gone unclassified or inaccurately represented in the data generated by the analysis. This gave rise to a set of 'method corrections'. From this point forward, whenever an abstract evoked this unsettling awareness the least understood terms and issues in the abstract I least understood. Upon completion of the analysis, the data sets were re-viewed with a list of 22 concerns, and one by one the Excel's word/phrase search engine was used to find all relevant abstracts in each institute-specific spreadsheet of the CIHR data sets. These abstracts were analyzed again from a more experienced perspective, and any inaccuracies or mistakes of any kind found were corrected.

For example, when the phrase "cell death" was first encountered in an abstract, it was in reference to brain damage, and so the project was categorized as mental illness research (i.e. stroke, injury, etc.). However, about three quarters of the way through an abstract indicated that a certain degree of "cell death" is natural and necessary for the healthy process of brain cell regeneration (apoptosis); a few abstracts even referred to these cells as "suicidal". This meant some studies of "cell death" should be considered

mental health research. In due time, all three quarters of abstracts previously analyzed were searched for "cell death" and the related abstracts were re-analyzed, making re-categorization of two studies necessary. In another case, the initial understanding of the term "sonic hedgehog" was of an electronic device for neurological stimulation, but when analysis was almost complete an abstract indicating that "sonic hedgehog" was actually a name scientists had given a particular molecule came to light. This completely changed the original understanding of these abstracts, necessitating a re-analysis of all abstracts containing this term.

After the analysis of all the abstracts was complete, the categorization and sub-categorization was periodically checked with ten randomly chosen projects, with titles, abstracts and keywords of projects reread to identify any other methodological mistakes that needed correcting. Approximately 90-95% of the re-views were in agreement with the first assessment of the abstract; but sometimes designations were added, subtracted or replaced to tighten or correct categorical and/or sub-categorical designations representing the information in the abstract; there were also a handful of typographical errors. During these post-analysis checks, the researcher found the capacity for incisive comprehension of abstracts had improved with the experience gained from analysis of over 5000 of them. This was encouraging in one sense, but also raised the distinct possibility that still more inaccuracies in the original analysis may remain. As a result, almost 30 more random checks were performed in the weeks that followed, mostly on projects categorized and sub-categorized in the early stages of the analysis. When a mistake was conceivably repeatable, a search for that mistake was initiated. These checks were discontinued after

finding ten projects in a row that did not need to be corrected in any way.

Random quality control checks notwithstanding, another kind of check performed after analysis gave confidence that the study had achieved an acceptable margin of error. In the process of reading thousands of abstracts, creating designations to represent the various data they contained, and categorizing and sub-categorizing projects accordingly, gradually the researcher became more educated regarding the terminology and phrasing commonly used in mental health and illness research abstracts. The encyclopedic online medical dictionaries were used when a term not immediately recognized or understood was encountered, providing a working knowledge of MHIR abstract jargon, and progressively increasing the efficiency of the analysis.

All the above measures resulted in significant adjustments being made to a number of abstracts revisited over the course of this process of method correction; but these measures ensured that most of the abstracts that could have conceivably needed correction had been revisited, and those found in need of correction had been corrected, bolstering the integrity and reliability of the research method and its findings. These corrections arose directly from the study's process method of analysis; the method had generated its own corrections by turning the researcher's experience of performing the complete analysis back on itself to fix errors made earlier when less experienced. The systematic edification of the researcher was a product of the process method; and this became a function of the process, even as it used the researcher's progressive experience with the data to correct itself.

Finally, the writing of this thesis, involving explanations of the method of analysis

and typology generation, afforded countless opportunities to check the work. Whether defining a designation, looking for the best examples to include in the method section, or pursuing a passing scientific curiosity – once the initial analysis was completed, further interactions with the data sets, for whatever reason, were occasions for evaluating the research method. At this point, finding fewer and fewer adjustments need to be made until there are rarely any at all, may be taken as a fair indication of the quality of the analysis, and verification of the process method's capacity for self-correction through the progressive education and experience of the researcher – all of which is necessary if we are to deliver reasonably reliable results.

CHAPTER 5: RESULTS AND CONCLUSIONS

In summary, the current study has put forth its research objective, formulated its three-part research question, and justified both with a thorough literature review. Next, it considered how best to ask the question and fulfill the objective methodologically, which meant finding an effective approach to data extraction/collection, and designing a suitable method of analysis for the scrutiny of the 5204 research project titles and abstracts in the data sets provided by CIHR (reduced to 4975 after various "adjustments"). Concurrently, the analysis involved progressive creation of a typology of designations based on what was found in the titles and abstracts, and the application of designations to systematically categorize and sub-categorize each research project accordingly. The research question has been posed; it has been justified and properly 'asked'. We now turn to the study's findings for quantitative answers to the question. The analysis spawned several sets of figures, but what do they tell us? First we revisit some of the preliminary findings to see what conclusions can be drawn from this information.

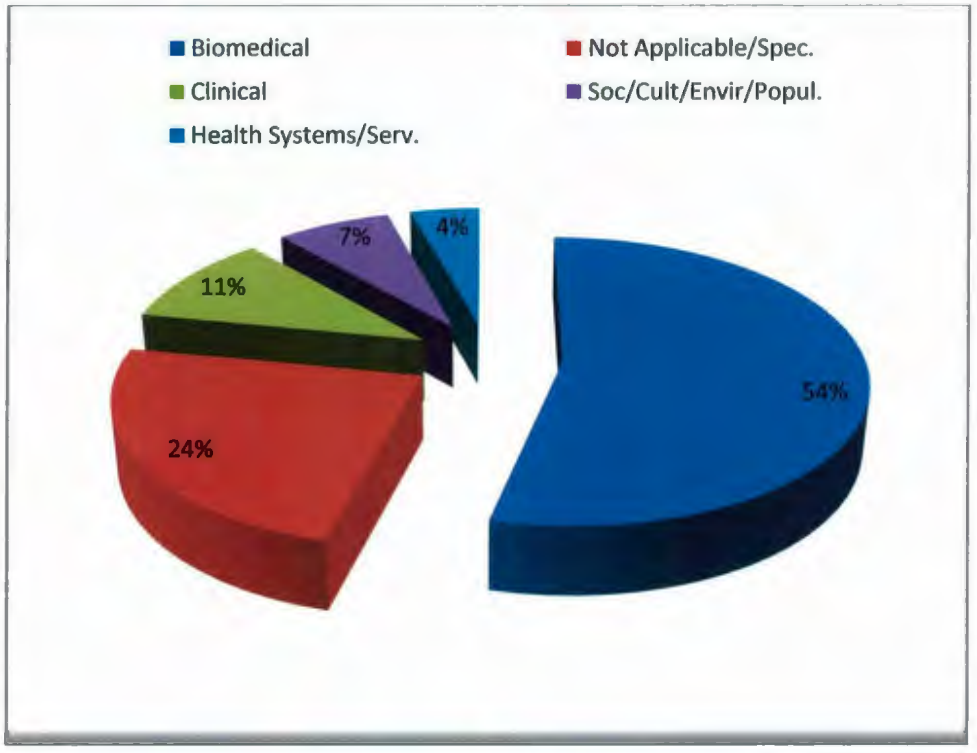
5.1: On the Preliminary Analysis and Findings

5.1.1: Results

The preliminary analysis was performed using CIHR's online funded research database. Although the database's limited keyword search capacity was obviated for this study by CIHR's internal search capabilities, a series of queries using the online database's search criteria produced a number of interesting and, in some cases, intriguing facts regarding CIHR research as a whole. The results of the breakdown by institute

(1999-2008) shown in Table 2 (p.51) indicate CIHR funded more than $1.2 billion of research for which no institute was applicable or specified – 22% of all CIHR research over this nine year period. Updating the research pillar figures from the preliminary analysis to include the entire ten year period (1999-2009), Figure 4 shows it still stands at 22%, and now totals more than $1.46 billion:

Figure 4: CIHR's Proportional Funding of Research Pillars (1999-2009)



In fact, the set of research projects for which no institute was applicable or specified received more money each year than any of CIHR's 13 virtual institutes, and more than the seven least funded virtual institutes combined (Institute of Aboriginal Health; Institute of Gender and Health; Institute of Aging; Institute of Health Services and Policy; Institute

of Population and Public Health; Institute of Musculoskeletal Health and Arthritis; and Institute of Human Development, Child and Youth).

It was curious to find 95% of the $1.46 billion of research for which no institute was applicable or specified ($1.39 billion) is contained in a larger set of research projects that has taken a 24% of the global budget ($1.57 billion) from 1999 to 2009 – research uncategorized in terms of CIHR's four research pillars. The results of the breakdown by program family (1999-2008) shown in Table 3 (p.53) indicates almost three quarters of the research funded by CIHR comes in the form of operating grants, with salary programs a distant second. Several other general facts emerged from the preliminary analysis that merit consideration:

- INMHA has consistently received more funding each year than any other institute, by far.
- INMHA has spent less than 3% of its research funding budget on randomized controlled trials.
- The Institute of Population and Public Health (IPPH) received less than 3.5% of the CIHR budget on average from 1999 to 2008, and the Institute of Health Services and Policy Research (IHSPR) barely 3%.

Between them, the IPPH and IHSPR received less than 6.5% of CIHR's total funding over its first nine years of operations; and checking the figures for the full ten year period of interest, we find that together these two institutes received just 6% of the total CIHR budget, so it appears to have lost ground last year.

5.1.2: Conclusions

Besides what was found in the literature, the first signs in this study that CIHR may not have an adequate grasp of the impact of its funding allocations were found in the preliminary analysis. Using CIHR's online funded research database and exploring information in the public domain to familiarize myself with its operation, indicators were discovered on several levels. Strictly speaking, the preliminary findings are secondary to the study's research objectives; but they nevertheless provide important background for the study, giving us a sense of CIHR's general practices and policies. Any one of them alone may not have seemed questionable, but together they weigh in favour of legitimate concerns if not conclusions, and they will require more study than preliminary analysis for this research could provide. Even so, some of the information gathered with the preliminary work is glaring, and raises a number of questions.

For example, what kind of research funding can fall outside the scope of all four research pillars, and take almost 25% of CIHR's total funding budget, including the more than 20% unrelated to any institute? In terms of program families, it is not surprising that Operating Grants and Salary Programs receive most of the money, but between them they take 86% of all funding. With the extensive and varied health research concerns across CIHR as a whole, and the growing appreciation for the value of qualitative and mixed research methods in recent years, the percentages for all other program families seem lower than one might expect. A closer look at relative levels of funding to the institutes, research pillars and program families gives us pause regarding our commitment (as represented by CIHR's funding allocations) to the contemporary concept of population

health. As pointed out previously (p. 28), the population health movement has contributed greatly to a positive change for mental health and illness issues early in the 21st century; therefore, knowing the standing of population health at CIHR may be contextually important for the findings of the present study.

Consider that from 1999 to 2009 the Institute of Aboriginal People's Health, Institute of Aging, Institute of Gender and Health, Institute of Health Services and Policy Research, Institute of Human Development, Child and Youth Health, and Institute of Population and Public Health – combined – received just 17% of CIHR's total funding. In light of this, I looked at pillar figures for the 2008-09 funding year and found two of the four pillars combined, Health Systems/Services and Social/Cultural/ Environmental and Population Health, received just 14% of the total funding. The institutes and research pillars in question represent all areas identified as crucial to population health in Canada, and in the context of health research at CIHR. Given the percentage for these six institutes, and the level of funding for these two research pillars, the health research priorities reflected in CIHR's funding allocations to its institutes and research pillars over its first 10 years appear to undervalue essential elements of population health. One can appreciate the need for certain institutes and research pillars to dominate to some extent, but such a sweeping lack of emphasis on the fundamental precepts of population health raises the question of funding allocation imbalances at CIHR, at least on some levels.

If the set of projects defying categorization with respect to institute is bigger than that of every institute, we begin to wonder if a fourteenth institute or category may be necessary. When such a set of projects is larger than seven of CIHR's virtual institutes

combined, it is reasonable to begin questioning the relatively low level of funding for these institutes, and the extent to which we value and support their respective mandates. This is certainly not purposeful on the part of CIHR; but whatever the reason(s) for these imbalances, we have cause for concern. Uncategorized research should be examined and, if possible, projects should be re-categorized. They may even have to be placed in a more meaningful fourteenth category; it need not be a fourteenth institute, but for the sake of transparency and accountability it should be established and named in a way that better reveals what is being funded. If this cannot be accomplished it may be necessary to revamp the entire system of classifying funding at CIHR. Clarifying the situation regarding research projects that are "not applicable or specified" (whether in terms of institutes, research pillars or program families) would be a way to begin. Indeed, if sufficient means of evaluation had been put in place at CIHR earlier on, it is unlikely such unwieldy and inscrutable sets of projects would exist today.

If we look at the various names and mandates given CIHR's institutes 10 years ago, it is clear that the concept of population health was brought in on the ground floor. However, 10 years later we find what seem to be inordinately low levels of funding to institutes, pillars and programs that are crucial to Canada's population health-centered health care system. The findings of the study's preliminary analysis indicate that, to some degree, CIHR has been drifting from its original vision in this regard. The establishment of individual institutes, with distinct roles to play in a reinvigorated, future-facing health research agenda for the 21st century, was a monumental step in the right direction; but continuing to underfund whole components and fundamental aspects of it 10 years later

deemphasizes the universal spirit of what has been established, and threatens to disable purposeful movement forward. We must not allow ignorance of the cause to frustrate the effect. Research studies with objectives formulated to identify imbalances and help CIHR evaluate the impact of its funding allocations routinely would give us a more informed and effective health research agenda, and make research projects like the present study unnecessary.

Little more can be said about these matters, as hard and fast conclusions cannot be drawn without pursuing them more substantially than this study could accommodate. Nevertheless, the preliminary analysis and its results provide the context for the MHIR undergoing analysis.

5.2: Mental Health and Illness Research – Proportion

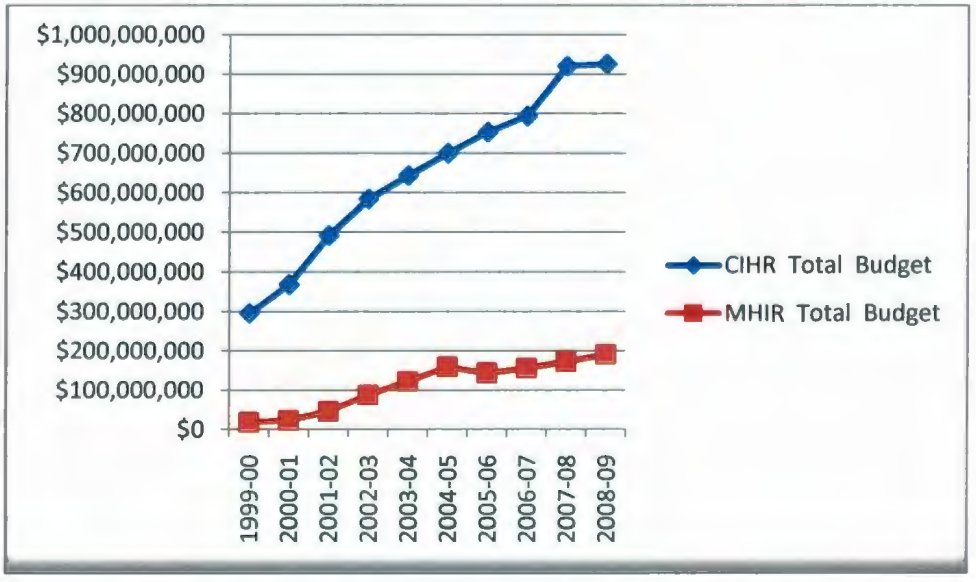
5.2.1: Results

For the first part of the research question we set out to determine the proportion of CIHR's global budget that has gone to fund MHIR over its first 10 years of operation. When finite resources must cover a wide range of expenditures and research demands, as with CIHR's mandate, proportions are a good way to evaluate how well the resources are being distributed. To find the proportional percentages of MHIR for each funding year at CIHR, the yearly totals from CIHR's global health research budget were divided into the yearly MHIR totals from the data sets. The results are shown in the following table and graphic:

Table 8: CIHR vs. MHIR – Total Budget w/ Proportional Percentages (1999-2009)

Funding Year	CIHR Total Budget	MHIR Total Budget	MHIR: % of CIHR Total Budget
1999-00	$296,051,529	$17,390,350	5.00%
2000-01	$368,716,716	$22,287,066	6.00%
2001-02	$492,324,742	$45,560,390	9.00%
2002-03	$584,645,241	$87,581,198	14.00%
2003-04	$644,095,532	$121,717,132	18.00%
2004-05	$700,337,606	$158,949,182	22.00%
2005-06	$753,721,039	$142,962,870	18.00%
2006-07	$794,506,084	$155,408,494	19.00%
2007-08	$921,135,199	$171,806,194	18.00%
2008-09	$926,081,078	$190,527,576	20.00%
Totals	**$6,481,614,766**	**$1,114,190,452**	**17.00% (average)**

Figure 5: CIHR's Total Budget vs. MHIR Total Budget (1999-2009)



We could compare the numbers of individual MHIR projects funded for each year, but projects at CIHR are funded from one to as many as ten years, and sometimes

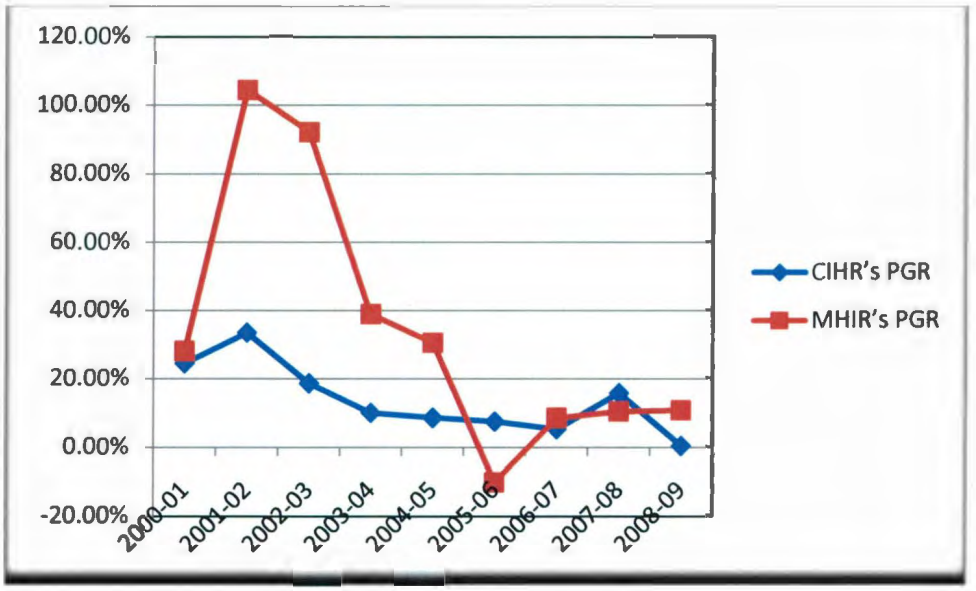
they are extended beyond the original funding period by one or more years – counting projects would hide this fact. However, even though comparing numbers of projects alone may not be advisable when comparing details, at the macro-levels of data used in this part of the study they may give us a sense of the relative distribution of projects which, coupled with the more precise calculations using funding dollars, can have some supportive value for evaluative purposes. For example, the data sets under scrutiny indicate MHIR constitutes 19% of all CIHR projects over the time period of interest, which verifies our findings with funding dollars to a certain extent.

The dollar figures also provide an opportunity to compare in terms of increase in funding from year to year. With the figures in Table 8, the standard percent growth rate (PGR) formula was used to compare their respective yearly rates of growth from year to year – $\frac{\text{This Year's Total} - \text{Last Year's Total}}{\text{Last Year's Total}} \times 100$, generating the following table and graphic:

Table 9: CIHR vs. MHIR: Percent Growth Rate (PGR) in Funding (2000-2009)

Funding Year	CIHR's PGR	MHIR's PGR
2000-01	24.54%	28.15%
2001-02	33.52%	104.42%
2002-03	18.75%	92.23%
2003-04	10.16%	38.97%
2004-05	08.73%	30.58%
2005-06	07.62%	-10.05%
2006-07	05.41%	08.70%
2007-08	15.93%	10.55%
2008-09	00.53%	10.89%
Average	**13.91%**	**33.93%**

Figure 6: CIHR vs, MHIR: Percent Growth Rate (PGR) in Funding (2000-2009)



These results answer the first part of the three-part question designed to address this study's research objective – What proportion of all health research funded by CIHR from 1999 to 2009 is dedicated to mental health and illness research? It also provides a comparison of their respective growth in funding from year to year.

5.2.2: Conclusions

If we wish to evaluate cancer research funded by CIHR, most of it will be found in the Institute of Cancer Research, with perhaps a portion taking place in the Institute of Genetics, and a smattering of studies here and there in one or two other institutes. In general, one would expect the vast majority of research projects pertaining to a given institute is funded in that institute (e.g. diabetes research in the Institute of Nutrition,

Metabolism and Diabetes). However, this is not so with the Institute of Neurosciences, Mental Health and Addiction. Although the main focus for INMHA is, of course, MHIR, more than half of the MHIR funded by CIHR has been conducted outside INMHA in other institutes. In fact, MHIR funded by CIHR, captured in the data sets for analysis in the current study, can be found in every institute, including a substantial portion in CIHR's "No Institute Applicable or Specified" category. This is indicative of the universality of mental health and illness issues in the spheres of human life, health and medicine.

More to the point, if we evaluate MHIR funded by CIHR by studying INMHA alone, we do so with less than half of all MHIR, and our evaluation may not give us an accurate reading. Therefore, the current study has sought out all MIHR from 1999 to 2009 for review, wherever it occurs at CIHR, to achieve optimum evaluative precision. As stated, we are examining each member of the entire population of MHIR projects over the first ten years, not making statistical estimations with samples.

Table 8 and Figure 5 (p. 93) both indicate CIHR's total funding budget has consistently grown over the ten years of interest; and, but for a setback in the 2005-06 funding year, MHIR's totals have also been steadily climbing from year to year. This supports the findings from the preliminary work done with the online database, which showed that every year INMHA received more money than any of the other 12 virtual institutes; INMHA took 13.25% of CIHR's budget for the decade (see Table 2, p. 51), surpassed only by the 'fourteenth institute' – "No Institute Applicable/Specified".

The yearly growth in funding for MHIR has been fairly constant, but the rate of this growth compared to that of CIHR is another matter. The figures in Table 8, and

particularly the comparison in Figure 5, show CIHR's yearly gains have been much more dramatic, while MHIR funding grew modestly by comparison from the 1999-00 funding year to 2004-05, and the last four funding years have seen a slowing in the growth of MHIR funding as it approaches an annual allocation of $200 million. For a closer look at this, the percent growth rates (PGR) of both were compared. The results are displayed in Table 9 (p. 94) and Figure 6 (p. 95), and they give us another perspective.

Here we recall Hampton (2006) and the deceptive nature of the figures she studied on American health research spending (p. 43). Whereas previous figures indicated a fairly consistent rate of increase and comparability, the PGRs for CIHR and MHIR over the decade each display a haphazard variability from year to year, and there is very little consistency by comparison. Given the first set of results, these findings are surprisingly unusual. MIHR's PGR plummeted from the 2001-02 funding year to 2005-06 (a year of negative growth), then comes up to level off much closer to the PGR of CIHR. However, much of this is due to a leap in PGR for MHIR of more than 100% in 2001-02 that skews the overall numbers, after which it would have to decline to some degree toward CIHR's average rate of 13.91%. For example, if we remove the funding years 2001-02 and 2002-03, MHIR's average PGR drops from 33.93% to 16.83%. One can see the early development and establishment of CIHR's funding allocation strategy reflected in the figures from the early years, as the CIHR personnel had pointed out.

We conclude that on the macro-level of funding dollar proportions, there has clearly been a concerted effort at CIHR to elevate the funding of MHIR over the course of its first 10 years, even considering the understandable imbalances in the figures from

the first two years of operation. Indeed, this may be the only explanation for the fact that all the percentages in the proportional calculations for Table 8, and many other such calculations in this study's results, work out to whole numbers – they have not been rounded off.

Funding levels give us a raw sense of the extent of the funding in general, but the funding allocations deliver a view of the range of and relative emphasis on the particulars being funded. Having had the opportunity to closely examine and consider the demands of the mandate of MHIR, both inside INMHA and in the other virtual institutes, it is reasonable to say the mandate of MHIR at CIHR is far more extensive than any other institute, and this needs to be taken into consideration. This is borne out by the funding levels for INMHA, and the fact that there is more MHIR being funded in other institutes than in INMHA. The range of research objectives in the Institute of Nutrition, Metabolism and Diabetes, for example, is undoubtedly more limited than that of the Institute of Neurosciences, Mental Health and Addiction. Depending on how much more extensive INMHA's range of objectives is, there is a greater likelihood particular researchobjectives and areas of research could be underfunded.

Assuming MHIR is sufficiently funded as a whole, as these results would seem to indicate, we now need to ask: How is MHIR funding allocated, considering the extensive set of demands in its mandate? Inasmuch as we have used the macro-numbers for CIHR and MHIR, the calculations in this section may be said to give us the 'big picture – a picture we must now analyze in two ways, corresponding to the two remaining parts of the question.

5.3: Mental Health vs. Mental Illness Research

MHIR from 1999 to 2009 was measured proportionately against the total CIHR budget, but it was decided that measuring subsets of MHIR proportionately against the total CIHR budget would not contribute to this study's objective. However, MHIR itself is also charged with allocating finite resources for a wide variety of concerns. Therefore, for the rest of the results selected portions of MHIR (e.g. mental health research, neuroscientific research) were measured proportionally against the total MHIR budget.

5.3.1: Results

Each project was categorized as one of five general study types. In this study, all addiction research projects are deemed mental illness research, so the total NMH and MH projects constitute all mental health research, and the total NMI, MI and ADD studies make up all mental illness research. Results are given in the following table and graphics:

Table 10: Mental Health Research vs. Mental Illness Research: Funding Dollars with Proportional Percentage of Total MHIR (1999-2009)

Funding Year	Mental Health Research Dollars (% of total MHIR)	Mental Illness Research Dollars (% of total MHIR)
1999-00	$8,598,787 (49.0%)	$8,791,563 (51.0%)
2000-01	$12,369,478 (55.0%)	$9,917,588 (45.0%)
2001-02	$26,312,393 (57.0%)	$19,247,997 (43.0%)
2002-03	$50,344,432 (57.0%)	$37,236,766 (43.0%)
2003-04	$68,262,065 (56.0%	$53,455,067 (44.0%)
2004-05	$84,007,073 (52.0%)	$74,942,109 (48.0%)
2005-06	$73,898,105 (51.0%)	$69,064,765 (49.0%)
2006-07	$74,623,069 (48.0%)	$80,785,425 (52.0%)
2007-08	$78,551,255 (45.0%)	$93,254,939 (55.0%)
2008-09	$83,457,866 (43.0%)	$107,069,710 (57.0%)
Totals (Averages)	**$560,424,523 (51.3%)**	**$553,765,929 (48.7%)**

Figure 7: Mental Health Research vs. Mental Illness Research: Funding Dollars (1999-2009)

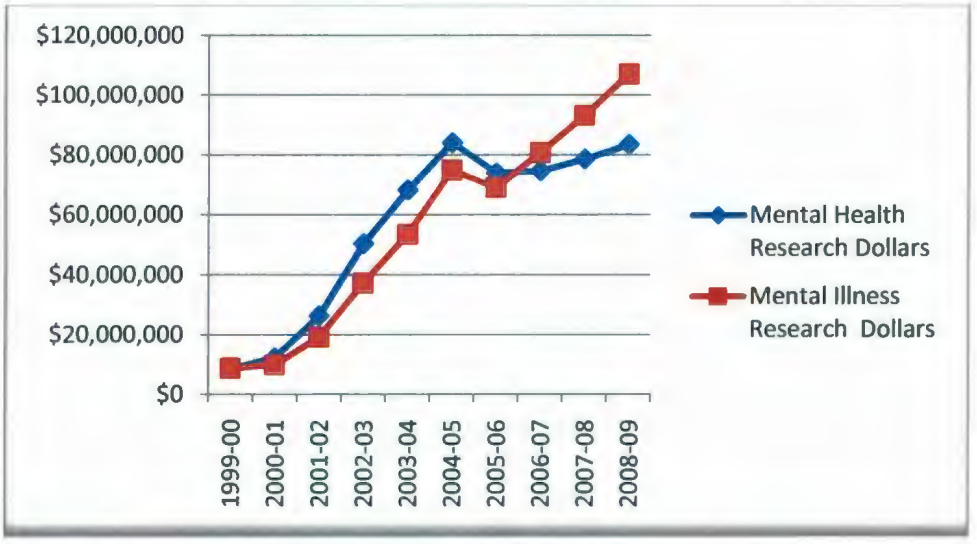
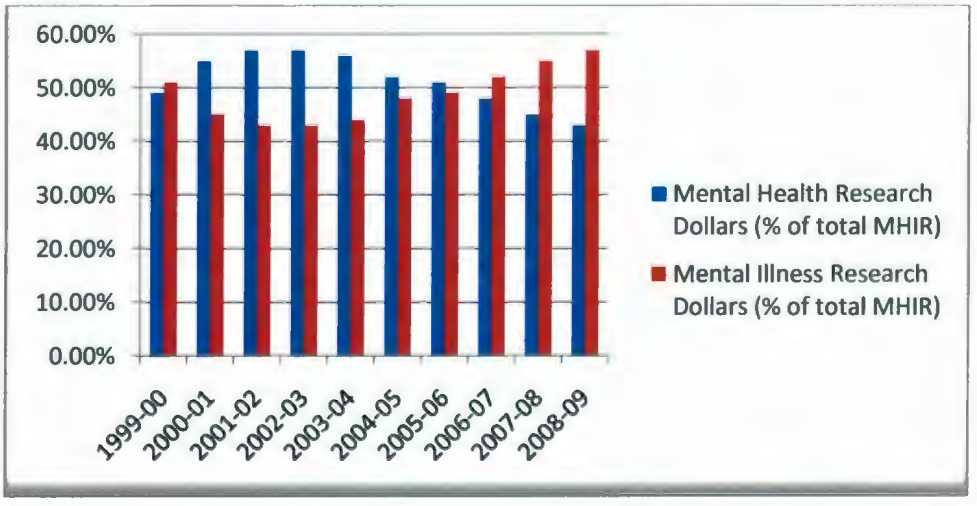


Figure 8: Mental Health Research vs. Mental Illness Research: Proportional Percentage of Total MHIR (1999-2009)



These results answer the second part of the research question – How much of the MHIR funded at CIHR can be considered mental health research versus mental illness research?

5.3.2: Conclusions

Proportions of total funding have told us CIHR has elevated the level of funding for MHIR as a whole over the last 10 years. The distinction this study makes between mental health research and mental illness research is an effort to ascertain how this funding is being distributed, determining to some extent whether CIHR's funding allocations to MHIR adequately address all that MHIR must address. Put another way, as regards this part of the results, are we robbing Peter (research into the mental illnesses of Canadians) to pay Paul (research into the mental health of Canadians)?

Table 10 (p.99) and Figure 7 (p.100) indicate that across the 10-year period of interest, allotments for mental health research versus mental illness research are almost two halves of a whole. Though the figures up to the end of 2005-06 show mental health research had the upper hand (over 50%), the trend in the later years is reversing this, turning relative proportions around in favour of mental illness research. This is illustrated in Figure 7, with a clear increase for mental illness research in the last couple of years diverging from that of mental health research. The peaks in the proportional percentages for both in Figure 8 (p. 100) and the trends both show, we see two waves that are the inverse of one another. We conclude there has been a fairly equal allocation of funding for mental health research versus mental illness research over the last ten years at CIHR.

5.4: Neuroscientific Research vs. Other Research

5.4.1: Results

We turn now to the findings for the answer to the third part of this study's research objective. Once again, we are concerned with a quantitative measurement,

reserving recommendations and speculation for the final chapter. CIHR's data sets came with a column to indicate a study was either neuroscientific (1) or otherwise (2), and the results are given in the following table and graphics:

Table 11: Neuroscientific vs. Non-Neuroscientific MHIR: Funding Dollars with Proportional Percentage of Total MHIR (1999-2009)

Funding Year	Neuroscientific Research Dollars (% of total MHIR)	Non-Neuroscientific Research Dollars (% of total MHIR)
1999-00	$3,393,675 (19.0%)	$13,996,675 (81.0%)
2000-01	$13,138,479 (58.0%)	$9,148,587 (42.0%)
2001-02	$29,401,003 (64.0%)	$16,159,387 (36.0%)
2002-03	$52,631,740 (60.0%)	$34,949,458 (40.0%)
2003-04	$73,136,467 (60.0%)	$48,580,665 (40.0%)
2004-05	$93,048,462 (58.0%)	$65,900,720 (42.0%)
2005-06	$86,633,468 (60.0%)	$56,329,402 (40.0%)
2006-07	$91,077,850 (58.0%)	$64,330,644 (42.0%)
2007-08	$97,494,585 (56.0%)	$74,311,609 (44.0%)
2008-09	$117,368,388 (61.0%)	$73,159,188 (39.0%)
Totals	**$657,324,117 (58.0%)**	**$456,866,335 (42.0%)**

Figure 9: Neuroscientific vs. Non-Neuroscientific MHIR: Funding Dollars (1999-2009)

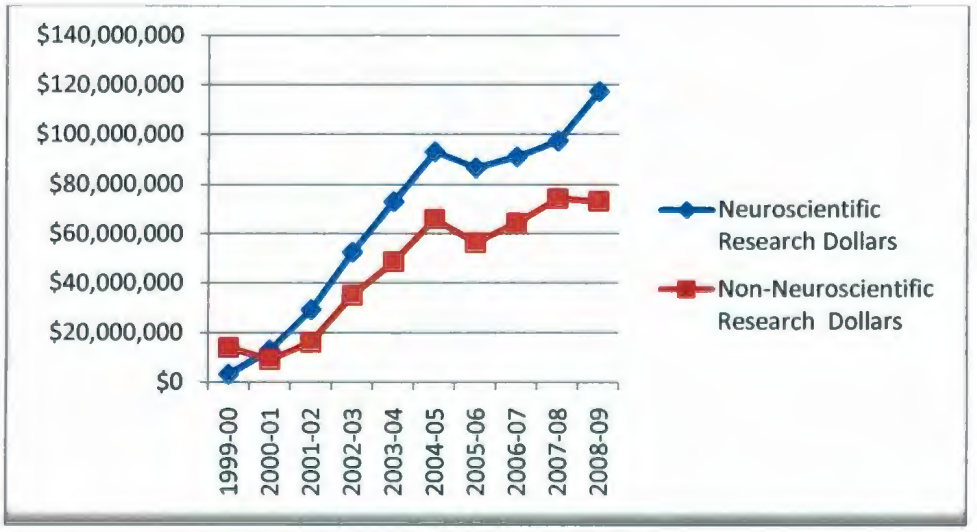
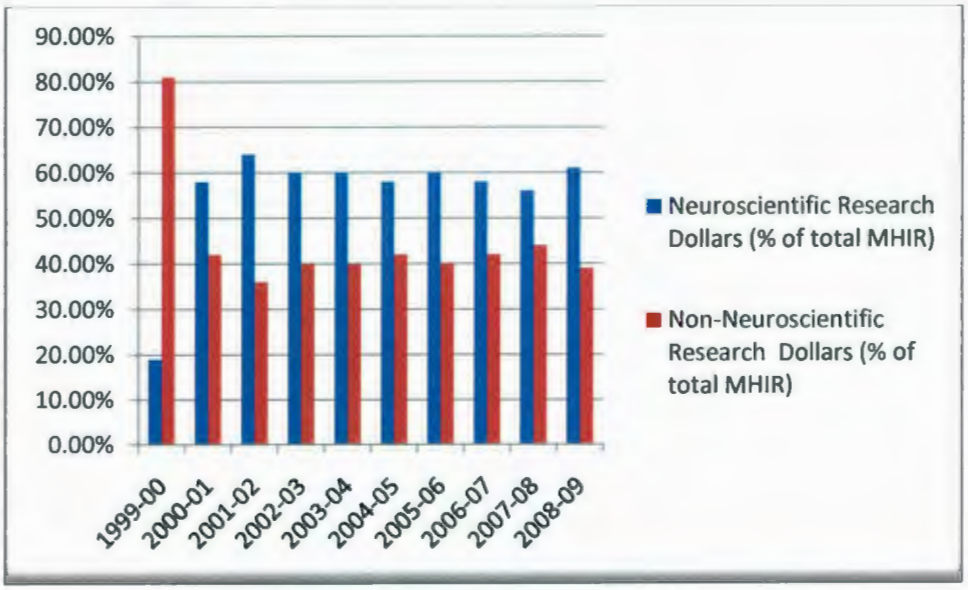


Figure 10: Neuroscientific vs. Non-Neuroscientific MHIR: Proportional Percentage of Total MHIR (1999-2009)



These results answer the third part of the research question – How much of the MHIR funded and conducted at CIHR is neuroscientific research? Due to the multiple levels of analysis possible with this study, we find conclusions regarding the findings sometimes necessitate a return to the data to pursue further results.

5.4.2: Conclusions

The current study has chosen not to weigh in on the 'reductionism' debate with a substantive argument, as this cannot be accommodated within the strictures of a Master's program. However, the study contributes to the debate by summing and comparing the funding of neuroscientific and non-neuroscientific MHIR over the first ten years of CIHR's operation, providing hard, quantitative evidence for both sides to consider. Table

11 and Figure 9 (p.102), and Figure 10 (above) show that if we average the 10 years, well over half of all MHIR at CIHR has been neuroscientific research (58%). Furthermore, looking at the figures from year to year, a troubling trend for Paris (2009) and the anti-reductionist camp has been developing – except for the first year, which can be discarded as statistically misleading, neuroscientific research dominated with an average of 59.44% of all MHIR funding, leaving all other research to share little more than 40%. Figure 9 indicates this will continue, as in the last two years the lines in the graph for each flare in different directions; neuroscientific research funding is continuing to go up, while all other types of MHIR funding are going down.

We can conclude from the results of the present study that neuroscientific research does indeed dominate all other study types in the field of MHIR, whatever the consequences may be for the future of psychiatric research. This data was not collected and compiled without interest, as the contemporary discussion regarding the growing domination of neuroscience in psychiatric research relates to the present study's pivotal distinction between mental health and mental illness research. It further justifies this study's efforts to determine, to some extent, whether the funding needs of certain mental illness research areas are adequately addressed in CIHR's broad MHIR mandate, as it pursues a host of mental *health* research objectives amid its mental *illness* research agenda. In fact, 61% of neuroscientific MHIR analyzed in this project was categorized as mental health research. Clearly, Paris (2009) shares this concern: "Thus far, neuroscience research has contributed more to the understanding of the brain than to determining the causes of mental disorder." (p. 513)

5.5: Summary and Interpretation of the Conclusions

There are many conceivable conclusions that can be drawn from the findings of this study, as many important questions have been raised, and more research is required on a number of fronts. The foregoing portions of this chapter constitute a systematic effort to draw conclusions based on how the results answer the three parts of the research question, but taken together they point to one overarching conclusion: MHIR as a whole seems to be adequately funded at CIHR, but funding allocations within MHIR may not be meeting all the research objectives it is charged with pursuing. In particular, specific mental illnesses may well be under-researched.

Again, MHIR has a particularly extensive mandate at CIHR, and with a plethora of research objectives to address with finite financial resources, the funding of MHIR is prone to allocations that spread the money too thinly in some areas, and too generously in others. We will need to identify these areas to ensure MHIR funding at CIHR is distributed as efficiently and effectively as possible. Closer examination of CIHR's funding allocation practices and policies as regards its MHIR, both quantitatively and qualitatively, is clearly required on a number of levels; and, based on the present study's findings, further research could ultimately call into question the ostensible sufficiency of CIHR's overall funding of MHIR.

This conclusion is supported by more than the quantitative findings of the study. First, the literature review showed us a world and nation that have only recently recognized the central importance of mental health, the scope and burden of mental illnesses, and so the value of MHIR. This means we need to monitor what we are doing

about them here in the early going, the better to develop optimal practices and policies.

Second, the findings indicate mental health research funding and mental illness research funding at CIHR are almost equal. This may or may not be a desirable ratio, and without a more profound examination of the data collected and generated in this study (i.e. the sub-categorical designations for the projects' research objectives), and serious pursuit of a range of future research objectives indicated by the study, we will not know. But we will need to know this if we are to identify and redress imbalances in allocations that result in the underfunding and/or neglect of research into specific mental illnesses.

Third, the concerns of Dr. Paris and the Canadian Alliance on Mental Illness and Mental Health regarding the dominance of neuroscience in psychiatric research (p.15-16) are borne out in this study's findings, adding yet another dimension to the possibility of funding allocation imbalances within MHIR at CIHR. Without deeper investigation of the datasets, and the initiation of a myriad of other future research approaches to this issue, a potentially dangerous, devolutionary trend in MHIR could continue unchecked.

Finally, this study has erred on the side of caution with respect to categorizing research projects as either mental health research or mental illness research, and it has therefore categorized all addiction research projects as mental illness research. However, there is still a good deal of debate regarding the medical status of addiction, and not everyone agrees addiction should be classified and addressed as illness. In any case, a more penetrating and perspicacious analysis of the addiction research data generated by the study is indicated; many of these research projects could conceivably be reclassified as mental health research, modifying the findings to some extent.

CHAPTER 6: RECOMMENDATIONS AND DISCUSSION

One of the main observations made by the International Review Panel after the five years of operation was that CIHR had not built in sufficient means of monitoring and evaluating its performance. Ten years on, the present study discovered CIHR still leaves much to be desired in this regard, and it has tried to find ways of gauging CIHR's funding allocation policies, particularly in terms of the consequences for its MHIR. A quantitative analysis of CIHR's 10-year funding allocation track record in terms of MHIR has revealed that CIHR's funding allocation policies and practices need reviewing, in terms of MHIR and across CIHR as a whole. Moreover, the study has learned the examination it has started will need to go deeper, that extensive qualitative research into CIHR's funding allocation policies is needed, and it has laid a solid foundation for such a research agenda with its results. Indeed, its most important contribution may yet be the various new research questions it raises, making other avenues of research possible and necessary.

The research field of MHIR is wide open. Historically neglected until recently, there is much that has yet to be done, and still more yet to be conceived. As motivating as this can be to a researcher, those of us working in this field would prefer it was more crowded, which is rather the point. With this in mind, the present study identified a portion of this needed research for itself – to quantitatively ascertain the consequences of CIHR's funding allocations for MHIR and particular areas of research within MHIR over its first 10 years of operation. We need to do more than recognize that MHIR *may* be an under-studied area of health research at CIHR, and that funding imbalances *may* exist within MHIR – we need to get down to working on this research more purposefully, more

thoroughly, and in greater numbers; and we must begin to address our ignorance of the efficiency and effectiveness of CIHR's funding and funding allocations for MHIR. In so doing, we can rectify and guard against the underfunding of research into specific mental illnesses.

In the process of investigating this, the study faced a number of methodological and philosophical issues inherent to this kind of research. In response, it had to make decisions on how best to cope with each of these issues in a scientifically sound manner. Every stage brought new questions and considerations, not infrequently calling for more research, sending the study back to its origin. The study endeavoured to break out of this circularity with an intentional pursuit of its research objective. The issues it encountered throughout now form the basis for a set of widespread recommendations.

Recommendations fall into two categories: 1) those that come from the analysis itself, the method it needed to adopt, and the results; and 2) those appearing in the process of generating results due to the unexpected limitations it revealed for the study. This is followed by a discussion of the implications of this research for CIHR and health research in general. Finally, the merits and complexities of researching CIHR's health research agenda are explored in light of the study's limitations.

6.1: Analysis and Results

The present study approached its research objective with a degree of skepticism regarding the funding levels and distribution for MHIR, based on a literature review that followed years of professional and personal experience with mental health and illness

issues. However, once the research objective had become focused in a question, every effort was made to lay aside any opinions and assumptions. Healthy questioning brought the researcher to the study, but a spirit of discovery and scientific curiosity governed the analysis. Research projects assessing operations, systems, practices and/or policies that only look for and report on what is wrong, limit themselves to the detriment of science and that which is being assessed. Obviously, improvements are made when problems are identified and solved, but it is also important to know what is working, so that these things may be maintained and enhanced to bring us closer to knowing what works best.

Analysis of the data with respect to the first part of the three-part research question found solid evidence of a positive trend in CIHR's funding allocations to MHIR from 1999 to 2009. The online database indicates that every year INMHA has been given more funding dollars than any other institute. The results of this study show rapid, substantial growth in total MHIR funding as a percentage of CIHR's total budget - an encouraging find. There has been a purposeful push to give MHIR 20% of CIHR's global budget – even managing to allocate 22% in the 2004-05 funding year. In this regard, MHIR's 17% average for the decade is misleading, as over the last seven years the average has been over 19%. Future research may reveal 20% is not enough, but working towards addressing the 20% prevalence of mental illness in the population with 20% of the global budget is a laudable initial goal that has been achieved.

It bears mentioning here that in communications with CIHR personnel, they advised not to put too much stock in the figures for the first two years, as much of what took place early in the transitional calendar year of 1999 is considered pre-CIHR, and the

rest of 1999 and most of 2000 was taken up with establishing benchmarks for the funding of 13 newly configured institutes. This is reflected in Table 8 (p.93).

Conclusions regarding the second part of the research question were that, on balance, mental health research and mental illness research are being funded equally. However, this may or may not be desirable. Should they be funded equally, or would it be more preferable to have one dominate the other; and, if so, which one? Answering this question requires answers to several other questions, some of which have been rarely asked, and others that will require serious consideration leading to extensive research – research hereby recommended. This recommendation leads us deeper. In evaluating a body of health research, as with this study, how important is it to know relative proportions of funding to individual research objectives (e.g. post-traumatic stress), and/or groupings of related research objectives (e.g. mood disorders)? Should individual research objectives pursued within MHIR be assigned to either side of this distinction as has been done in the present study, or is there a better way? Do different medical research pursuits require different blends of health and illness research to achieve their desired ends? In pursuit of a clear understanding of the etiology of schizophrenia, for example, to find a cure or develop best treatments and practices, how much does studying healthy brain activity contribute to the achievement of this goal?

These may be difficult questions to answer, and some may argue we do not need answers to such questions at all. The results and limitations of the present study indicate they do need to be asked and pursued with an array of research objectives and methods, and this is highly recommended. As regards achieving detailed knowledge of the

composition of the MHIR that has undergone analysis in this research, we have really only scratched the surface. Nevertheless, the present study has brought us to the edge of this knowledge with the greater proportions and differentiations, and has set the context for future research that will need to be more specific. The composition of MHIR for CIHR's first 10 years in terms of individual research objectives and groupings of research objectives is well worth knowing, particularly if we are concerned with doing a better job in years to come.

Serious consideration of the foregoing issues will also entail examination of the role of neuroscience in MHIR, the target of the third part of the study's research question. Irrespective of the opposing views taken on neuroscience in the sphere of psychiatric research, the results clearly show neuroscientific research holds significant sway over MHIR in terms of study type. Given the present study's concern regarding mental health research versus mental illness research, and the implications it holds for specific mental illness research objectives and mentally ill Canadians, close monitoring of this trend is recommended, that we may better understand what the future of psychiatry and psychiatric research holds for the mental health and illness needs of Canadians. Based on its results and the arguments it has highlighted with respect to this debate, the present study strongly recommends more research into this health research phenomenon and its influence on the MHIR agenda in Canada.

6.2: Results Generation and New Limitations

For answers to the second and third parts of the research question, we used results from the data generated in the general categorization of all projects as one of five major

study types: neuroscientific mental health research (NMH), non-neuroscientific mental health research (MH), neuroscientific mental illness research (NMI), non-neuroscientific mental illness research (MI), or addiction research (ADD). With the sub-categorization scheme applied to the detailed records for all MHIR projects at CIHR from 1999 to 2009, a more specific comparison is possible compared with the simple juxtaposition of CIHR and MHIR totals. However, two methodological issues were encountered after analysis during the process of generating results, indicating movement from general categorization to the particulars involved in the sub-categorization of research objectives will be fraught with difficulty.

The first revolves around quantifying, combining and/or comparing projects with different numbers of funding years. Without the level of detail for CIHR globally as we have in the MHIR data sets, this problem was unassailable at the macro-level of proportional measurement, and it became necessary to rely purely on dollar values; but working within the detailed MHIR data sets this could be achieved. As stated above, simply counting individual projects would hide the fact that CIHR funds research projects for one or multiple years, and that sometimes additional funding is granted for extension of a project. Having worked with the data sets from CIHR, the researcher believes this problem can be overcome by breaking the data down into 'project-years' – individual years of funding as units of funding for calculative valuations and comparisons of research projects funded for different numbers of years.

Consider, for example, that from 1999 to 2009 INMHA funded 2440 MHIR projects, but that this translates into a total of 7607 project-years for an average of 3.12

years per project. For the same period, 4975 MHIR projects were funded across all CIHR's institutes (captured in the current study's data sets), when in fact 14009 project-years were funded for an average of 2.82 years per project. One project-year is the lowest common denominator for all studies, and so must be used as the base unit for quantitative determinations of MHIR funding according to project; similarly, $1 is the lowest base unit for quantitative determinations in terms of money. The current study recommends using project-years for compositional assessments of research areas in terms of research objectives, and comparisons of individual projects with different funding periods.

The second methodological issue faced in the generation of results will be a much more difficult obstacle to overcome in processing results from a deeper analysis of the data generated by the sub-categorization of projects according to research objectives – how to deal with research projects with multiple research objectives (e.g. depression, anxiety and suicide). When a given study has multiple objectives, whether due to co-morbidity, shared symptoms, or a common etiology, it is because studying them together is deemed scientifically necessary; and, invariably, this is explained in some detail in the study's abstract. If, for example, a project is designed to study depression and anxiety in people at high risk for suicide, it is no less a study of any one of these objectives merely because other objectives are involved. These phenomena occur together often enough for their relationship to be targeted for study, and any scientist interested in researching either of these research objectives exclusively will be interested in the results of any examination of this relationship.

In such cases, how should each objective be counted in terms of project-years, and

how much of the total funding allocated for a multi-objective project should be assigned to each individual research objective pursued with the project? At first, it may seem reasonable to give each objective in such a project a fraction of the project-years, and apportion the dollar value of funding among the different objectives, equally or otherwise. Such a procedure would involve weighing the relative value of each objective according to what is laid out in the abstract – a complex operation more difficult and labour intensive than the present study could accommodate, even with the data in Excel spreadsheet form. Careful consideration of this issue, however, reveals this approach to multi-objective projects may unnecessarily and even improperly complicate the generation of results. Having read more than 5000 of these abstracts, the researcher knows this method of dealing with multi-objective research projects would imperil the integrity and reliability of the findings due to the abstracts' inability to convey this kind of information clearly, if at all.

How, then, will this problem be solved? We can apportion a fraction of the funding and project-years for multi-objective projects to each of its research objectives, or we may decide all research objectives targeted by a given study should claim the full value of the funding, as each is looking into an important aspect of their respective concerns – its relation to the others; and there may be other methodological avenues we can take. If we are to be more discerning than the present study, and mine the data generated by the sub-categorization of projects according to their research objectives, a scientifically valid means of addressing research projects with multiple objectives will need to be found.

In a sea of research objectives pursued by CIHR with its MHIR, this degree of specificity will be needed to find out how individual objectives and groupings of related research objectives are faring, relatively speaking; and, in particular, how research objectives formulated to study the etiology, symptomology, treatment or provision of adequate services for people with this or that mental illness are doing. To determine if CIHR's funding of MHIR is spread too thin, thereby possibly leaving some mental illnesses or mental illness research areas under-researched, the funding for individual mental illness research objectives and groupings of related mental illness research objectives will have to be quantified. As with the historical neglect of MHIR as a whole, we need to see the value of knowing the composition of MHIR in terms of research objectives before we move to address it.

It may be helpful here to restate a question posed earlier on: Amid all our mental health and illness research, across the extensive mandate of CIHR, what research are we conducting to alleviate the suffering of mentally ill Canadians? The data generated from the current analysis of the CIHR data sets, and the sub-categorization of MHIR projects according to their research objectives, lies ready to provide a provisional answer to this question. On the strength of how far this study has taken its analysis, and the value of taking it further, further research on these methodological issues is recommended, that an even better understanding of what has been happening at CIHR with respect to its MHIR funding allocations may be achieved. Indeed, these recommendations conceived in efforts to confront various methodological obstacles the study encountered along the way may prove the most worthwhile and lasting contributions of this research.

6.3: CIHR, Research and the Health of Canadians

The results of this study should prove a valuable evidentiary tool for mental health and illness advocacy organizations like the Canadian Mental Health Association and the Mental Health Commission of Canada, but the greatest beneficiary may be CIHR. There will always be calls for greater funding in all areas of health research. An ever growing budget is needed to meet an ever growing demand as new frontiers in research are opened up and explored, and we do need to take a closer look at funding allocations for MHIR; but it is indisputable that CIHR's funding levels for MHIR today approximate more to Canada's mental health and illness research needs more than federally funded health research has ever before. However, results of this study's analysis suggest that, regarding the influence of CIHR's funding allocation on fulfillment of its mandate and its mental health and illness research agenda in particular, its mandate may be too widespread to adequately deal with all it must address on a finite budget.

Of all research funding at CIHR, 30% is earmarked for special initiatives (i.e. based on policy decisions by CIHR), and 70% is investigator-driven (i.e. the sum of all the individual research objectives of every project, taking shape, independent of any pre-conceived policy). This is how it seems, but is this how it really is? A theory of what determines the proportionality of funding among and within the institutes is beginning to emerge – CIHR may not monitor the proportionality of research funding among the vast array of possible health research objectives because this is determined by the subject matter of the research proposals going to make up the investigator-driven 70%. It appears the relative composition of investigator-driven research as a whole is not pre-determined, as each individual application coming in to CIHR for research funding is judged on its

own merits. This means the composition of investigator-driven research at CIHR, with respect to research objectives, is 'discovered' at the end of each year.

In addressing this, the findings of the present study and the research it breeds can be helpful in many ways: to help new investigators know where more work needs to be done, or where enough is being done; to help NGOs decide where best to focus energy and resources to be most effective; and to help CIHR make the best possible decisions regarding how to direct the CIHR-driven 30%. Otherwise, we are missing opportunities to allocate our health research funding in proportions more closely matching our health research needs as Canadians; to conduct health research better aligned with the epidemiological data we routinely gather (i.e incidence and prevalence of diseases, the relative financial burden of diseases, mortality, morbidity, etc.), thereby maximizing our health research potential and achieving the most desirable results. We need to know what we can and cannot control in the health research funding allocation process, that we may conduct the most effective and efficient health research possible. More to the point of this thesis, this knowledge will allow us to more precisely determine what proportion of CIHR's overall health research budget goes to support particular research areas like MHIR and, subsequently, engage in a meaningful debate regarding how appropriate and sufficient that proportion may be. We have seen MHIR appears to be well funded at the macro-level, but without knowing MHIR's composition with respect to research objectives we go forward, to some extent, blind.

If this study can be said to have any limitations other than those discovered in the generation of the results, it would be with respect to the scope of its objective and the

value of its achievement. As important as it is to ascertain our national health research priorities as they are reflected in the Canadian government's relative allocation of money for health research, the federal government does not have the market cornered on health research in Canada – far from it. Statistics Canada estimates health research accounted for one fifth ($6.12 billion) of Canadian research and development performed in 2008; and it anticipates the federal government will have funded just 19% of all health research, with the higher education sector (e.g. universities, teaching hospitals) funding as much as 27%, the business enterprise sector (for the most part, the pharmaceutical industry) funding about 25%, and provincial governments, the private non-profit sector and foreign sources funding the remainder. With respect to the actual performance of health research, the figures are even more startling, as the federal government is expected to have performed only 4% of all Canadian health research in 2008, with the higher education and business enterprise sectors collectively performing a full 95% (Statistics Canada, 2009).

From a research perspective, the somewhat limited role of the federal government in the funding Canadian health research makes understanding the relative composition of all health research funded by the federal government all the more important, particularly if we find it necessary to influence the direction it takes in terms of its relative research funding allocations. Unlike our powerlessness to influence the research priorities of pharmaceutical companies, for example, if we find the priorities of our federally funded health research institutions are 'out of step' or lacking in some way, we have some recourse to improving the situation. It is encouraging that the higher education sector

funds and performs such a substantial portion of our health research in Canada, but the considerable portion being funded and performed by the business enterprise sector is less inspiring. Even so, while it is true that research conducted by pharmaceutical companies is a vital part of our overall health care strategy, the profit-oriented motivation that drives this kind of health research would make it a biased indicator of our health research priorities in this or any other country.

In any case, we could never succeed in dictating or even significantly influencing the research agendas of these corporations to better reflect the national will, but we must influence what we can otherwise. Conceivably, all other sites of Canadian health research can be influenced to some extent, which would amount to 70-75%. It may be difficult, if not impossible, to gain a complete picture of health research in Canada, taking all health research funding agendas and sites of health research into account; but if we are to accurately assess our national health research priorities, research like the present study will have to be performed in all realms of health research in Canada, that a meta-analysis of some kind may be possible in the future. This study's examination of CIHR's funding allocations to MHIR over its first ten years of operation provides a measure of insight regarding how to begin.

One final recommendation needs to be made. In terms of data needed to fulfill its research objective, this study analyzed the abstracts of MHIR funded from 1999 to 2009 at CIHR, as nothing in the funded research database could yield more of the information it required. Strictly speaking, however, research project abstracts are the stated *intentions* of researchers regarding the objectives they wish to pursue, and how they plan to pursue

them, justifying why the research should be funded. This may be seen as a limitation of the present study; but, more importantly, it shows the need for another kind of research approach to evaluating health research funding allocations, at CIHR or elsewhere.

The study looked at the research intentions of principal investigators as found in 10 years of MHIR abstracts, but we will also need to examine their concrete results; that is, follow-through research is required to track these projects regarding what they have said they would do, compared with what they succeeded in actually doing. Whether or not the pre-research nature of project abstracts can be termed a limitation for the present study, its findings nevertheless provide a baseline of intentions for further research into the results, and such research is hereby recommended. Whatever else this study has achieved, it has succeeded in highlighting some of the important MHIR yet to be conducted, and in revealing some of the merits and complexities involved in researching research.

6.4: Closing Thoughts

Recent years have seen significant conceptual advances in terms of mental health and illness issues in Canada and around the world, giving rise to a number of significant practical advances (e.g. improved treatments, better medications, etc.). It may be argued, however, that substantial improvement in the education of health professionals and the public with respect to mental health and illness tops the list of conceptual advances, providing an increase in awareness and a corresponding decrease in stigma. These advances have brought many challenges, including a need to update practices and policies

that have become outmoded in light of the better perspective we have achieved. One of these policy areas is the funding allocation decision-making processes of health research funding bodies such as CIHR, and a deeper study of this process is needed in advance of any necessary redress of what may be revealed with it. The present study aims to be a forerunner to such research, using the CIHR health research funding budget and funding allocation decision-making process as a prime indicator of Canadian health research priorities generally, and as an indicator of Canadian MHIR priorities specifically.

Reviewing the historically impoverished concepts of mental health and mental illness in Canada and around the world, as laid out in the present study's literature review, we may be buoyed by the positive developments in recent years. Internationally, many mental health and illness inequities in low and middle income countries persist, but we are more aware of such problems. We are more determined to bring about meaningful, lasting changes nationally and globally; and in the developed world the enhancement and expansion of mental health and illness policies and practices progresses as never before.

In Canada, the population health movement took hold over the course of the 1970s and 1980s, and it came to positively redefine individual and collective approaches to health, health protection and prevention strategies, and it revolutionized health care and the health care system. The Medical Research Council of Canada was not able to keep up with the spirit of change and its burgeoning demands, making a more substantial, comprehensive health research agenda necessary. Inevitably, this led to the establishment of the Canadian Institutes of Health Research.

Research funding imbalances notwithstanding, the Canadian Institutes of Health Research has given Canada a more substantial and internationally competitive health research agenda, one that is unprecedented in our history. In the process, light has been cast on mental health and illness, expanding our national consciousness and conscience, and the cause of mental health and illness research has received more attention than ever before – publically, politically and financially. The Institute of Neurosciences, Mental Health and Addiction being one of the original 13 institutes at CIHR is strongly indicative of this, and the comprehensive, well-funded Mental Health Commission of Canada is another indication that much has improved. These advances are underlined by the very existence of research like the present study, and the excitement and anticipation regarding the future of mental health and illness in this country is palpable.

Without the establishment of CIHR, and the new era in Canadian health research it embodied, we would still be lacking a purposeful national health research agenda; and without the track record of CIHR, the research objective of this study could not have been conceived or pursued. Critical analysis of our national health research in terms of MHIR, or any other health research area for that matter, would not be possible without the track record of an established national health research agenda, as it is embodied in CIHR, to analyze. What is wrong with CIHR certainly needs to be addressed, but what is right with CIHR is monumental.

That said, mental health and mental illness are such fundamental features of health care and the human experience in Canada that any degree of neglect of MHIR is more than a serious health research deficiency – it is insidiously detrimental to all

Canadians, as clearly shown in the latest figures for prevalence and socio-economic burden of mental illness, and supported by the literature and the present study. The study's results are, at worst, a preponderance of evidence pointing to an educated suspicion; at best, they open doors to future research in a historically unattended realm of health research, encouraging the greater numbers of MHIR researchers alluded to earlier.

If Canada suddenly discovered a disease with 20% prevalence, such a high level would immediately be termed an epidemic, and resources would pour in from all quarters to swiftly address it. Our recent enlightenment regarding mental health and illness may be seen as the discovery of just such a disease, yet we still find ways to avoid adequately addressing it. Insufficient and/or imbalanced funding of MHIR is one of the most nefarious ways, and in doing so we fail to adequately address the full range of MHIR concerns – at our peril. The cost in terms of money and productivity is staggering, and costs in terms of quality of life are incalculable. While we have finally put health research on the road to sufficiency and sound funding allocation policies, we cannot expect to actually get there without seriously investing in more MHIR across its wide range of research objectives. The findings of the present study indicate this needs redress. In the long-awaited interests of mental health and illness, we must act on this indication.

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Appendix A

CIHR 'Depression' Research by Institute (in millions of $)

INSTITUTE	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07
Aging	0	0	0	0.05	0.34	0.33	0.36	0.53
Aboriginal Health	0	0	0	0	0	0	0.12	0.03
Cancer	0	0	0.04	0.03	0.15	0.19	0.61	0.29
Circulatory & Respiratory Health	0.13	0.19	0.14	0.37	0.49	0.44	0.31	0.28
Gender and Health	0.12	0.10	0.10	0.16	0.98	0.96	0.70	1.17
Genetics	0	0	0	0	0	0	0.04	0.09
Health Services & Policy	0	0	0.05	0.15	0.24	0.34	0.30	0.32
Human Development, Child & Youth Health	0.05	0.22	1.29	1.04	2.38	2.85	3.28	3.05
Infection & Immunity	0	0	0	0	0	0	0	0.09
Musculoskeletal Health & Arthritis	0	0	0	0.05	0.09	0.16	0.13	0.20
Nutrition, Metabolism & Diabetes	0.08	0.08	0.11	0.09	0.09	0.14	0.54	0.81
Population & Public Health	0	0.08	0.15	0.19	0.18	0.19	0.47	0.57
Neurosciences, Mental Health & Addiction	2.10	3.32	4.46	5.60	6.17	7.20	7.81	10.11
Unspecified/Not Applicable	0.31	0.79	0.83	0.54	0.47	0.20	0.24	0.26
TOTALS	**2.79**	**4.78**	**7.16**	**8.27**	**11.57**	**13.00**	**14.93**	**17.79**
% of CIHR's total	**0.9**	**1.3**	**1.5**	**1.4**	**1.8**	**1.8**	**2.0**	**2.2**

Appendix B

CIHR 'Mental' Research by Institute (in millions of $)

INSTITUTE	99-00	00-01	01-02	02-03	03-04	04-05	05-06	06-07
Aging	0.46	1.00	1.77	3.02	5.15	7.00	8.60	9.74
Aboriginal Health	0	0	0.23	1.36	2.69	3.48	4.16	4.75
Cancer	0.03	0.05	0.07	0.09	0.12	0.15	0.17	0.16
Circulatory & Respiratory Health	0.16	0.17	0.18	0.23	0.32	0.37	0.44	0.45
Gender and Health	0.29	0.27	0.42	1.54	3.85	4.72	4.56	5.48
Genetics	0.70	1.02	1.27	1.60	1.85	2.25	2.77	3.19
Health Services & Policy	0.07	0.48	0.82	1.51	2.32	2.63	2.70	3.24
Human Development, Child & Youth Health	0.49	0.83	1.33	1.84	2.43	3.22	3.76	4.36
Infection & Immunity	0.05	0.09	0.12	0.16	0.22	0.30	0.38	0.46
Musculoskeletal Health & Arthritis	0.17	0.28	0.41	0.50	0.81	0.91	1.16	1.28
Nutrition, Metabolism & Diabetes	0.30	0.32	0.53	0.69	0.92	1.13	1.52	1.52
Population & Public Health	0.59	1.29	2.03	3.17	4.40	4.97	5.14	7.54
Neurosciences, Ment. Health & Addiction	34.32	50.34	68.35	82.37	87.53	94.84	98.84	105.92
Unspecified/Not Applicable	5.16	4.64	4.26	4.28	4.19	3.28	2.91	2.69
TOTALS	**42.79**	**60.86**	**81.77**	**102.37**	**116.79**	**129.07**	**137.11**	**150.78**
% of CIHR's total	**14.4**	**16.5**	**16.5**	**17.4**	**18.1**	**18.3**	**18.1**	**18.9**

Appendix C

Master List of Keywords in CIHR's Search for All Mental health and Illness Research

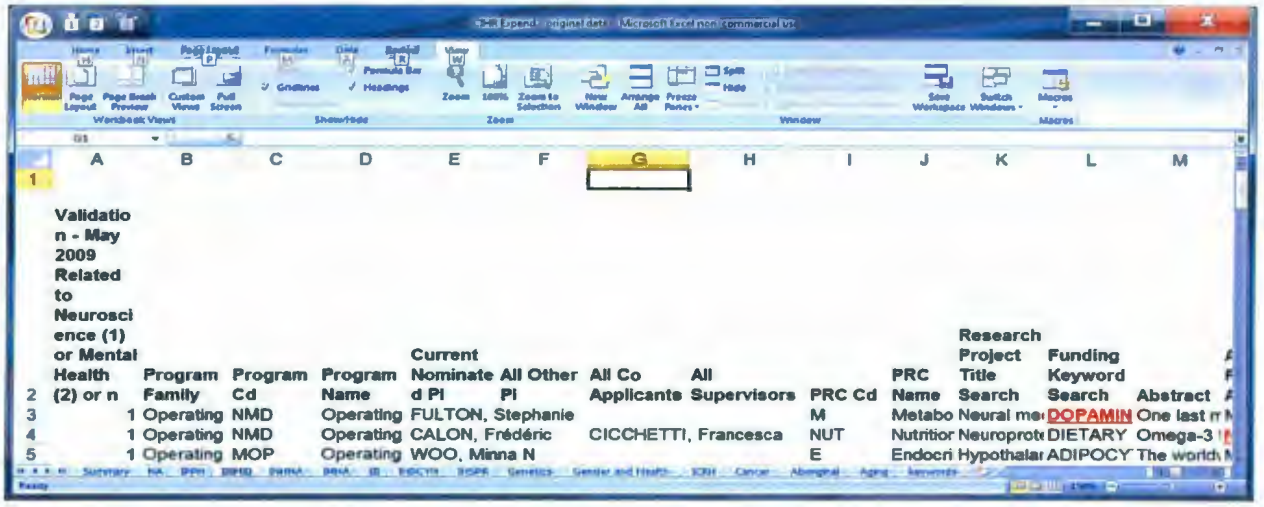
ADD; ADDICTION; ADHD; ALCOHOL; ALCOOL; ALS; AMBLYOP; AMD; AMPHETAMINE; AMYOTROPHIC LATERAL SCLEROSIS; ANOREXI; ANXIET; APPRENTISSAGE; ASPERGER; ATTENTION DEFICIT DISORDER; ATTENTION DEFICIT HYPERACTIVITY DISORDER; AUDITIF; AUDITION; AUDITORY; AUTISM; AUTONOMIC NERVOUS SYSTEM; AXON; BASAL GANGLIA; BEHAVIOR; BEHAVIOUR; BIOLOGICAL RHYTHM; BIPOLAIRE; BIPOLAR; BLEPHAROSPASM; BOULIMIE; BRAIN TUMOR; BRAIN TUMOUR; BRAINSTEM; BULIMIA; CANAL IONIQUE; CATARACT; CATECHOLAMINE; CELLULE SOUCHE NEURONAL; CEREBELLUM; CEREBRAL CORTEX; CERVELET; CHOLINERGI; CHORE; CNS ORGANIC; COCAINE; COCHLEAR PROSTHESIS; COGNITION; COMPORTEMENT; CONCURRENT DISORDER; CONNAISSANCE; CORTEX CEREBRAL; CORNE; CYTOKINE; DEAF; DEGENERESCENCE MACULAIRE; DELINQUANT SEXUEL; DEMENCE; DEMENTIA; DENDRITE; DEPRESSION; DESORDRE CONCOURANT; DIFFERENCIATION NEURONAL; DIFFERENTIATION; DMLA; DOPAMINE; DOULEUR; DRUG ADDICTION; DRUG DEPENDENCE; DYSPHONI; DYSTONI; DYSTROPHIE MUSCULAIRE; LEARNING; EATING DISORDER; EFFORT; EPILEP; EYE; EFA; FAS; FORENSIC PSYCHIATRY; FUME; G PROTEIN LINKED RECEPTOR; G-PROTEIN LINKED RECEPTOR; GABA; GENE DE LA MH; MUTATION DE LA MH; GERIATRIC PSYCHIATRY; GERONTOPSYCHIATRIE; GLAUCOMA; GLIOGENES; GLUTAMATE; HEAR; HEROIN; HD GENE; HD MUTATION; HUNTINGTON; HYPERACTIVITE AVEC DEFICIT D'ATTENTION; INHALANT; ION CHANNEL; ISCHEMI;LIMBIC SYSTEM;

LOCOMOTION; LONG-TERM POTENTIATION; LOU GEHRIG; L-DOPA; MACULAR DEGENERATION; MEMOIRE; MEMORY; MENTAL HEALTH; MENTAL; MOELLE EPINIERE; MOOD DISORDER; MOTOR SYSTEM; MPTP; MULTIPLE SCLEROSIS; MUSCULAR DYSTROPHY; MYOCLONI; MYOPATH; MYOTONI; NARCOMANIE; NEURAL STEM CELL; NEURO ONCOLOG; NEUROGENES; NEUROMUSCULA; NEURONAL; NEUROONCOLO; NEURO-ONCOLOG; NEUROPATH; NEUROPSYCHIATR; NEUROTOXICIT; NEUROTRANSMETTEUR; NEUROTRANSMITTER; NICOTINE; NOYAUX GRIX CENTRAUX; OBSESSIVE COMPULSIVE DISORDER; OCULOMOTEUR; OCULOMOTOR; OEIL; OPIAC; OPIATE; OUIE;PAIN;PANIC DISORDER;PARKINSON;PDD;PERSONALITY DISORDER; PERVASIVE DEVELOPMENTAL DISORDER; PHARMACODEPENDANC; PLASTICIT; POLYGLUTAMIN; POTENTIALISATION A LONG TERME; PRESYNAPTI; PSYCHIATR; PSYCHOGERIATRI; PSYCHOLOG; PSYCHOSE REFRACTAIRE; RECEPTEURS LIEES AUX PROTEINES G;RECEPTEUR LIE AUX PROTEINES G;REFRACTI;REFRACTORY PSYCHOSIS; RETIN; RYTHMES BIOLOGIQUES; RYTHME BIOLOGIQUE;SAD; SAF; SANTE MENTALE; SCHIZOPHRENI; SCIENCE DU COMPORTEMENT; SCLEROSE EN PLAQUE; SCLEROSE LATERALE AMYOTROPHIQUE; SEASONAL AFFECTIVE DISORDER; SECOND MESSAGER; SECOND MESSENGER; SENSORY SYSTEM; SEIZURE; SEROTONIN; SEX OFFENDER; SLA; SLEEP; SMOKE; SMOKING; SOMATOSENSORIEL; SOMATOSENSORY; SOMMEIL; SPECTRUM DISORDER; SPINAL CORD; STRABISM; STRESS; SUBSTANCE INHALE; SUICIDE; SURDIT; SYNAPSE; SYNAPTOGENES; SYSTEME LIMBIQUE; SYSTEME MOTEUR; SYSTEME NERVEUX AUTONOME; SYSTEME SENSORIEL; TABAC; TED (TROUBLE

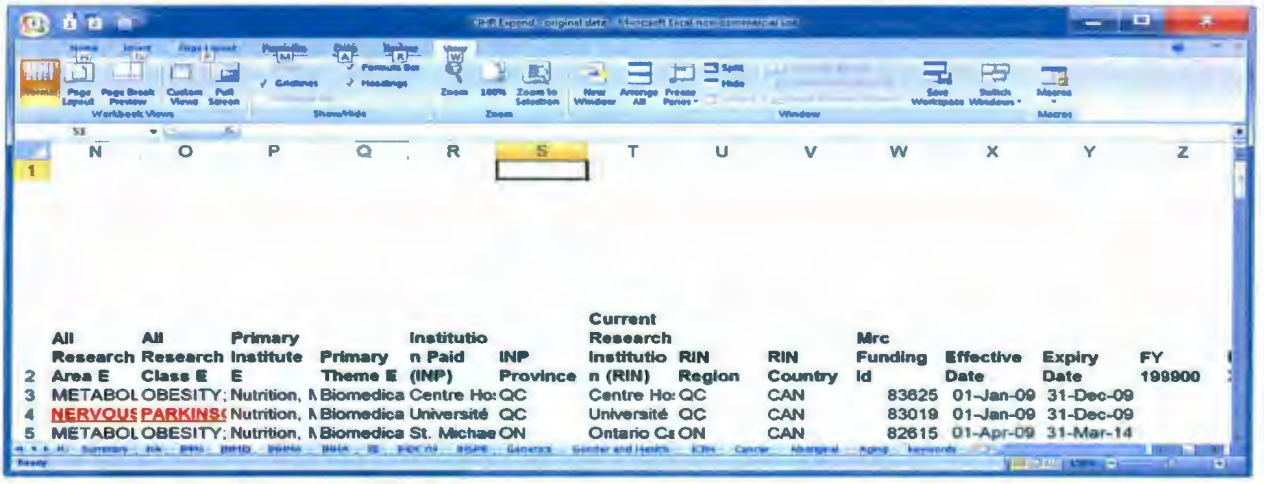
ENVAHISSANT DU DEVELOPPEMENT); THADA; THALAMUS; TOBACCO; TORTICOL; TOURETTE; TOXICOMANIE; TRONC CEREBRAL; TROUBLE AFFECTIF SAISONNIER; TROUBLE ALIMENTAIRE; TROUBLE ALIMENTATION; TROUBLE DEFICITAIRE DE L'ATTENTION AVEC HYPERACTIVITE; TROUBLE ENVAHISSANT DU DEVELOPPEMENT; TROUBLE HUMEUR; TROUBLE OBSESSIVO-COMPULSIF; TROUBLE PANIQUE; HYPERACTIVITE AVEC DEFICIT DE L'ATTENTION; TROUBLE DE PERSONNALITE; TROUBLES DE PERSONNALITE; TROUBLES DE L'ALIMENTATION; TROUBLES DU SOMMEIL; VISION; VISUAL; VISUEL; CHRONIC FATIGUE SYNDROME; DISEASES AFFECTING SPEECH; GLAUCOMA; INJURY, REGENERATION; PITUITARY; SPINAL CORD DISEASE; BIOCHEMISTRY; GENOMICS, PROTEOMICS, AND BIOINFORMATICS; IMAGING; MOLECULAR BIOLOGY; NERVOUS SYSTEM; PSYCHOSOCIAL; HEALTH BEHAVIOURAL

Appendix D

Original Data Sets from CIHR (in three portions)



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Validation - May 2009 Related to Neuroscience (1) or Mental Health (2) or n	Program Family	Program Cd	Program Name	Current Nominated PI	All Other PI	All Co Applicants	All Supervisors	PRC Cd	PRC Name	Research Project Title Search	Funding Keyword Search	Abstract
2													
3	1	Operating	NMD	Operating	FULTON, Stephanie				M	Metabo	Neural me	DOPAMIN	One last n
4	1	Operating	NMD	Operating	CALON, Frédéric		CICCHETTI, Francesca		NUT	Nutritior	Neuroprot	DIETARY	Omega-3
5	1	Operating	MOP	Operating	WOO, Minna N				E	Endocri	Hypothalar	ADIPOCY	The world

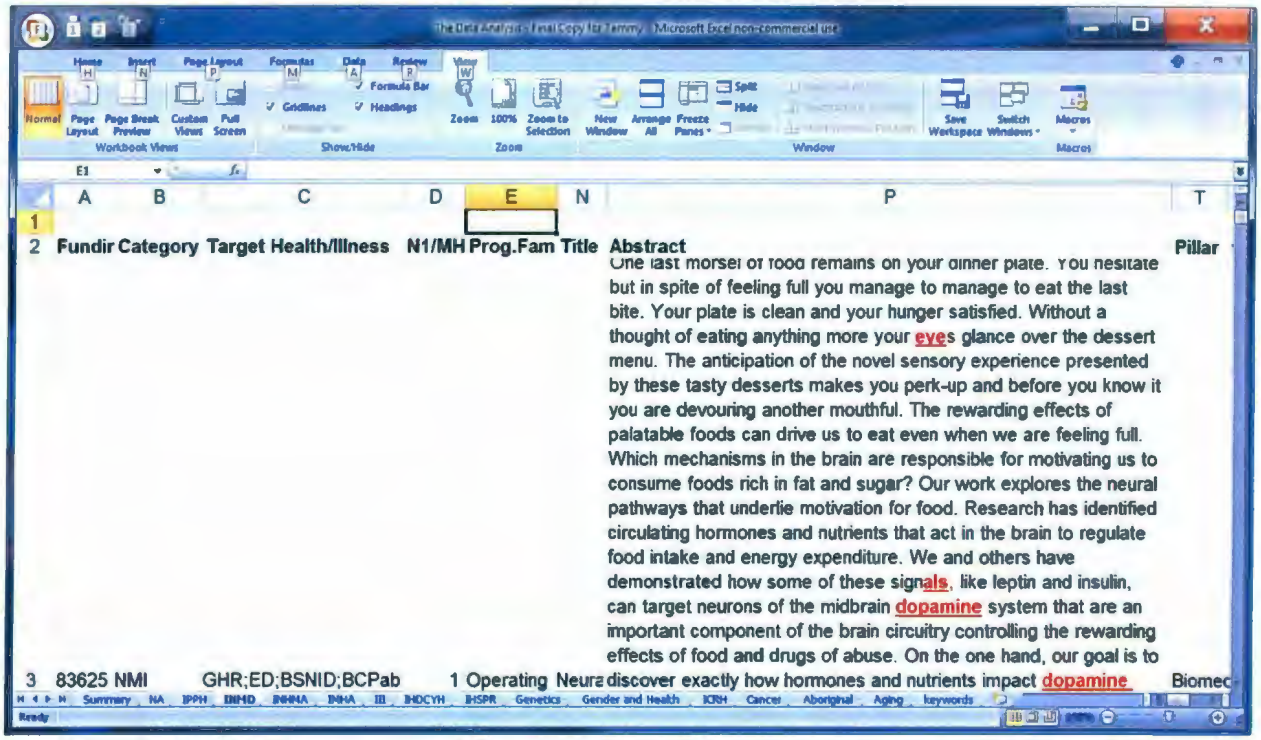


	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1													
2	All Research Area E	All Research Class E	Primary Institute E	Primary Theme E	Institution Paid (INP)	INP Province	Current Research Institution (RIN)	RIN Region	RIN Country	Mrc Funding Id	Effective Date	Expiry Date	FY 199900
3	METABOL	OBESITY;	Nutrition, M	Biomedica	Centre Ho	QC	Centre Ho	QC	CAN	83825	01-Jan-09	31-Dec-09	
4	NERVOUS	PARKINS	Nutrition, M	Biomedica	Université	QC	Université	QC	CAN	83019	01-Jan-09	31-Dec-09	
5	METABOL	OBESITY;	Nutrition, M	Biomedica	St. Michae	ON	Ontario Ca	ON	CAN	82615	01-Apr-09	31-Mar-14	

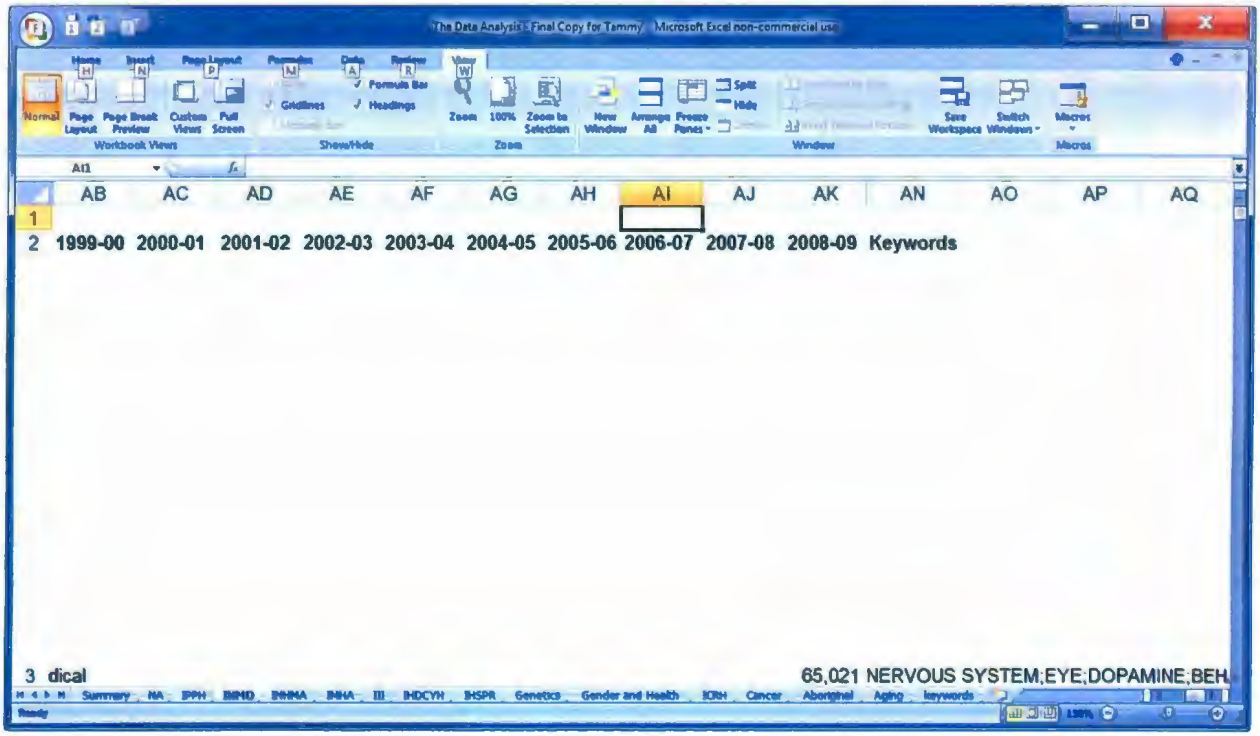
	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM
1													
2	FY 200001	FY 200102	FY 200203	FY 200304	FY 200405	FY 200506	FY 200607	FY 200708	FY 200809	FY 200910 and future commitments	Nb Occurrences	Keywords	
3									65,021	0	6	NERVOUS SYSTEM;EY	
4									100,000	0	10	NERVOUS SYSTEM;SA	
5									23,286	582,544	2	THALAMUS;HEAR;	

Appendix E

Working Copy of the Data Sets from CIHR (in two portions)



	A	B	C	D	E	N	P	T
1								
2	Fundir	Category	Target Health/Illness	N1/MH	Prog.Fam	Title	Abstract	Pillar
3	83625	NMI	GHR;ED;BSNID;BCPab	1	Operating	Neura	One last morsel of food remains on your dinner plate. You hesitate but in spite of feeling full you manage to manage to eat the last bite. Your plate is clean and your hunger satisfied. Without a thought of eating anything more your eyes glance over the dessert menu. The anticipation of the novel sensory experience presented by these tasty desserts makes you perk-up and before you know it you are devouring another mouthful. The rewarding effects of palatable foods can drive us to eat even when we are feeling full. Which mechanisms in the brain are responsible for motivating us to consume foods rich in fat and sugar? Our work explores the neural pathways that underlie motivation for food. Research has identified circulating hormones and nutrients that act in the brain to regulate food intake and energy expenditure. We and others have demonstrated how some of these signals, like leptin and insulin, can target neurons of the midbrain dopamine system that are an important component of the brain circuitry controlling the rewarding effects of food and drugs of abuse. On the one hand, our goal is to discover exactly how hormones and nutrients impact dopamine	Biomed



	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AN	AO	AP	AQ
1														
2	1999-00	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	Keywords			
3	dical										65,021 NERVOUS SYSTEM;EYE;DOPAMINE;BEH			

Appendix F

Primary Sub-Categorical Designations: Mental Illness Research Objectives

ABS – Abnormal sexuality and/or sexual experience

ADHD – Attention Deficit Hyperactivity Disorder

ALZ – Alzheimer's

AM – Aging (mental)

ANX – Anxiety

AS – Andermann Syndrome

AUT – Autism

BBS – Bardet-Biedl Syndrome

BT – Brain or spinal cord tumour/disease

BPD – Bipolar Disorder

CP – Cerebral Palsy

D – Depression

DD – Developmental disabilities (as a group)

DS – Down Syndrome

E – Epilepsy

ED – Eating disorders (as a group)

FA – Friedreich's Ataxia

FAS – Fetal Alcohol Syndrome

FXS – Fragile-X Syndrome

HD – Huntington's Disease

HYD – Hydrocephalus

IBS – Injury to brain or spinal cord

IS – Ischemia re stroke

L – Lupus

LBD – Lewy Body Dementia

LD – Learning deficit/disability (as a group)

LGD – Lou Gehrig's Disease

MD – Mood/affective disorders (as a group)

MDYS – Muscular Dystrophy

MR – Mental Retardation

MS – Multiple Sclerosis

NDD – Neurodegenerative disorders (as a group)

NPD – Niemann-Pick Disease

NTD – Neural Tube Defect

OCD – Obsessive-Compulsive Disorder

PA – Psychology (abnormal)

PAN – Panic Disorder

PD – Parkinson's Disease

PED – Pedophilia

PH – Phobias (as a group)

PRMI – Pregnancy related mental illness

PSY – Psychosis (in general)

PTS – Post-Traumatic Stress

PWS – Prader-Willi Syndrome

RS – Rett Syndrome

SCH – Schizophrenia

SDM – Sleep disorders(mental aspects) (as a group)

STR – Stress

SUI – Suicide

TS – Tourette's Syndrome

TSC – Tuberous Sclerosis Complex

TSE – Transmissible Spongiform Encephalopathies (as a group)

TSSD – Tay-Sachs/Sandoff Disease

WBS – Williams-Beuren Syndrome

WKS – Wernicke-Korsakoff Syndrome

Addiction Research Objectives

ADD – Addiction (in general)

ADDA– Addiction to Alcohol

ADDD – Addiction to Drugs

ADDG – Addiction to Gambling

ADDN – Addiction to Nicotine

Appendix G

Primary Sub-Categorical Designations: Mental Health Research Objectives

AI – Autoimmune disorders (not MS or Lupus)

AIDS – AIDS (includes HIV)

AP – Aging (physical)

DIA – Diabetes

FM – Fibromyalgia (and related musculo-skeletal disorders)

GHR – Glandular/ hormonal regulation, etc.

HEP - Hepatitis

IO – Ischemia re heart disease, or disorders of organs/tissues other than the brain

LA – Learning ability

MHPO – Mental health strategies for physical or overall health

NDP – Neurological disease as a cause or aspect of a physical disorder

PM – Pain management

PN – Normal psychology

PRPI – Pregnancy related physical illness

SDP- Sleep disorders (physical aspects)(as a group)

SHS – Sight/hearing/speech/smell and the senses in general

SIBH – Systemic Improvement for Better Health and better health services

Appendix H:

Secondary and Tertiary Sub-Categorical Designations

Secondary Designations

Mental Health Research Descriptors

BCPn – Bio/chem/pharma (normal)

BSNF – Brain, spinal cord & CNS function

NG – Neuroscientific genetics

Mental Illness Research Descriptors

BCPab – Bio/chem/pharma (abnormal)

BSNID – Brain, spinal cord & CNS injury/disorder

PG – Psychiatric genetics

Tertiary Designations

Additional Cross-Category Observations

PSB – Psycho-social, behavioural and/or qualitative studies

NSET – Neuroscientific equipment and techniques

PARD – Prosthetic/assistive/rehabilitative devices and developments