2013-08-30

Assured Income for the Severely Handicapped (AISH): The Impact of Raising Employment Income Exemption Limits on Employment Rates – A Focus on Recipients with Schizophrenia

Marriott, Brian

UNIVERSITY OF CALGARY

Assured Income for the Severely Handicapped (AISH): The Impact of Raising Employment Income Exemption Limits on Employment Rates – A Focus on Recipients with Schizophrenia

by

Brian Marriott

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE

DEGREE OF MASTER OF SCIENCE

DEPARTMENT OF COMMUNITY HEALTH SCIENCES

CALGARY, ALBERTA

AUGUST, 2013

Abstract

Alberta's Assured Income for the Severely Handicapped (AISH) program provides financial and health-related assistance to adults who have a permanent disability that prevents them from fully participating in the labour market. Recognizing the benefits of employment, AISH encourages its clients to work to the extent that they are able. However, employment income earned beyond a set exemption limit reduces the assistance received. In 2008, the upper threshold of the exemption limit increased by $500. This study explored the policy's impact on AISH recipients with schizophrenia compared to those with other mental health disorders. As well, the personal characteristics associated with the level of employment among AISH recipients with schizophrenia were assessed. The findings suggest that employment did not increase after the policy-amendment for either group. Marital status, number of children, age, and place of residence were associated with employment income for AISH recipients with schizophrenia.

Acknowledgements

Completion of this thesis would not have been possible without input and guidance from the following individuals:

- Dr. Gillian Currie, Supervisor
- Dr. Herb Emery, Supervisory Committee Member
- Dr. Scott Patten, Supervisory Committee Member

Financial support provided by the following entities has also been very helpful and has allowed the focus to remain on the research rather than on finances:

- the Department of Community Health Sciences (Svare funds)
- the Faculty of Graduate Studies (Student Support)
- Alberta Health Services (Learning and Professional Development Fund)
- the Government of Alberta (Alberta Graduate Student Scholarship)

I wish to also extend my gratitude to Alberta Health Services, namely management within the Addiction and Mental Health Information Management, Evaluation and Research (IMER) unit, for permitting me time and flexibility to work on my research.

Appreciation is also extended to select Government of Alberta staff and leadership, specifically Marcel Lajeunesse (Senior Policy Planner, AISH Planning, Policy and Support), Patti Schimpf (Manager, AISH Planning, Policy and Support), Donna Ludvigsen (Assistant Deputy Minister, Ministry of Seniors), and Honourable George VanderBurg (Minister, Ministry of Seniors).

Finally, completion of this thesis would not have been at all possible without the love and support of my family.

Dedication

To Meagan, Kyler and Isabella.

Meagan, thank you for your unwavering and untiring support;

you are an amazing woman – you are my everything.

And thank you Kyler and Isabella for the escapism!

Table of Contents

Abstract ii
Acknowledgements iii
Dedication iv
Table of Contents v
List of Tables vii
List of Figures ix
Epigraph x

CHAPTER ONE: INTRODUCTION 1
Background 2
The AISH Program 6
Purpose and Research Questions 9
Hypotheses 10
Usefulness of the Research 11

CHAPTER TWO: METHODS 13
Research Design 13
Data. 16
Models 18
Approach to Data Analysis 22
Strengths and Limitations 23

CHAPTER THREE: RESULTS 26
Descriptive Statistics 26
All AISH Recipients with a Mental Health Disorder 26
AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia Compared to Schizophrenia 28
Data Analysis 29
Research Questions One and Three – The Impact of the Policy Amendment 30
Within Group Differences 32
Between Group Differences 37
Multiple Regression Model 40
Research Question Two – The Impact of Personal Characteristics on Level of Employment 50
Assumptions 51
Model Summary 55

CHAPTER FOUR: DISCUSSION 58
Research Questions One and Three – The Impact of the Policy Amendment 58
Primary Hypothesis 58
Second Hypothesis 61
Summary and Analysis 62
Research Question Two – The Impact of Personal Characteristics on Level of Employment 68

CHAPTER FIVE: CONCLUSION.....73

BIBLIOGRAPHY.....76

List of Tables

Table 1: Covariates: Research Questions One and Three - The Impact of the Policy Amendment 21

Table 2: Descriptive Statistics: Gender, Marital Status, and Place of Residence – All AISH Recipients with a Mental Health Disorder (n=5,282) 27

Table 3: Descriptive Statistics: Age, Number of Children, and Monthly Employment Income – All AISH Recipients with a Mental Health Disorder (n=5,282) 27

Table 4: Descriptive Statistics: Gender, Marital Status, and Place of Residence – AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia (n=2,897) Compared to Schizophrenia (n=2,385) 28

Table 5: Descriptive Statistics: Age, Number of Children, and Monthly Employment Income – AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia (n=2,897) Compared to Schizophrenia (n=2,385) 29

Table 6: Mean Employment Income Greater-Than $0: AISH Recipients with a Mental Health Disorder (n=5,282), AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia (n=2,897), and AISH Recipients with Schizophrenia (n=2,385) 31

Table 7: Mean Difference of the Logarithm of Mean Monthly Employment Income: Various Demographic Groups of Interest 33

Table 8: Correlation Between the Number of AISH Recipients in Period of Assistance and the Logarithm of Mean Monthly Employment Income - AISH Recipients with a Mental Health Disorder, a Mental Health Disorder, Excluding Schizophrenia, and Schizophrenia 35

Table 9: Mean Difference of the Logarithm of Mean Monthly Employment Income: Various Demographic Groups of Interest, Full Timeframe and Data from January 2010 to December 2010 Excluded 36

Table 10: Mean Difference of the Logarithm of Mean Monthly Employment Income: AISH Recipients with Schizophrenia Compared to Mental Health Disorder, Excluding Schizophrenia 38

Table 11: Assessing Multicollinearity: Tolerance Values for Research Questions One and Three - The Impact of the Policy Amendment 43

Table 12: Statistical Significance of the Model: Research Questions One and Three - The Impact of the Policy Amendment (Model 1) 46

Table 13: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 1) 46

Table 14: Summary of Multiple Regression Analysis: Research Questions One and Three - The Impact of the Policy Amendment (Model 1) 48

Table 15: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 2 - Outliers Removed) 49

Table 16: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 3 – Recipients Earning Employment Income Within the 50% Exemption Limit) 50

Table 17: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 4 – Recipients Earning at the Top End of the 50% Exemption Limit) 50

Table 18: Assessing Multicollinearity: Tolerance Values for Research Question Two - The Impact of Personal Characteristics on Level of Employment 53

Table 19: Statistical Significance of the Model: Research Question Two - The Impact of Personal Characteristics on Level of Employment 55

Table 20: Explained Variance: Research Question Two - The Impact of Personal Characteristics on Level of Employment 56

Table 21: Summary of Multiple Regression Analysis: Research Question Two - The Impact of Personal Characteristics on Level of Employment 56

Table 22: Summary of Results: Research Questions One and Three - The Impact of the Policy Amendment 63

List of Figures

Figure 1: Number of AISH Recipients with Schizophrenia and Other Mental Health, Excluding Schizophrenia – January 2006 to December 2010 34

Figure 2: Logarithm of Mean Monthly Employment Income: AISH Recipients with Schizophrenia and Other Mental Health Disorder, Excluding Schizophrenia – January to December 2010 37

Figure 3: Scatterplot of Studentized Residuals and Unstandardized Predicted Values: Research Questions One and Three - The Impact of the Policy Amendment 41

Figure 4: Histogram of the Standardized Residuals: Research Questions One and Three - The Impact of the Policy Amendment 44

Figure 5: Normal P-P Plot of Regression Standardized Residual: Research Questions One and Three - The Impact of the Policy Amendment..... 45

Figure 6: Scatterplot of Studentized Residuals and Unstandardized Predicted Value: Research Question Two - The Impact of Personal Characteristics on Level of Employment 52

Figure 7: Histogram of the Standardized Residuals: Research Question Two - The Impact of Personal Characteristics on Level of Employment..... 54

Figure 8: Normal P-P Plot of Regression Standardized Residual: Research Question Two - The Impact of Personal Characteristics on Level of Employment 55

Figure 9: Earning Potential of Single People Without Children Pre and Post Policy Amendment..... 64

Figure 10: Earning Potential of Single Parents and Couples Pre and Post Policy Amendment... 65

Figure 11: Mean Monthly Employment Income Pre-Amendment: Single People Without Children..... 66

Figure 12: Mean Monthly Employment Income Pre-Amendment: Single Parents and Couples 66

Epigraph

According to most studies, people's number one fear is public speaking. - number two is death. Death is number two… this means to the average person, if you go to a funeral, you're better off in the casket than doing the eulogy.

~ Jerry Seinfeld

CHAPTER ONE: INTRODUCTION

In Alberta, the Assured Income for the Severely Handicapped (AISH) program provides financial and health-related assistance to adults who have a permanent disability that is severe enough to impair his or her ability to enter the labour market. In recognition of the benefits (both financial and non-pecuniary) that arise from employment, AISH encourages its clients to work to the extent that they are able. However, employment income that is earned beyond a set exemption limit does impact AISH recipients' benefits. On July 1, 2008 the upper limits of the employment income exemptions increased by $500. This study explored the impact of the policy amendment on AISH recipients with schizophrenia as compared to AISH recipients with other mental health disorders. As well, the personal characteristics associated with the level of employment among AISH recipients with schizophrenia were assessed. Differences within and between groups were explored and multiple regression techniques were also used. This study contributes to various bodies of literature, including literate associated with the labour supply of individuals with schizophrenia and literature concerned with health and social policy. As well, the study provides evidence for Alberta-based and Canada-based policy makers in an area where empirical evidence is scarce.

This thesis is organized as follows. After this introductory chapter, Chapter Two will outline the methods used for the research. Chapter Three will then provide a detailed overview of the results. A discussion of the results will follow in Chapter Four. Finally, Chapter Five will conclude by providing a brief summary of the research, its implications, and areas for further research.

The remainder of this introduction chapter will: 1) outline the background behind the project, 2) describe relevant aspects of the AISH program, 3) provide a clear description of the

project's purpose, 4) outline the research hypotheses, and 5) highlight the usefulness of the research.

Background

Persons with severe mental illness (SMI)[1], including those with schizophrenia, receive many positive benefits from engaging in competitive employment[2] (Noble, 1998). Benefits such as improved self-esteem and better controlled psychiatric symptoms are well documented in the literature (Bond, 2004) (Bond, Resnick, Drake, Xie, McHugo, & Bebout, 2001). As well, employment plays a critical role in creating a sense of self-empowerment and self-actualization leading to decreased dependence on financial, social and health-related supports from both family and government (Linhorst, 2006). Other therapeutic outcomes include enhanced treatment compliance, improved functional status in activities of daily living, maintenance of living situation, and improved quality of life (Lehman, 1995). In general, evidence suggests that work is an essential component to recovery for persons with SMI (New Freedom Commission on Mental Health, 2003) (O'Day & Killeen, 2002).

Employment among persons with SMI also benefits society (New Freedom Commission on Mental Health, 2003). That is, from a social welfare theory perspective, the fact that individuals are better off within a society dictates greater overall welfare of society. As well, it can be argued that society places intrinsic value on having a healthier and better functioning population. There is also evidence of direct benefit to society. From the perspective of health services utilization, individuals with SMI who are employed have fewer hospitalizations and

[1] "There is no internationally agreed definition of SMI" (Ruggeri, Leese, Thornicroft, Bisoffi, & Tansella, 2000). However, the definition with the widest measure of consensus is the "three-dimensional definition" which asserts that an individual has SMI when he or she has the following: a diagnosis of any non-organic psychosis (e.g. schizophrenia), a duration of treatment of two years or more, and dysfunction as measured by the Global Assessment of Functioning (GAF) (Ruggeri, Leese, Thornicroft, Bisoffi, & Tansella, 2000).

[2] Competitive employment is defined as any job that pays market wages and for which anyone can apply (Crowther, Marshall, Bond, & Huxley, 2001).

emergency room visits than unemployed matched controls (Henry, Lucca, Banks, Simon, & Page, 2004). In a publicly funded and administered health care system such as Canada's, this produces financial benefits for society and health-related benefits due to increased capacity.

Despite the noted benefits and consistent evidence suggesting that most people with SMI want to work (Boardman, Grove, Perkins, & Shepherd, 2003) (McQuilken, Zahniser, Novak, Starks, Olmos, & Bond, 2003), there is evidence to suggest that employment levels among this population are low. Looking first at published non-employment rates, Linhorst notes that the most commonly cited non-employment rate among this population is 85% (Linhorst, 2006). An examination of the literature shows that recorded levels of employment do vary from jurisdiction to jurisdiction however. For example, a 2001 paper published in the British Medical Journal cited that in the United Kingdom between 61% to 73% of persons with SMI were not employed (Crowther, Marshall, Bond, & Huxley, 2001); in the United States the estimate was between 75% and 85% (Crowther, Marshall, Bond, & Huxley, 2001). [3] [4] Some authors note that jurisdictional differences in non-employment rates are due largely to differences in local employment incentives (Averett, Warner, Little, & Huxley, 1999).

It is also instructive to look at less formal measures of employment. A cohort study published by Bebbington et al. in 2005 reported that 88.5% of the Britons that were included in the study sample (all of whom had schizophrenia) were not in paid employment (Bebbington, et al., 2005). Bebbington et al. did not use strict methods for calculating levels of employment. That is, individuals who were actively searching for work and individuals who were not actively

[3] Crowther, Marshall, Bond and Huxley refer to these figures as "unemployment rates". Formal uunemployment calculations only consider those who are actively seeking work however; individuals who are not actively seeking work are considered to be out of the labour force and are therefore not factored into such measures (Institute for Work & Health, 2009). This distinction is important but is something that is often overlooked outside of the economics literature. Given the high numbers reported by Crowther et al. it can be assumed that they are actually reporting on non-employment rather then unemployment.

[4] Canadian employment statistics for this population are not readily available in the literature.

searching for work were both included in the calculation. No matter what metric is used to describe the phenomenon however, it is clear that "…unemployment rates for people with mental illness are significant" (Canadian Mental Health Association Ontario and Centre for Addiction and Mental Health, 2010). The literature highlights three reasons why there are currently low levels of employment among individuals with SMI.

First, from the standpoint of mental health service providers and consumers, the paradigm that asserts that all people with SMI are employable has just, very recently, started to gain strength and acceptance. Indeed, the sheltered workshops that became popular in the 1960s and the 1970s, in which those with SMI performed low demand work activities for non-market wages in an environment controlled by a mental health service provider, have just recently started to be phased out (Cook & Razzano, 2000) (Lehman, 1995).

Second, from the standpoint of competitive employers, evidence suggests that due to general mental health stigma and to lack of success in past experiences, many employers are cautious about employing people who are mentally ill, particularly those with SMI (Manning & White, 1995). There is evidence to suggest that this is slowly changing with the rise of the supported employment model of vocational rehabilitation however[5] (Bond, Resnick, Drake, Xie, McHugo, & Bebout, 2001).

Third, from an economic standpoint, public policy can act as a disincentive for those with SMI to gain employment or to maximizing their employment hours (Priebe, Warner, Hubschmid, & Eckle, 1998). That is, in jurisdictions such as Canada, increased earnings trigger decreased benefits from social welfare programs (Priebe, Warner, Hubschmid, & Eckle, 1998).

[5] The supported employment model of vocational rehabilitation focuses on providing intensive on-the-job supports to both employees (with SMI) and employers with a gradual tapering of support over time (Bond, Resnick, Drake, Xie, McHugo, & Bebout, 2001).

Consequently the incentive to move from unemployment to full or part-time employment is mitigated (Averett, Warner, Little, & Huxley, 1999). As Linhorst notes, among recipients of the two primary federal disability income programs in the United States (Supplementary Security Income, SSI, and Social Security Disability Insurance, SSDI), both of which reduce benefits as employment income is earned, only 1% of all recipients (including those with SMI) ever terminate benefits because of a return to full-time employment (Linhorst, 2006); however "…research based on the historical record estimates that around 30 to 40 percent of SSDI applicants would work if it were not for the disincentives associated with the SSDI program" (Stapleton, O'Day, Livermore, & Imparato, 2006).

Although disability programs often create work disincentives, some jurisdictions recently have modified their programs to provide incentives for recipients to obtain employment (Kostol & Mogstad, 2013). Countries such as the United Kingdom, Sweden, Norway, Denmark and Germany have increased efforts to assist disabled people to gain employment (Dalton & Ong, 2007). For example, the United Kingdom recently reformed its disability insurance program allowing recipients to retain 50% of their disability benefits for up to 12 months if they return to full time employment (Kostol & Mogstad, 2013). Likewise, in Norway, the national government recently changed the structure of its disability insurance program adding a return to work incentive. Eligible recipients are now able to retain $0.4 for every $1 earned above a set threshold (Kostol & Mogstad, 2013).

Although there is little empirical evidence of the effectiveness of these programs (Kostol & Mogstad, 2013) some work has been done. Work published in May 2013 by Kostol and Mogstad shows that, in Norway, the return to work incentive described above increased the labour force participation of disability insurance recipients aged 18 to 49 by 8.5% (Kostol &

Mogstad, 2013). Kostol and Mogstad also highlight that, in addition to increased labour force participation, the policy change increased the earnings of recipients (Kostol & Mogstad, 2013). Their conclusion is that "…many DI [disability insurance] recipients have a considerable capacity to work that can be effectively induced by providing financial work incentives" (Kostol & Mogstad, 2013). However, notwithstanding this assertion based on evidence from Norway, it is worth noting that "like everyone else, people with psychiatric disabilities balance several factors to optimize their income... 1) the economic return, 2) the stress and effort involved, and 3) the satisfaction derived from the work" (Warner, 2000).

The AISH Program

In Alberta, the Ministry of Seniors administers the Assured Income for the Severely Handicapped (AISH) program. AISH provides financial and health-related assistance to adults who have a permanent disability (including those with SMI) that is severe enough to impair his or her ability to enter the labour market. In recognition of the benefits that arise from competitive employment, AISH encourages its clients to work to the extent that they are able.[6] However, employment income[7] that is earned beyond a set exemption limit does impact AISH recipients' benefits. On July 1, 2008 the upper limits of the employment income exemptions increased by $500 to $1,500 per month for single people[8] receiving AISH and to $2,500 per month for couples, couples with dependant children, and single parents (Government of Alberta, 2010). A

[6] As stated by Premier Ed Stelmach in the July 21, 2008 news release outlining the new policy: "Many AISH clients want to work to the extent that they are able and this change helps support that drive... AISH clients have told us that, in addition to providing more income, having a job helps them connect with the community, develop new friendships and increase their self-confidence." The news release goes on to explain that "enhancing employment incentives is one way the Alberta government is supporting AISH clients who are working or wish to do so" (Government of Alberta, 2008).

[7] Canada Revenue Agency (CRA) allowable deductions are used to calculate net employment and self-employment income (Government of Alberta, 2010).

[8] The single exemption applies to a single person or to two people if they are both AISH eligible and have no dependent children (Government of Alberta, 2010).

full description of the employment income exemption limits prior to and after the July 1, 2008 policy amendment follows.

Some employment earnings under the AISH program are 100% exempt, some are 50% exempt, and some are non-exempt[9] – this is the case both before and after the July 1, 2008 policy amendment (Government of Alberta, 2010). Prior to July 1, 2008 the employment income exemption limits for single people receiving AISH were as follows:

- Earnings up to $400 per month were 100% exempt, meaning that every dollar earned was retained by the AISH recipient, effectively giving recipients the potential to enhance their monthly AISH living allowance by up to $400.
- Earnings between $401 per month and $1,000 per month were 50% exempt meaning that for every dollar earned AISH recipients retained 50 cents, giving recipients the potential to enhance their monthly AISH living allowance by up to $700 ($400 fully exempt and $600 50% exempt, or an additional $300).
- Earnings over $1,000 per month were 0% exempt, meaning that, effectively, every dollar earned over $1,000 produced no financial benefit to the AISH recipient.

After July 1, 2008, for single people, earnings up to $400 per month were still 100% exempt, meaning that every dollar earned was still retained by the AISH recipient, maintaining recipients' potential to enhance their monthly AISH living allowance by up to $400. However, earnings between $401 per month and $1,500 per month were now 50% exempt giving recipients the potential to enhance their monthly AISH living allowance by up to $950 ($400 fully exempt and $1,100 50% exempt, or an additional $550). After July 1, 2008 earnings over $1,500 per

[9] It should be noted that, because of the non-financial benefits that persons with SMI receive from engaging in competitive employment (outlined above), there may still be incentive for these individuals to earn non-exempt employment earnings.

month were 0% exempt meaning that, effectively, every dollar earned over $1,500 produced no financial benefit to the AISH recipient.

For couples, couples with dependant children, and single parents, prior to July 1, 2008, the employment income exemption limits were as follows:

- Earnings up to $975 per month were 100% exempt, meaning that every dollar earned was retained by the AISH recipient, effectively giving recipients the potential to enhance their monthly AISH living allowance by up to $975.
- Earnings between $976 per month and $2,000 per month were 50% exempt meaning that for every dollar earned AISH recipients retained 50 cents, giving recipients the potential to enhance their monthly AISH living allowance by up to $1,487.50 ($975 fully exempt and $1,025 50% exempt, or an additional $512.50).
- Earnings over $2,000 per month were 0% exempt, meaning that, effectively, every dollar earned over $2,000 produced no financial benefit to the AISH recipient.

After July 1, 2008, for couples, couples with dependant children, and single parents, earnings up to $975 per month were still 100% exempt, meaning that every dollar earned was still retained by the AISH recipient, maintaining recipients' potential to enhance their monthly AISH living allowance by up to $975. However, earnings between $976 per month and $2,500 per month were now 50% exempt giving recipients the potential to enhance their monthly AISH living allowance by up to $1,737.50 ($975 fully exempt and $1,525 50% exempt, or an additional $762.5). After July 1, 2008 earnings over $2,500 per month were 0% exempt meaning that, effectively, every dollar earned over $2,500 produced no financial benefit to the AISH recipient.

Purpose and Research Questions

The purpose of this study was to assess the impact that the July 1, 2008 policy amendment had on employment levels of AISH recipients with schizophrenia. As well, the research sought to explore the predictors of employment status among AISH recipients with schizophrenia. Specifically two questions were explored:

1. Did the policy amendment change the level of employment among AISH recipients with schizophrenia?
2. What personal characteristics impact the level of employment among AISH recipients with schizophrenia?

It was instructive to compare the findings from question one above with a comparison group. AISH recipients who had a mental health disorder as their primary diagnosis that was not schizophrenia formed the comparison group. The research therefore also explored the following secondary question:

3. Did the policy amendment change the level of employment among AISH recipients with other mental health disorders, excluding schizophrenia?

The specified comparison group was selected for two reasons. First, there is a need to explore whether individuals with schizophrenia respond differently to social welfare policy as compared to individuals with other mental health disorders, excluding schizophrenia. Literature related to the research focuses mostly on individuals with schizophrenia and/or those with SMI. Often in the literature the term SMI is not operationalized however, so it is not clear if the "three-dimensional definition" (see footnote one above - Ruggeri, Leese, Thornicroft, Bisoffi, & Tansella, 2000) has been applied or if SMI refers to a more inclusive definition that incorporates a variety of mental health disorders into its meaning. As a result, a study that clearly delineated between individuals with schizophrenia and individuals with other mental health disorders and

how both groups respond to policy incentives related to employment was needed. This study did just that.

Second, individuals with mental illness of all types share many of the same barriers to gaining employment, including stigma, reluctance from employers to employ such individuals, and a perceived risk of failure by both employers and mental health professionals alike[10] (Manning & White, 1995); further these barriers are more significant than for other disability groups, save those with a severe learning disability (Boardman, Grove, Perkins, & Shepherd, 2003). Because the comparison group and the primary study group share barriers to obtaining employment, the internal validity of the research was strengthened. That is, differences detected between the two groups could more reasonably be attributed to how the two groups responded to policy incentives rather than to other factors such as barriers to becoming employed. If a physical condition was used as the comparison group, differences in employability between the groups would be larger, therefore the potential for confounding would have been much greater, and the internal validity would have been reduced.

Hypotheses

For research question number one, based on the literature cited in the Background section above, it was hypothesised that increased AISH exemption limits would incent increased levels of employment among AISH recipients with schizophrenia. The primary hypothesis was that, looking at the entire group, the policy amendment would motivate individuals to increase their level of employment as measured by mean monthly employment income. The second hypothesis was that the policy amendment would only have an effect on individuals who were earning

[10] It should be noted however that "cognitive impairment is a core feature of schizophrenia… [and] cognitive functioning is a robust predictor of response to psychiatric rehabilitation… including outcomes such as work" (McGurk, Twamley, Sitzer, McHugo, & Mueser, 2007). Given this, it is likely that individuals with schizophrenia face some additional barriers not shared by those with other mental health disorders.

employment income within the 50% exemption limit; that is, the policy amendment would incent these individuals to maximize their income in accordance with the new employment income exemption limits.

Regarding research question number two, it was hypothesised that certain personal characteristics help predict the level of employment obtained by AISH recipients with schizophrenia. This hypothesis was based on previous work done by González, a study by Averett et al., and work done by the Organization for Economic Cooperation and Development (OECD).

Finally, for research question number three, it was hypothesised that increased AISH exemption limits would incent increased levels of employment among AISH recipients with a mental health disorder, excluding schizophrenia. The primary hypothesis was that, looking at the entire group, the policy amendment would motivate individuals to increase their level of employment as measured by mean monthly employment income. The second hypothesis was that the policy amendment would only have an effect on individuals who were earning employment income within the 50% exemption limit; that is, the policy amendment would incent these individuals to maximize their income in accordance with the new employment income exemption limits.

Usefulness of the Research

This research will be useful in two ways. First, the research will contribute to two bodies of the economics literature. The research will contribute to the body of economics literature that looks at labour supply as there is scant literature on this topic as it applies to individuals with

schizophrenia.[11] As well, the research will contribute to the body of economics literature in the area of health and social policy. Secondly, the research will be instructive for Alberta-based and Canada-based[12] policy makers as, to date, no similar research has been conducted on the AISH program. Findings and recommendations will therefore be useful politically (to justify future policy development), socially (to provide an evidence base for social welfare reform), and economically (to offer justification for the allocation of scarce resources).

[11] The assertion that there is little literature on the labour supply of individuals with schizophrenia was put forward in a paper by Averett et al. in 1999 (Averett, Warner, Little, & Huxley, 1999). A review of the literature published since 1999 reveals that there are still very few studies on the topic.

[12] Each Canadian province has a program that is similar to Alberta's AISH program.

CHAPTER TWO: METHODS

This section will: 1) outline details of the research designs that were used, 2) provide details on the data that was collected and used for this study, 3) outline the models that were specified for the analysis, 4) describe the approach that was used for data analysis, and 5) note the strengths and limitations of the research.

Research Design

The research questions that aimed to explore changes in employment levels among AISH recipients with schizophrenia and AISH recipients with other mental health disorders, excluding schizophrenia, (i.e. questions one and three) were natural experiments; these questions leveraged an opportunity presented by the July 1, 2008 policy amendment. As described by Roe and Just, within a natural experiment, "the researcher takes advantage of a change in context or setting that occurs… due to natural causes or social changes beyond the researcher's and subjects' influence", the corollary of which is the creation of a "control group" and a "treatment group" (Roe & Just, 2009). Natural experiments are common in the realm of public policy research and analysis.

There are advantages to the natural experiment methodology. With respect to internal validity[13], as compared to cross-sectional data, natural experiments have greater temporal clarity and the issue of recall bias is eliminated (Roe & Just, 2009). Natural experiments also can allow for more longitudinal learning as compared to controlled laboratory experiments which normally are more time-limited in scope (Roe & Just, 2009). Likewise, unlike laboratory experiments, natural experiments are less susceptible to sample bias given that subjects are not recruited or

[13] Roe and Just define internal validity as "the ability of a researcher to argue that observed correlations are causal".

selected for the research (Roe & Just, 2009). As for external validity[14], because of "the presence of organically formed context", Roe and Just conclude that external validity in natural experiments tends to be quite high.

There are also disadvantages to the natural experiment methodology. One issue is that of replicability. Often the events that are studied in a natural experiment are unique. Thus, often replication "is limited to analyses of alternate data from the same event" (Roe & Just, 2009). Additionally, there can be greater potential for confounding due to differences between the control and treatment groups and unobserved variables, as opposed to laboratory experiments where the control and treatment groups can be matched and exogenous changes can be controlled (Roe & Just, 2009). Another cited limitation of natural experiments is the fact that there are relatively fewer topics available to study, as compared to field or laboratory experiments, because topics of study are restricted to the actual occurrence of events (Roe & Just, 2009). In all however, natural experiments maintain a good balance between internal and external validity, a balance not achieved by most other methods of economic research (Roe & Just, 2009).

The research question that aimed to explore the personal characteristics that impact employment levels among AISH recipients with schizophrenia (i.e. question two) can be classified as a retrospective cohort design; this question used existing data to look at an outcome of interest, studying an exposure for which randomization was not possible due to practical and ethical reasons (Euser, Zoccali, Jager, & Dekker, 2009). A retrospective cohort study is characterized by the researcher using historical data to select a group of exposed and un-exposed individuals and comparing the incidence of outcome between the two groups over a specified time period (Gordis, 2009). Within the context of this research, the exposure was whether the

[14] Roe and Just define external validity as "the ability to generalize the relationships found in a study to other persons, times, and settings".

AISH recipient was coded as having schizophrenia or another mental health disorder, excluding schizophrenia; the outcome was level of employment. Retrospective cohort designs are useful for determining how independent characteristics impact an outcome of interest as was done here.

The main advantage of the retrospective cohort design relates to the time frame that is required to conduct the study. That is, as compared to a prospective cohort design (where the population is identified at the beginning of the study and followed prior to, during, and after the exposure), the methodology significantly reduces the length of time that is required to conduct the study (Gordis, 2009) as the data have already been collected (Mann, 2003). As a result, retrospective cohort studies are relatively less expensive to conduct as compared to prospective studies (Mann, 2003). Another advantage of the retrospective cohort design comes from the fact that, generally, the outcome of interest was not the original reason for collecting the data (Mann, 2003); therefore there is no "bias in the assessment of the outcome" because decisions on whether or not the outcome exists in each subject have been made a priori (Gordis, 2009). Thus, a form of masking is present.

The main disadvantage of the retrospective cohort design is the inability to control for all other factors that might differ between the two groups, that is to control for confounding variables (Mann, 2003). However, this disadvantage is shared among many other research designs. Indeed, according to Mann "the only way to eliminate all possibility of a confounding variable is via a prospective randomised controlled study… [in which] each type of exposure is assigned by chance and so confounding variables should be present in equal numbers in both groups" (Mann, 2003)[15]. As well, because in a retrospective cohort design, the cohort was

[15] It should be noted that Mann's assertion that randomized control studies are capable of eliminating "all possibility of a confounding variable" is a strong one. That is, other authors are less bold on this point noting that randomized control studies only act to minimize the potential for

originally constructed for another purpose, it is possible that all the relevant information may not have been rigorously collected. This lies in stark contrast to a prospective cohort design in which the researcher can dictate exactly what information is collected and how it is collected.

The randomized clinical trail (RCT) is considered by many to be the gold standard of research designs. Indeed the design does address many of the disadvantages noted above while at the same time also sharing many of the noted advantages of the natural experiment and retrospective cohort designs. However, given this study's context, an RCT would not have been feasible due to ethical and logistical considerations. The two research designs that were utilized in this study were the strongest research designs available and, when paired with appropriate analytic techniques, still yield valid results. A good understanding of the strengths and limitations of the designs is important however to ensure that findings are interpreted and communicated appropriately.

Data

Data for this project was obtained from the Government of Alberta, specifically from the administrative databases that are used to administer and maintain the AISH program. Information on the employment status and demographics of AISH recipients with all diagnoses was provided for the time period January 1, 2006 to December 31, 2010. Specifically, AISH provided monthly data per client that included:

- employment income
- AISH medical code
- marital status
- date of birth

---

confounding, stating further that analytic techniques should be employed to check for baseline characteristics as "…differences in confounding variables may arise by chance" (Kendall, 2003).

- gender
- number of dependent children
- postal code

All data provided by AISH was anonymized prior to being sent to the researcher. The only information received that was potentially identifiable was postal code which was not reported in any analysis. Before proceeding with the research, the project was reviewed and approved by the Conjoint Health Research Ethics Board (CHREB). All appropriate precautions were taken through the data management, analysis and reporting processes to ensure that any information that was potentially identifiable was not included in the write up of the results or discussion. All electronic information for the project was stored on a secure network drive of Alberta Health Services at all times.

There were challenges associated with choosing an appropriate timeframe for data collection. One of the challenges related to the behavioural changes that AISH recipients with schizophrenia may have had prior to July 1, 2008 if they were aware that a policy amendment was imminent. That is, in anticipation of increased exemption limits, recipients may have deferred obtaining employment or seeking more employment hours until the new policy was in place. This behaviour would be consistent with the rational choice model of behavioural change theory which asserts that individuals rationally seek to maximise their welfare (Australian Government: Australian Public Service Commission, 2007) (McClennen, 2010).

Likewise, after the policy amendment, there may have been a lag in recipients adjusting their behaviour due to lack of information or understanding of the new policy. It was anticipated that a data collection window extending from January 1, 2006 to December 31, 2010 (30 months before and 30 months after the July 1, 2008 policy amendment) would highlight any trends that

help to affirm or refute these behavioural theories. Previous work in this area validates this approach. That is, work by González has illustrated that the impact of welfare reforms on employment levels increase over time post-reform, and the effects grow stronger with time (Gonzalez, 2008).

Models

For the analysis, only AISH recipients whose medical code indicated a primary diagnosis of a mental health disorder were selected. From this sample, two groups were formed based on diagnosis: 1) schizophrenia, and 2) any other mental health disorder, excluding schizophrenia. As listed in AISH`s administrative data, the latter included diagnoses of "affective disorder (depression, bi-polar, mania) ", "anxiety", "personality disorder", "polysubstance abuse (alcohol, drug)", "post traumatic stress disorder (PTSD)", and "other mental illness". This resulted in a group consisting of 2,385 unique individuals coded as having a diagnosis of schizophrenia over the five year timeframe; 2,897 unique individuals formed the group of those with a mental health disorder, excluding schizophrenia. The full sample therefore consisted of 5,282 individuals.

The dependant variable for all three research questions was some variant of employment income; employment income in this study was used as a surrogate measure for employment status (employed versus unemployed) and level of employment (number of hours worked). For research questions one and three, which looked at the impact of the policy amendment on employment levels, the time series dimension was removed by aggregating the data into two time periods (Bertrand, Duflo, & Mullainathan, 2004). Work by Emery and Matheson (Emery & Matheson, 2011) and Bertrand, Duflo and Mullainathan informed this approach (Bertrand, Duflo, & Mullainathan, 2004).

Time series data is characterized as having repeated observations over time on the same unit of measurement (Beck, 2001). Time series analysis involves looking at trends in time series data and the direction and magnitude of these trends. For this study, the data consisted of monthly observations of employment income over a five year period of time for individual AISH recipients. The data that was provided was of a time series nature. However, instead of taking a time series approach and looking at the direction and magnitude of trends in mean monthly employment income over the five year period, including before and after the policy amendment, the decision was made to calculate AISH recipient's mean monthly employment income before the policy amendment and their mean monthly employment income after the policy amendment. This created more of a 'paired' dataset and made it possible to compare individuals' mean monthly employment income after the policy amendment with their mean monthly employment income before the policy amendment. This comparison was taken one step further however and the relative change in mean monthly income was calculated by converting the mean monthly employment variables (pre and post amendment) to logarithms and subtracting the pre-policy amendment value from the post-policy amendment value. This formed the dependent variable for the regression model which was then used to determine the impact of the policy amendment while controlling for potential confounding variables.

The empirical model used was:

$$\Delta \log (Y_t) = \beta_0 + \beta_1 D + \beta_2 G + \beta_3 M + \beta_4 C + \beta_5 A + \beta_6 EDM + \beta_7 RURAL \quad (1)$$

where Y_t was mean monthly employment income (in constant 2002 CDN dollars) in time period *t*, where *t* was either January 1, 2006 to June 30, 2008 (i.e. pre-policy amendment) or July 1, 2008 to December 31, 2010 (i.e. post-policy amendment). The dependent variable was the difference of the logarithm of mean monthly employment income. The difference was specified

as the logarithm of mean monthly employment income after the policy amendment minus the logarithm of mean monthly employment income before the policy amendment. Taking the difference of the logarithm of mean monthly employment income in this manner yielded the relative change in mean monthly employment income from the pre-amendment to the post amendment time period.

As Table 1 illustrates, D was the diagnosis covariate dummy where 0 equalled other mental health disorders, excluding schizophrenia and 1 equalled schizophrenia. G was a gender covariate dummy where 0 equalled female and 1 equalled male. M was a marital status covariate dummy where 0 represented individuals that did not have a cohabitating partner at any point over the five year time period and 1 represented individuals that did.[16] C was the continuous number of children covariate. A was the age (in years – calculated from date of birth) covariate. EDM was the first dummy covariate for place of residence; using Calgary as the reference category, 0 equalled Calgary, Rural and 1 equalled Edmonton. RURAL was the second dummy covariate for place of residence; again, Calgary was the reference category so 0 equalled Calgary, Edmonton and 1 equalled Rural.

[16] This method of dichotomizing marital status has been used by other authors, for example González (Gonzalez, 2008).

Table 1: Covariates: Research Questions One and Three - The Impact of the Policy Amendment

Covariate	Abbreviation	Dummy Coding
Diagnosis	D	0=Other Mental Health Disorder, Excluding Schizophrenia 1=Schizophrenia
Gender	G	0=Female 1=Male
Marital Status	M	0=No Cohabitating Partner 1=Cohabitating Partner
Number of Children	C	n/a (continuous variable)
Age	A	n/a (continuous variable)
Place of Residence	EDM	0=Calgary, Rural 1=Edmonton
	RURAL	0=Calgary, Edmonton 1=Rural

The choice to code place of residence into Calgary, Edmonton, and rural was based on two works. Vera-Toscano et al. validates an approach that views place of residence in terms of rural versus urban as they have concluded that rural individuals, versus their urban counterparts, are in a more precarious position "in terms of labour-market transition in and out of adequate employment" (Vera-Toscano, Phimister, & Weersink, 2004). The choice to select Calgary and Edmonton as the only two urban centres is justified by González who views urban centres as those with a population of over 200,000 inhabitants (Gonzalez, 2008). At the time of writing, Calgary and Edmonton were the only two urban centres with greater than 200,000 inhabitants.

Generally, covariates were selected based on the literature in this area of policy analysis. That is, based on previous work done by González, a study by Averett et al., and work done by the Organizatin for Economic Cooperation and Development (OECD), differences by age (Gonzalez, 2008), number of dependent children (Averett, Warner, Little, & Huxley, 1999) (Gonzalez, 2008), place of residence (Gonzalez, 2008), and marital status (Organization for

Economic Co-operation and Development (OECD), 2005) were expected; no significant effect based on gender was expected (Averett, Warner, Little, & Huxley, 1999).

The model specified for research question two was:

$$Y = \beta_0 + \beta_1 G + \beta_2 M + \beta_3 C + \beta_4 A + \beta_5 EDM + \beta_6 RURAL \quad (2)$$

where Y, the dependant variable, was mean monthly employment income (in constant 2002 CDN dollars) over the five year period. Logarithm transformation was not required for Y as the data were reasonably normally distributed (see the Results section below) and it was not necessary to calculate a relative difference as was needed for equation (1). The goal of this model was to ascertain what (if any) personal characteristics impact the level of employment among AISH recipients with schizophrenia. Covariates were defined as above.

Approach to Data Analysis

For research questions one and three, before moving to the regression model as specified in equation (1) above, a simpler exploratory approach was first employed. First, employment levels were explored for the entire sample (i.e. all AISH recipients with a mental health disorder) and for the two subgroups being explored (i.e. schizophrenia and other mental health, excluding schizophrenia). The proportion of individuals reporting mean monthly employment income greater-than $0 in the pre-amendment period, the post-amendment period, and in both the pre and post-amendment periods was calculated. The goal essentially was to look (at least crudely) at changes to employment levels from the pre-policy amendment period to the post policy amendment period.

Next, using diagnostic and gender data to construct various subgroups of interest, differences within groups were explored using the dependent variable. That is, for each subgroup, the null hypothesis that the mean difference of the logarithm of mean monthly

employment income equalled zero was tested against the alternative hypothesis that the mean difference was not equal to zero. The goal here was to use the dependent variable to identify cursory changes to employment levels from the pre-policy amendment period to the post-policy amendment period, that is changes that did not take into account the control variables identified in equation (1). At this level of analysis, a robustness check was performed altering the time period of analysis as informed by the data.

Finally, before moving to the regression model for research questions one and three, differences between groups were explored using the dependent variable. That is, the null hypothesis that the mean difference of the logarithm of mean monthly employment income for AISH recipients with schizophrenia was statistically the same as the mean difference of the logarithm of mean monthly employment income for AISH recipients with a mental health disorder, excluding schizophrenia was tested. The goal here was to determine, again at a cursory level, if AISH recipients with schizophrenia responded to the policy amendment differently versus AISH recipients with other mental health disorders, excluding schizophrenia. The same test was performed for females and males to detect any gender differences.

The regression model in equation (1) was then fit to the data. This was first done for the entire sample to assess hypothesis one. Then, to assess hypothesis two, the model was fit to a sub-sample consisting of only individuals earning employment income within the 50% exemption limit. The regression model in equation (2) was then fit to the sample of AISH recipients with schizophrenia to assess research question two.

Strengths and Limitations

This project aimed to explore employment related behaviour as it pertains to two subsets of the AISH population - those with schizophrenia and those with a mental disorder, excluding

schizophrenia. The narrow focus of the research means that the findings of the study cannot reasonably be extrapolated to the larger AISH population. Although this is a noted limitation of the research, there are also benefits to this approach. Most notably, the narrow focus makes the findings more generalizable to similar groups of people outside of the study, namely persons with schizophrenia.

Another limitation of the research is the fact that the research designs that were utilized (natural experiment and retrospective cohort design) are quasi-experimental rather than experimental. Although this may impact the internal validity of the study (Bryman, Teevan, & Bell, 2009), the replicability of the study, and may impact availability of data and data quality, given the research questions that were being explored, time and resource constraints, and the noted advantages of these designs, the use of these designs was reasonable and still produced valid results.

Finally, it should be noted that the sample was constructed of individuals who reported employment income for at least one of the 60 months of the study period. Individuals not reporting any employment income over the 60 month study period were not included (data for these individuals was not available from the AISH program). Because this study used employment income as a surrogate measure for employment status (employed versus unemployed), the results therefore demonstrate the impact of the policy amendment only for those who were employed for at least one month over a five year period.

To be considered part of the labour force in Canada however, an individual must be either employed or unemployed. Unemployed is defined as those individuals who are actively seeking

employment[17] and are available for work; that is, individuals who are willing and able to supply labour to the labour market (Statistics Canada, 2010). This study considers those who have not been employed for at least one month in the five year study period to not be actively seeking employment, not available for work, or not willing or able to work; therefore these individuals are considered to be out of the labour force. Because individuals who are not part of the labour force are not factored into employment and unemployment statistics in Canada, excluding these individuals from the analysis is justified. This notwithstanding, the exclusion of these individuals does impact the external validity of the results.

Notwithstanding the noted limitations, there are many strengths to the research that was conducted. For example, there are many advantages to the natural experiment and retrospective research designs and to using the analytic techniques outlined above. Strength can also be viewed in terms of the utility of the information. That is, this research will contribute to bodies of literature in which there are gaps (i.e. the labour supply of individuals with schizophrenia and how they respond to health and social policy) and will also be useful to policy makers in Alberta and in other jurisdictions. There is no doubt that these strengths help to counterbalance the noted shortcomings.

[17] Statistics Canada defines actively seeking work as looking for work in the past four weeks (Statistics Canada, 2010)

CHAPTER THREE: RESULTS

This section will present results from all data analysis. First, descriptive statistics will be presented for: a) all AISH recipients who are coded as having a mental health disorder as their primary medical condition, and b) AISH recipients coded as having schizophrenia as their primary medical condition as compared to AISH recipients coded as having a mental health disorder, excluding schizophrenia. Second, data analysis for each research question will be presented. For research questions one and three (which explore the impact of the policy amendment), differences within groups will first be explored (one sample t-tests), differences between groups will then be explored (independent samples t-tests), and finally the results from the empirical model specified in equation (1) will be presented. For research question two, the results from the empirical model specified in equation (2) will be presented.

Descriptive Statistics

Descriptive statistics for all AISH recipients who are coded as having a mental health disorder as their primary medical condition will be presented below. This is followed by descriptive statistics for AISH recipients coded as having schizophrenia as their primary medical condition and AISH recipients coded as having a mental health disorder, excluding schizophrenia.

All AISH Recipients with a Mental Health Disorder

Table 2 presents descriptive statistics for gender, marital status and place of residence for all AISH recipients who are coded as having a mental health disorder as their primary medical condition (n=5,282). As Table 1 shows, 51.5% of individuals are male, 88.4% do not have a cohabitating partner, 42.1% live in rural Alberta, 33% live in Edmonton, and 24.8% live in Calgary.

Table 2: Descriptive Statistics: Gender, Marital Status, and Place of Residence – All AISH Recipients with a Mental Health Disorder (n=5,282)

Characteristic	Frequency	Percent
Gender		
Male	2,720	51.5
Female	2,562	48.5
Marital Status		
No Cohabitating Partner	4,669	88.4
Yes Cohabitating Partner	613	11.6
Place of Residence		
Rural	2,226	42.1
Edmonton	1,744	33.0
Calgary	1,309	24.8

Table 3 illustrates descriptive statistics for age, number of children, and monthly employment income for all AISH recipients who are coded as having a mental health disorder as their primary medical condition (n=5,282). As Table 3 shows, the mean age is 45.7 years (minimum=21, maximum=71, median=47). The mean number of children is 0.19 children (86.7% of individuals have no children, therefore the median is 0 as is the minimum, whereas the maximum=8). The mean monthly employment income for this group, over the five year time period, is $456.98 (minimum=$0, maximum=$2,337.10, median=$363.09).

Table 3: Descriptive Statistics: Age, Number of Children, and Monthly Employment Income – All AISH Recipients with a Mental Health Disorder (n=5,282)

Characteristic	Mean	Standard Deviation
Age	45.70	11.49
Number of Children	0.19	0.59
Monthly Employment Income	456.94	352.08

AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia Compared to Schizophrenia

Table 4 presents descriptive statistics for gender, marital status and place of residence for all AISH recipients who are coded as having a mental health disorder, excluding schizophrenia as their primary medical condition (n=2,897) compared to those who are coded as having schizophrenia as their primary medical condition (n=2,385). As Table 4 shows, more individuals with schizophrenia are male relative to the other group ($p<0.001$); this aligns with prevalence data that shows the prevalence of schizophrenia to be higher among males. Fewer individuals with schizophrenia have a cohabitating partner relative to the other group ($p<0.001$) and fewer live in rural Alberta ($p<0.001$).

Table 4: Descriptive Statistics: Gender, Marital Status, and Place of Residence – AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia (n=2,897) Compared to Schizophrenia (n=2,385)

Characteristic		Mental Health, Exclud Schizophrenia		Schizophrenia	
		Frequency	Percent	Frequency	Percent
Gender	Female	1743	60.2	819	34.3
	Male	1154	39.8	1566	65.7
Marital Status	No Cohabitating Partner	2514	86.8	2155	90.4
	Yes Cohabitating Partner	383	13.2	230	9.6
Place of Residence	Rural	1390	48.0	836	35.1
	Edmonton	884	30.5	860	36.1
	Calgary	620	21.4	689	28.9

Table 5 illustrates descriptive statistics for age, number of children, and mean monthly employment income for all AISH recipients who are coded as having a mental health disorder, excluding schizophrenia as their primary medical condition (n=2,897) compared to those who are coded as having schizophrenia as their primary medical condition (n=2,385). Looking at the

first group ("Mental Health, Excluding Schizophrenia" in the table), one sees that the mean age is 46.79 years (minimum=21, maximum=71, median=48). The mean number of children is 0.26 children (82.1% have no children, therefore the median is 0 as is the minimum, whereas the maximum=6). The mean monthly employment income for this group, over the five year time period, is $458.10 (minimum=$0, maximum=$2,337.10, median=$356.58). Looking next at the second group ("Schizophrenia" in the table), one sees that the mean age is 44.37 years (minimum=21, maximum=71, median=45). The mean number of children is 0.10 children (92.2% have no children, therefore the median is 0 as is the minimum, whereas the maximum=8). The mean monthly employment income for this group, over the five year time period, is $455.53 (minimum=$0, maximum=$2,104.38, median=$369.22). Statistically significant differences between the two groups exist for age ($p<0.001$) and number of children ($p<0.001$). However, statistically, mean monthly employment income for both groups is the same ($p=0.792$)

Table 5: Descriptive Statistics: Age, Number of Children, and Monthly Employment Income – AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia (n=2,897) Compared to Schizophrenia (n=2,385)

Characteristic	Mental Health, Excluding Schizophrenia		Schizophrenia	
	Mean	Standard Deviation	Mean	Standard Deviation
Age	46.79	11.66	44.37	11.14
Number of Children	0.26	0.68	0.10	0.45
Monthly Employment Income	458.10	364.18	455.53	336.87

Data Analysis

Data analysis for research questions one and three will be presented below. This is followed by data analysis for research question two.

Research Questions One and Three – The Impact of the Policy Amendment

Table 6 displays levels of employment for the full sample, the sample of individuals with a mental health disorder, excluding schizophrenia, and the sample of individuals with schizophrenia. As Table 6 shows, of the 5,282 AISH recipients in the sample who are coded as having a mental health disorder as their primary medical condition, 78.06% (n=4,123) had a mean employment income in the pre-amendment period greater than zero, 71.85% (n=3,795) had a mean employment income in the post-amendment period greater than zero, and 49.85% (n=2,633) earned employment income in both the pre-amendment and the post-amendment periods. In this study employment income was used as a surrogate measure for employment status and therefore was used to determine whether or not individuals were employed. Thus, for AISH recipients who are coded as having a mental health disorder as their primary medical condition, 78.06% where employed for at least one month over the 30 months before the policy amendment, 71.85% were employed for at least one month over the 30 months after the policy amendment, and 49.85% were employed for at least one month before and one month after the policy amendment.

Of the 2,897 AISH recipients in the sample whose primary medical condition is a mental health disorder, excluding schizophrenia, 75.39% (n=2,184) had a mean employment income in the pre-amendment period greater than zero, 70.59% (n=2,045) had a mean employment income in the post-amendment period greater than zero, and 45.91% (n=1,330) earned employment income in both the pre-amendment and the post-amendment periods. It can therefore be said that, for AISH recipients whose primary medical condition is a mental health disorder, excluding schizophrenia, 75.39% where employed for at least one month over the 30 months before the policy amendment, 70.59% were employed for at least one month over the 30 months after the

policy amendment, and 45.91% were employed for at least one month before and one month after the policy amendment.

Of the 2,385 AISH recipients in the sample whose primary medical condition is schizophrenia, 81.30% (n=1,939) had a mean employment income in the pre-amendment period greater than zero, 73.38% (n=1,750) had a mean employment income in the post-amendment period greater than zero, and 54.59% (n=1,303) earned employment income in both the pre-amendment and the post-amendment periods. Thus, for AISH recipients whose primary medical condition is schizophrenia, 81.30% where employed for at least one month over the 30 months before the policy amendment, 73.38% were employed for at least one month over the 30 months after the policy amendment, and 54.59% were employed for at least one month before and one month after the policy amendment.

Table 6: Mean Employment Income Greater-Than $0: AISH Recipients with a Mental Health Disorder (n=5,282), AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia (n=2,897), and AISH Recipients with Schizophrenia (n=2,385)

Group and Reference Period	Number with Mean Employment Income > $0	Percent with Mean Employment Income > $0
Mental Health Disorder		
Pre-Policy Amendment	4,123	78.06
Post-Policy Amendment	3,795	71.85
Both Pre and Post-Policy Amendment	2,633	49.85
Mental Health Disorder, Excluding Schizophrenia		
Pre-Policy Amendment	2,184	75.39
Post-Policy Amendment	2,045	70.59
Both Pre and Post-Policy Amendment	1,330	45.91
Schizophrenia		
Pre-Policy Amendment	1,939	81.30
Post-Policy Amendment	1,750	73.38
Both Pre and Post-Policy Amendment	1,303	54.59

Table 6 shows cursory evidence that, by all measures identified in the table, employment levels for those with schizophrenia are higher than those with a mental health disorder, excluding

schizophrenia. Table 6 also illustrates that the decrease in employment levels from the pre-amendment period to the post-amendment period is greatest for those with schizophrenia (7.92% decrease compared to 4.80% decrease). The following section explores these relationships in more detail.

Within Group Differences

Table 7 shows the mean difference of the logarithm of mean monthly employment income for major demographic groups (the difference of the logarithm of mean monthly employment income equals the logarithm of mean monthly employment income after the policy amendment minus the logarithm of mean monthly employment income before the policy amendment). Each difference was tested for statistical significance using a one-sample t-test, testing the null hypothesis that the mean difference of the logarithm of mean monthly employment income equals zero versus the alternative that the mean difference is not equal to zero. The standard error of the mean and the p-value are also provided for each test.

As Table 7 demonstrates, for all groups the mean difference of the logarithm of mean monthly employment income is negative indicating that mean monthly employment income decreased from the pre-amendment period to the post-amendment period. This decrease is statistically significant at the level $p<0.05$ for three of the groups, namely: Primary Medical Condition is Mental Health Disorder (i.e. AISH recipients during the time period who were coded as having any mental health disorder as their primary medical condition), Primary Medical Condition is Mental Health Disorder – Females (i.e. female AISH recipients who, during the time period, were coded as having any mental health disorder as their primary medical condition), and Primary Medical Condition is Schizophrenia (i.e. AISH recipients who, during the time period, were coded as having schizophrenia as their primary medical condition). The

mean difference is nearly equal for all three groups (1.54% decrease, 1.78% decrease, and 1.77 % decrease respectively), but is slightly larger for Primary Medical Condition is Mental Health Disorder – Females and Primary Medical Condition is Schizophrenia.

Table 7: Mean Difference of the Logarithm of Mean Monthly Employment Income: Various Demographic Groups of Interest

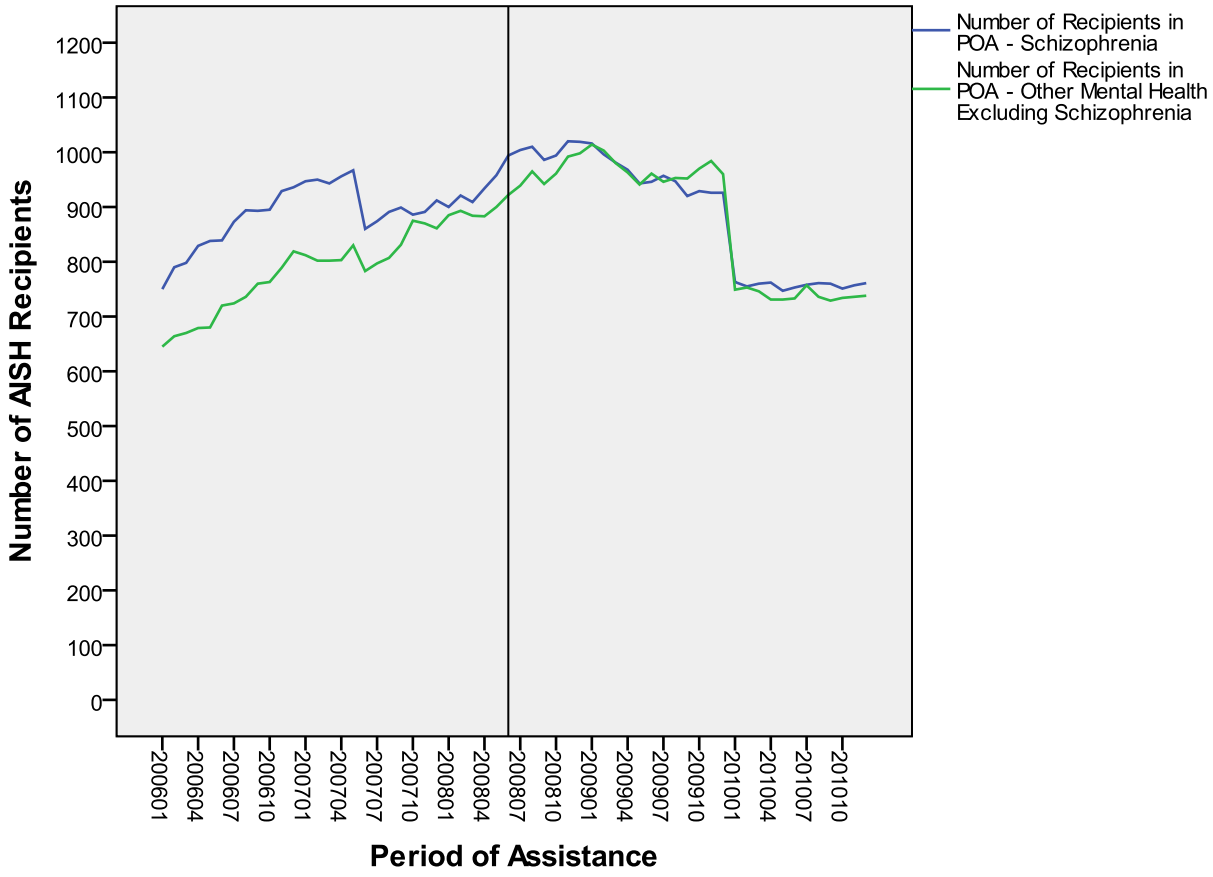
Group	Mean Δ log (Y_t)	SEM	p-value
Primary Medical Condition is Mental Health Disorder	-0.0154	0.0062	0.013*
Primary Medical Condition is a Mental Health Disorder, Excluding Schizophrenia	-0.0130	0.0089	0.143
Primary Medical Condition is Schizophrenia	-0.0177	0.0086	0.038*
Primary Medical Condition is Mental Health Disorder - Males	-0.0131	-0.0087	0.133
Primary Medical Condition is Mental Health Disorder - Females	-0.0178	0.0087	0.042*
Primary Medical Condition is a Mental Health Disorder, Excluding Schizophrenia - Males	-0.0144	0.0148	0.332
Primary Medical Condition is a Mental Health Disorder, Excluding Schizophrenia - Females	-0.0121	0.0110	0.273
Primary Medical Condition is Schizophrenia - Males	-0.0123	0.0107	0.250
Primary Medical Condition is Schizophrenia - Females	-0.0277	0.0143	0.054

*Notes: SEM is the standard error of the mean. Δ log (Y_t) is the difference of the logarithm of mean monthly employment income (specified as the logarithm of mean monthly employment income post-amendment minus the logarithm of mean monthly employment income pre-amendment). * indicates statistical significance at the 0.05 level.*

As Figure 1 illustrates, from December 2009 to January 2010, there was a substantial decrease in the number of AISH recipients with schizophrenia and the number of AISH

recipients with a mental health disorder, excluding schizophrenia. The reason for this sudden, but pronounced decrease is not known.

Figure 1: Number of AISH Recipients with Schizophrenia and Other Mental Health, Excluding Schizophrenia – January 2006 to December 2010



Notes: Period of assistance (POA) runs from January 2006 (200601) to December 2010. The vertical line represents the July 1, 2008 policy amendment.

Because there is some correlation between the number of AISH recipients in the period of assistance and the logarithm of mean monthly employment income (see Table 8) however, there is some evidence to suggest that this sudden decrease in AISH recipients may be skewing the results in Table 7 toward the negative. For this reason, the time period was modified to exclude data from January 2010 to December 2010 and the analysis from Table 7 was reproduced. Table 9 presents these findings.

Table 8: Correlation Between the Number of AISH Recipients in Period of Assistance and the Logarithm of Mean Monthly Employment Income - AISH Recipients with a Mental Health Disorder, a Mental Health Disorder, Excluding Schizophrenia, and Schizophrenia

Group	Pearson Correlation Coefficient	p-value
AISH Recipients with a Mental Health Disorder	0.477	< 0.001*
AISH Recipients with a Mental Health Disorder, Excluding Schizophrenia	0.609	< 0.001*
AISH Recipients with Schizophrenia	0.305	0.018*

*Notes: * indicates statistical significance at the 0.05 level.*

Table 9: Mean Difference of the Logarithm of Mean Monthly Employment Income: Various Demographic Groups of Interest, Full Timeframe and Data from January 2010 to December 2010 Excluded

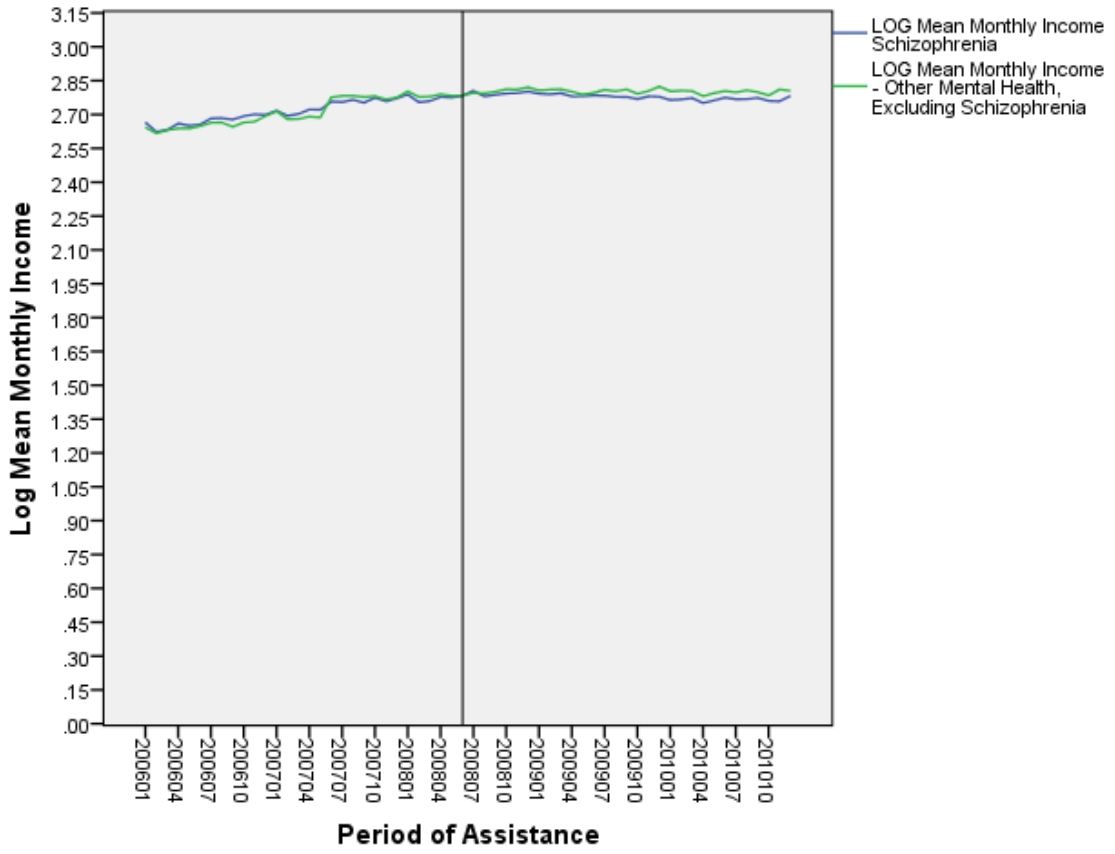
Group	*Mean Δ log (Y_t)*	*SEM*	*p-value*	Mean Δ log (Y_t)	SEM	p-value
Primary Medical Condition is Mental Health Disorder	*-0.0154*	*0.0062*	*0.013**	-0.0107	0.0059	0.068
Primary Medical Condition is a Mental Health Disorder, Excluding Schizophrenia	*-0.0130*	*0.0089*	*0.143*	-0.0118	0.0086	0.171
Primary Medical Condition is Schizophrenia	*-0.0177*	*0.0086*	*0.038**	-0.0096	0.0080	0.227
Primary Medical Condition is Mental Health Disorder - Males	*-0.0131*	*-0.0087*	*0.133*	-0.0089	0.0082	0.276
Primary Medical Condition is Mental Health Disorder - Females	*-0.0178*	*0.0087*	*0.042**	-0.0127	0.0084	0.131
Primary Medical Condition is a Mental Health Disorder, Excluding Schizophrenia - Males	*-0.0144*	*0.0148*	*0.332*	-0.019	0.0142	0.180
Primary Medical Condition is a Mental Health Disorder, Excluding Schizophrenia - Females	*-0.0121*	*0.0110*	*0.273*	-0.0069	0.0108	0.523
Primary Medical Condition is Schizophrenia - Males	*-0.0123*	*0.0107*	*0.250*	-0.0026	0.0099	0.792
Primary Medical Condition is Schizophrenia - Females	*-0.0277*	*0.0143*	*0.054*	-0.0226	0.0134	0.091

*Notes: SEM is the standard error of the mean. Δ log (Y_t) is the difference of the logarithm of mean monthly employment income (specified as the logarithm of mean monthly employment income post-amendment minus the logarithm of mean monthly employment income pre-amendment). * indicates statistical significance at the 0.05 level. Columns in italics and shaded represent analysis based on the full timeframe (i.e. January 2006 to December 2010) as previously displayed in Table 6.*

As Table 9 demonstrates, for all groups, when excluding data after December 2009, the mean difference of the logarithm of mean monthly employment income is still negative indicating that mean monthly employment income decreased from the pre-amendment period to the post-amendment period, however these decreases are no longer statistically significant. This

therefore suggests that the sudden decrease in AISH recipients is skewing the results in Table 7 toward the negative. Figure 2, however, does not show the same sudden decrease in the logarithm of mean monthly employment income after December 2009 for AISH recipients in the sample. Given this, the full timeframe of data was used for the analysis that follows.

Figure 2: Logarithm of Mean Monthly Employment Income: AISH Recipients with Schizophrenia and Other Mental Health Disorder, Excluding Schizophrenia – January to December 2010



Notes: Period of assistance runs from January 2006 (200601) to December 2010. The vertical line represents the July 1, 2008 policy amendment.

Between Group Differences

Table 10 shows results testing if the mean difference of the logarithm of mean monthly employment income is statistically different for AISH recipients with schizophrenia as compared

to AISH recipients with a mental health disorder, excluding schizophrenia. This "difference in differences" (Emery & Matheson, 2011) is also illustrated for the sample of males and females. The null hypothesis being tested is that the mean difference of the logarithm of mean monthly employment income for AISH recipients with schizophrenia is the same as the mean difference of the logarithm of mean monthly employment income for AISH recipients with a mental health disorder, excluding schizophrenia. The alternative hypothesis is that the mean difference of the logarithm of mean monthly employment income is not equal between the groups. Each mean difference was tested for statistical significance using an independent samples t-test. The difference in the standard error of the means and the p-value are also provided for each test.

Table 10: Mean Difference of the Logarithm of Mean Monthly Employment Income: AISH Recipients with Schizophrenia Compared to Mental Health Disorder, Excluding Schizophrenia

Groups Being Compared	Mean Difference	SEM Difference	p-value
AISH Recipients with Schizophrenia versus A Mental Health Disorder, Excluding Schizophrenia	0.005	0.0123	0.701
Females Only - AISH Recipients with Schizophrenia versus A Mental Health Disorder, Excluding Schizophrenia	0.0156	0.0181	0.389
Males Only - AISH Recipients with Schizophrenia versus A Mental Health Disorder, Excluding Schizophrenia	0.0021	0.0179	0.907

Notes: SEM Difference is the difference in the standard error of the means being compared.

One of the assumptions of an independent samples t-test is that both samples have equal variances. A Levene's test was done for each group comparison to investigate this assumption. Levene's tests illustrated that for all group comparisons performed in Table 10, there was equal variances between samples ($p > 0.05$).

As Table 10 illustrates, for AISH recipients with schizophrenia and AISH recipients with a mental health disorder, excluding schizophrenia the null hypothesis cannot be rejected. That is,

the mean difference of the logarithm of mean monthly employment income for AISH recipients with schizophrenia (-0.0177, p=0.038 - see Table 7) is statistically the same as the mean difference of the logarithm of mean monthly employment income for AISH recipients with a mental health disorder, excluding schizophrenia (-0.0130, p=0.143 - see Table 7). Thus, there appears to be no "difference in the differences". That is, there appears to be no difference in how AISH recipients with schizophrenia responded to the policy amendment as compared to AISH recipients with other mental health disorders, excluding schizophrenia. For both groups, mean monthly employment income decreased from the pre-amendment period to the post-amendment period, although only for AISH recipients with schizophrenia was the decrease statistically significant.

This holds true for both females and males. That is, looking just at females, the mean difference of the logarithm of mean monthly employment income for AISH recipients with schizophrenia (-0.0277, p=0.054 - see Table 7) is statistically the same as the mean difference of the logarithm of mean monthly employment income for AISH recipients with a mental health disorder, excluding schizophrenia (-0.0121, p=0.273 - see Table 7). Likewise, looking just at males, the mean difference of the logarithm of mean monthly employment income for AISH recipients with schizophrenia (-0.0123, p=0.250 - see Table 7) is statistically the same as the mean difference of the logarithm of mean monthly employment income for AISH recipients with a mental health disorder, excluding schizophrenia (-0.0144, p=0.332 - see Table 7). For all groups, mean monthly employment income decreased from the pre-amendment period to the post-amendment period, although for none of the groups was the decrease statistically significant.

Multiple Regression Model

Before presenting the results of the regression model, it is instructive to first demonstrate the validity of the results. Validity is only achieved when certain assumptions are met. Indeed, "when these assumptions are not met the results may not be trustworthy, resulting in a Type I or Type II error, or over- or under-estimation of significance or effect size(s)" (Osborne & Waters, 2002).

Assumptions

> There are… various assumptions underlying the application of multiple regression techniques. However, mention is seldom made by researchers who employ these techniques as to whether their assumptions have been tested. One must, therefore, take for granted, when reading such papers, that the researcher has cautiously analyzed each assumption. (Sevier, 1957)

Although this observation was made by Sevier over 55 years ago, this problem is still common in today's medical and economic literature. To avoid this common pitfall, six assumptions inherent within multiple regression were tested (Laerd Statistics, 2013) (Norman & Streiner, 2008) (Osborne & Waters, 2002). The results from these tests are presented below:

1. Independence of errors (residuals) (Laerd Statistics, 2013).

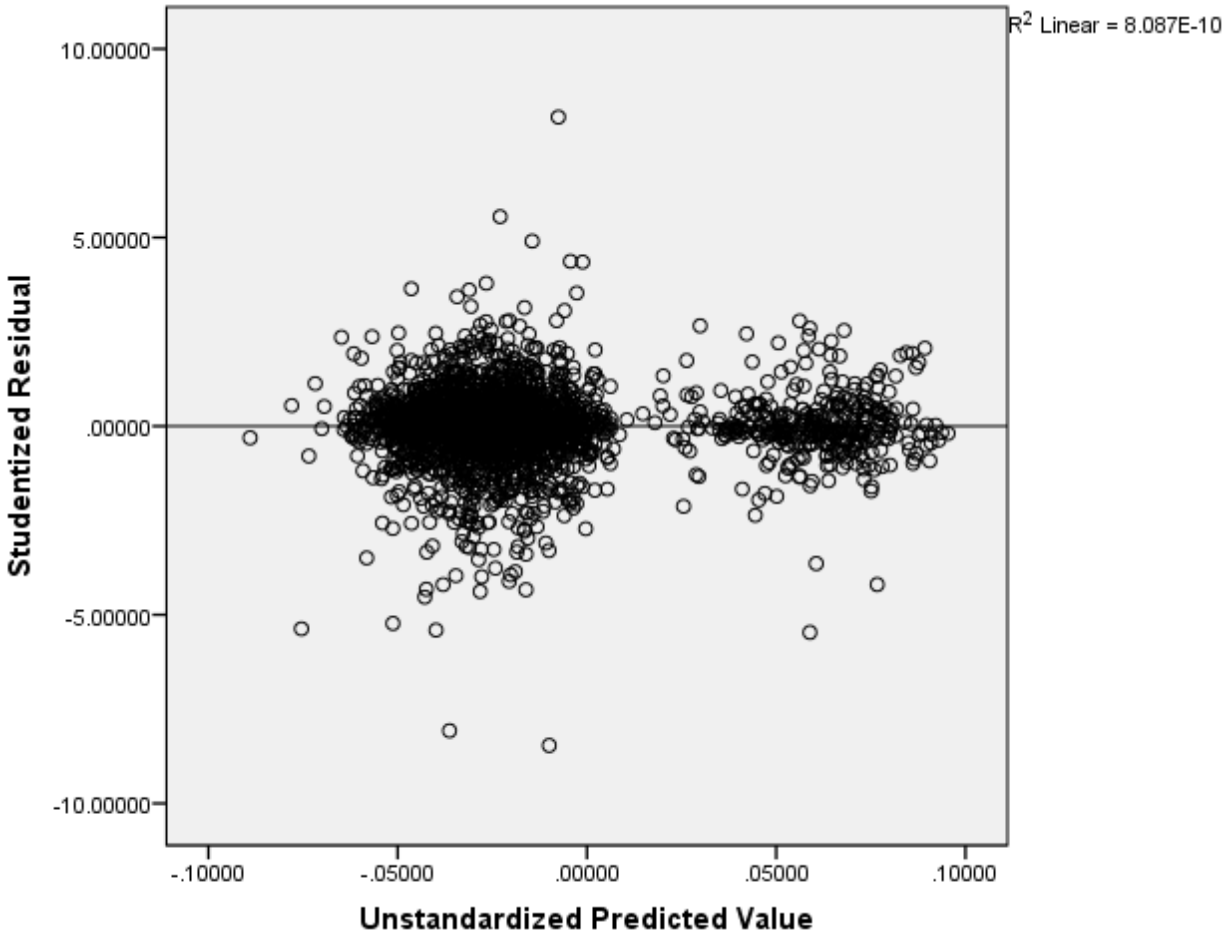
   Running the model produced a Durbin-Watson statistic of 1.997. Based on this it was concluded that there is no correlation between residuals (Laerd Statistics, 2013) (Norman & Streiner, 2008).

2. A linear relationship between the predictor variables and the dependent variable (Laerd Statistics, 2013) (Norman & Streiner, 2008) (Osborne & Waters, 2002).

   "Standard multiple regression can only accurately estimate the relationship between dependent and independent variables if the relationships are linear in nature… [and the] preferable method of detection is examination of residual plots" (Osborne & Waters, 2002).

Whether a linear relationship exists between all predictor variables (diagnosis, gender, marital status, number of children, age, and the first, second and third dummy covariates for place of residence) and the dependent variable was assessed. This was done by plotting the studentized residuals against the unstandardized predicted values. The result is displayed in Figure 3.

Figure 3: Scatterplot of Studentized Residuals and Unstandardized Predicted Values: Research Questions One and Three - The Impact of the Policy Amendment



As Figure 3 shows, when assessed together, there is a linear relationship between the predictor variables and the dependent variable as indicated by the horizontal clustering of the residuals around the 0 value.

3. Homoscedasticity (Laerd Statistics, 2013) (Norman & Streiner, 2008).

"One of the assumptions of multiple regression is homoscedasticity, which means that the variance is the same at all points along the regression line" (Norman & Streiner, 2008). As Osborne and Waters note, slight heteroscedasticity is of little concern, but "…when heteroscedasticity is marked it can lead to serious distortion of findings and seriously weaken the analysis thus increasing the possibility of a Type I error" (Osborne & Waters, 2002). Homoscedasticity can be assessed by plotting the residuals against the predicted value as was done in Figure 3 above. Visually inspecting the scatter-plot in Figure 3 seems to suggest that the assumption of homoscedasticity is met in as much as the points appear to be randomly placed above and below the zero value and no pattern is apparent (Norman & Streiner, 2008).
4. Multicollinearity (Laerd Statistics, 2013) (Norman & Streiner, 2008).

"Multicollinearity occurs when you have two or more independent variables that are highly correlated with each other" (Laerd Statistics, 2013). "The main effect of multicollinearity is to inflate the values of the standard errors of the βs, which in turn drives them away from statistical significance" (Norman & Streiner, 2008). Multicollinearity can be assessed by investigating tolerance; if tolerance for any variable is less than or equal to 0.1, evidence of multicollinearity is indicated and the variable should be excluded from the analysis (Norman & Streiner, 2008). As Table 11 illustrates none of the variables have tolerance less than or equal to 0.1.

Table 11: Assessing Multicollinearity: Tolerance Values for Research Questions One and Three - The Impact of the Policy Amendment

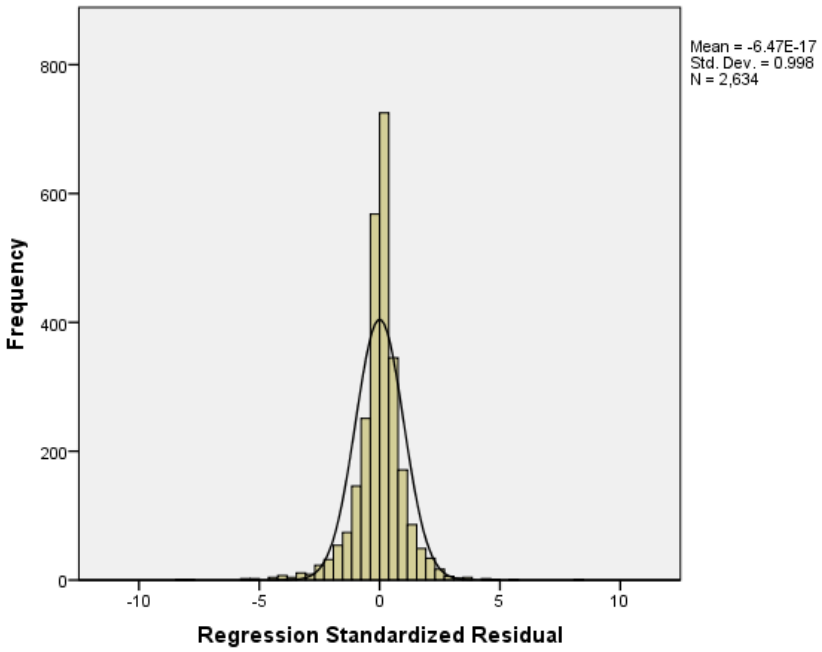
Variable	Tolerance
Diagnosis	0.922
Gender	0.899
Marital Status	0.868
Number of Children	0.839
Age	0.959
First dummy covariate for place of residence.	0.644
Second dummy covariate for place of residence.	0.635

5. No Influential Points (Laerd Statistics, 2013) (Norman & Streiner, 2008).

Influence, as measured by "Cook's distance", investigates "…how much the residuals of all of the other cases would change when a given case is deleted. A value over 1.00 shows that the subject's scores are having an undue influence and it probably should be dropped" (Norman & Streiner, 2008). All values of "Cook's distance" for the data being explored were less than or equal to 0.07. From this it can be concluded that there are no influential cases in the data set.
6. Residuals are Normally Distributed (Laerd Statistics, 2013).

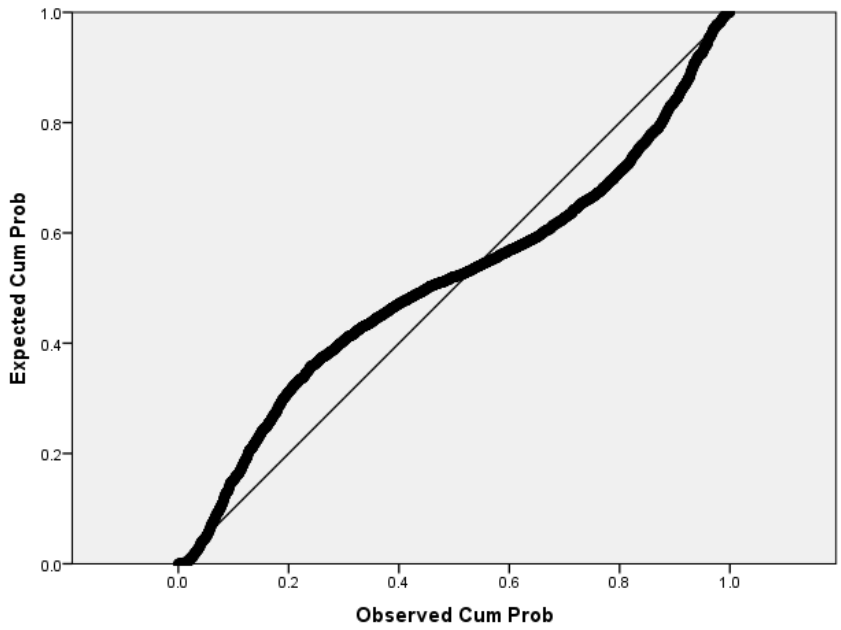
Robust analysis requires the residuals to be reasonably normally distributed (Laerd Statistics, 2013). Failure to meet this assumption can impact the validity of t-tests by impacting p-values (Institute for Digital Research and Education, UCLA, 2013). To assess if the residuals are reasonably normally distributed, it is instructive to look at a histogram of the residuals as in Figure 4. As Figure 4 illustrates, the residuals are approximately normally distributed.

Figure 4: Histogram of the Standardized Residuals: Research Questions One and Three - The Impact of the Policy Amendment



This is confirmed in Figure 5 which presents the corresponding Normal P-P Plot. The points are approximately aligned along the line indicating that the residuals are approximately normally distributed (Laerd Statistics, 2013).

Figure 5: Normal P-P Plot of Regression Standardized Residual: Research Questions One and Three - The Impact of the Policy Amendment



Having met all of the assumptions associated with multiple regression, an investigation into the results of the model was warranted (Laerd Statistics, 2013).

Model Summary

As Table 12 illustrates, the regression model is a good fit for the data overall at $F(7,2625)=4.261$, $p < 0.001$ (Laerd Statistics, 2013). That is, diagnosis, gender, marital status, number of children, age, and place of residence help predict the difference of the logarithm of mean monthly employment income (specified as the logarithm of mean monthly employment income post-amendment minus the logarithm of mean monthly employment income pre-amendment) and this relationship is statistically significant. “The null hypothesis of this test is that the multiple correlation coefficient, R, is equal to 0. What this also means, is that at least one regression coefficient (except the intercept) is statistically… different to zero” (Laerd Statistics, 2013).

Table 12: Statistical Significance of the Model: Research Questions One and Three - The Impact of the Policy Amendment (Model 1)

Model	Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Regression	2.963	7	0.423	4.261	0.000
Residual	260.831	2625	0.099		
Total	263.794	2632			

However, as Table 13 shows, the square of the multiple correlation coefficient (R^2) for the model was 0.011. This indicates that the proportion of the variance in the dependent variable explained by all of the independent variables was poor. In short, the model does not fit the data very well.

Table 13: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 1)

R	R^2	Adjusted R^2	Standard Error of the Estimate
0.106	0.011	0.009	0.315

Table 14 presents the summary of the multiple regression analysis using the full sample of AISH recipients with a mental health disorder (this will be referred to as Model 1). As noted previously, the unadjusted mean value of the dependent variable for the full sample was -0.0154 (p=0.013) and it was -0.0177 (p=0.038) for AISH recipients with schizophrenia and -0.0130 (p=0.143) for AISH recipients with other mental health disorders, excluding schizophrenia. Using the results from the regression model to ascertain the adjusted mean values, the values were -0.0243 (p<0.001, 95% confidence interval: -0.0256, -0.0229) for the full sample, -0.0266 (p<0.001, 95% confidence interval: -0.0283, -0.0248) for AISH recipients with schizophrenia, and -0.0220 (p<0.001, 95% confidence interval: -0.0240, -0.0200) for AISH recipients with other mental health disorders, excluding schizophrenia. That is, while controlling for all other

variables (gender, marital status, number of children, age, and place of residence), mean monthly employment income decreased from the pre-amendment to the post-amendment period by 2.7% for AISH recipients with schizophrenia and by 2.2% for AISH recipients with other mental health disorders, excluding schizophrenia.[18] It should be noted however that the difference between the two groups was not statistically significant (b=-0.005, p=0.702).

[18] The adjusted decrease was statistically significant at the level p<0.05 for both AISH recipients with schizophrenia and AISH recipients with other mental health disorders, excluding schizophrenia unlike in Table 7 where the schizophrenia group was driving the change in unadjusted mean for the group as a whole (i.e. AISH recipients with a mental health disorder).

Table 14: Summary of Multiple Regression Analysis: Research Questions One and Three - The Impact of the Policy Amendment (Model 1)

Variable	Unstandardized Coefficients		p-value	95% Confidence Interval for b	
	b	Standard Error		Lower Bound	Upper Bound
Constant	-0.002	0.032	0.960	-0.063	0.060
Diagnosis Dummy (0=Other Mental Health Disorder, Excluding Schizophrenia, 1=Schizophrenia)	-0.005	0.013	0.702	-0.030	0.020
Gender Dummy (0=Female; 1=Male)	0.005	0.013	0.728	-0.021	0.030
Marital Status Dummy (0=No Cohabitating Partner; 1=Cohabitating Partner)	0.095	0.019	0.000*	0.058	0.132
Number of Children	-0.014	0.012	0.231	-0.037	0.009
Age	-0.001	0.001	0.147	-0.002	0.000
First dummy covariate for place of residence (EDM) (0=Calgary, Rural, Other; 1=Edmonton)	0.024	0.016	0.138	-0.008	0.056
Second dummy covariate for place of residence (RURAL) (0=Calgary, Other, Edmonton; 1=Rural)	0.011	0.016	0.484	-0.020	0.041

*Notes: * indicates statistical significance at the 0.05 level.*

Again referring to Table 14, only marital status is statistically significant at the level $p<0.05$. Thus, for AISH recipients with a mental health disorder who had a cohabitating partner or were married, the logarithm of mean monthly employment income increased, on average, by 0.095 from the pre-amendment to the post-amendment period. That is, on average, mean monthly employment income for this group increased by 9.5% from the pre-amendment to the post-amendment period (95% confidence interval: 5.8%, 13.2%).

Although there were no influential points in the dataset, a model was run with all outliers removed (this will be referred to as Model 2)[19] in an attempt to improve the explained variance of the model. This reduced the sample size from 2,634 cases to 2,587 cases, and changed the mean value of the dependent variable to -0.0052 (p=0.308, 95% confidence interval: -0.0153, 0.0048). As Table 15 illustrates the square of the multiple correlation coefficient (R^2) for this model was 0.016. Thus, removing 47 outliers did not improve the proportion of the variance in the dependent variable explained by all of the independent variables. Within this model, again, only marital status had a statistically significant contribution to the model at the level $p<0.05$ (b=0.093, $p<0.001$, 95% confidence interval: 0.062, 0.124).

Table 15: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 2 - Outliers Removed)

R	R^2	Adjusted R^2	Standard Error of the Estimate
0.125	0.016	0.013	0.259

As Table 16 shows, when the sample was reduced to only recipients earning employment income within the 50% exemption limit (n=988), specifically single recipients without children earning between $401 and $1,000 and single parents and couples earning between $976 and $2,000 in the pre-amendment time period, the variance explained by the model did not improve (this will be referred to as Model 3).[20] For the sample overall, the mean value of the dependent variable did change to -0.0649[21] ($p<0.001$, 95% confidence interval: -0.08, -0.0499) indicating that for this group mean monthly employment income decreased, on average, by 6.49% from the

[19] All of the six assumptions for linear regression were tested for this model. All assumptions were met.

[20] All of the six assumptions for linear regression were tested for this model. All assumptions were met.

[21] The adjusted value for this sample was -0.0685 ($p<0.001$, 95% confidence interval: -0.0700, -0.0670).

pre-amendment to the post-amendment period. Within this model no covariates had a statistically significant contribution at the level $p<0.05$, including diagnosis ($b=0.021$, $p=0.187$).

Table 16: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 3 – Recipients Earning Employment Income Within the 50% Exemption Limit)

R	R^2	Adjusted R^2	Standard Error of the Estimate
0.1	0.01	0.003	0.241

As Table 17 shows, when the sample was reduced to just recipients earning at the top end of the 50% exemption limit, specifically single recipients without children earning between $900 and $1,000 and single parents and couples earning between $1,800 and $2,000 in the pre-amendment time period (n=59), the variance explained by the model did not improve greatly (this will be referred to as Model 4).[22] Within this model no covariates had a statistically significant contribution at the level $p<0.05$, including diagnosis. However, for the sample overall the mean value of the dependent variable did change slightly to -0.0807[23] ($p=0.001$, 95% confidence interval: -0.1285, -0.033).

Table 17: Explained Variance: Research Questions One and Three - The Impact of the Policy Amendment (Model 4 – Recipients Earning at the Top End of the 50% Exemption Limit)

R	R^2	Adjusted R^2	Standard Error of the Estimate
0.321	0.103	-0.02	0.185

Research Question Two – The Impact of Personal Characteristics on Level of Employment

As with research questions one and three, before presenting the results of the regression model, it is instructive to first demonstrate the validity of the results. As previously noted,

[22] All of the six assumptions for linear regression were tested for this model. In the first run, one influential point was discovered. This point was removed and the analysis re-run. All assumptions were then met.

[23] The adjusted value for this sample was -0.1082 ($p<0.001$, 95% confidence interval: -0.1385, -0.0779).

validity is only achieved when certain assumptions are met. Indeed, “when these assumptions are not met the results may not be trustworthy, resulting in a Type I or Type II error, or over- or under-estimation of significance or effect size(s)” (Osborne & Waters, 2002).

Assumptions

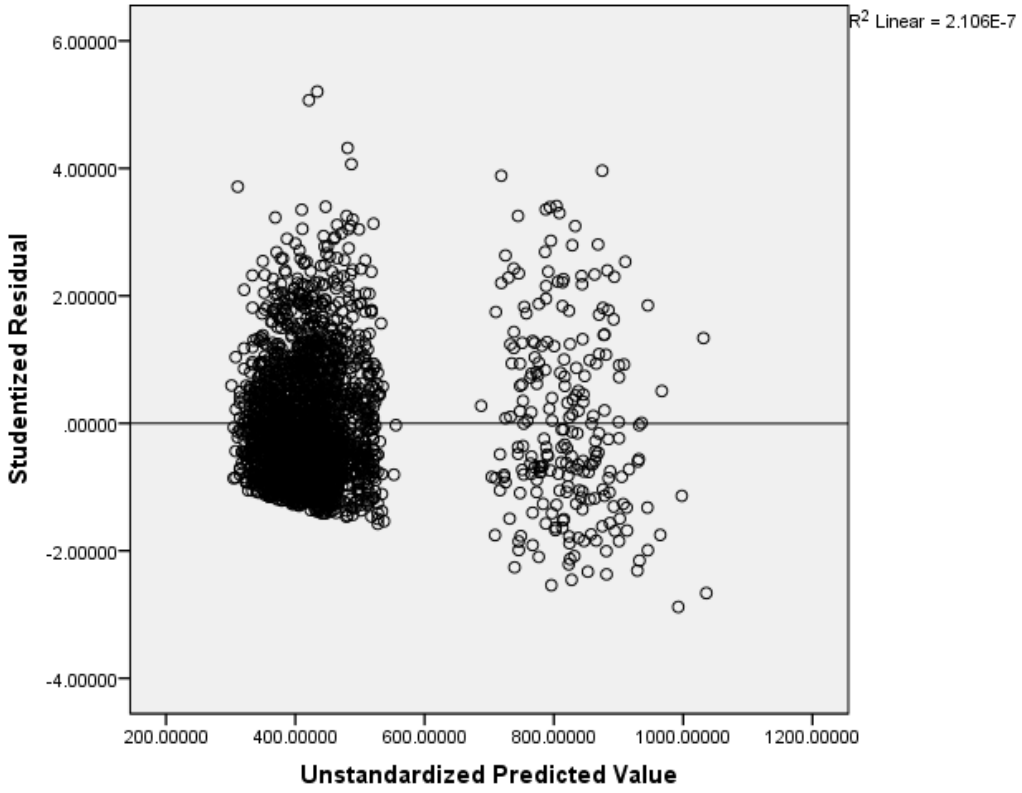
1. Independence of errors (residuals) (Laerd Statistics, 2013).

   Running the model produced a Durbin-Watson statistic of 2.012. Based on this it was concluded that there is no correlation between residuals (Laerd Statistics, 2013) (Norman & Streiner, 2008).

2. A linear relationship between the predictor variables and the dependent variable (Laerd Statistics, 2013) (Norman & Streiner, 2008) (Osborne & Waters, 2002).

   Whether a linear relationship exists between all predictor variables (gender, marital status, number of children, age, and the first, second and third dummy covariates for place of residence) and the dependent variable was assessed. This was done by plotting the studentized residuals against the unstandardized predicted values. The result is displayed in Figure 6.

Figure 6: Scatterplot of Studentized Residuals and Unstandardized Predicted Value: Research Question Two - The Impact of Personal Characteristics on Level of Employment



As Figure 6 shows, when assessed together, there is a linear relationship between the predictor variables and the dependent variable as indicated by the horizontal clustering of the residuals around the 0 value.

3. Homoscedasticity (Laerd Statistics, 2013) (Norman & Streiner, 2008).

Homoscedasticity can be assessed by plotting the residuals against the predicted value as was done in Figure 6 above. Visually inspecting the scatter-plot in Figure 6 seems to suggest that the assumption of homoscedasticity is met in as much as the points appear to be randomly placed above and below the zero value and no pattern is apparent (Norman & Streiner, 2008).

4. Multicollinearity (Laerd Statistics, 2013) (Norman & Streiner, 2008).

Multicollinearity can be assessed by investigating tolerance; if tolerance for any variable is less than or equal to 0.1, evidence of multicollinearity is indicated and the variable should be excluded from the analysis (Norman & Streiner, 2008). As Table 18 illustrates none of the variables have tolerance less than or equal to 0.1.

Table 18: Assessing Multicollinearity: Tolerance Values for Research Question Two - The Impact of Personal Characteristics on Level of Employment

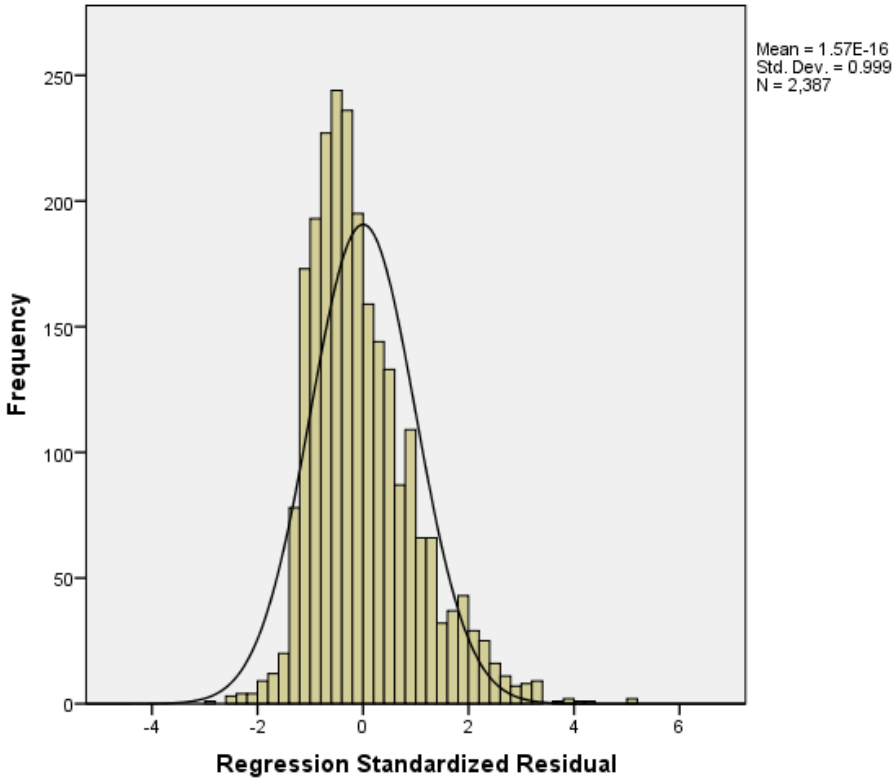
Variable	Tolerance
Gender	0.970
Marital Status	0.844
Number of Children	0.846
Age	0.981
First dummy covariate for place of residence.	0.695
Second dummy covariate for place of residence.	0.690

5. No Influential Points (Laerd Statistics, 2013) (Norman & Streiner, 2008).

All values of "Cook's distance" for the data being explored were less than or equal to 0.16. From this it can be concluded that there are no influential cases in the data set.
6. Residuals are Normally Distributed (Laerd Statistics, 2013).

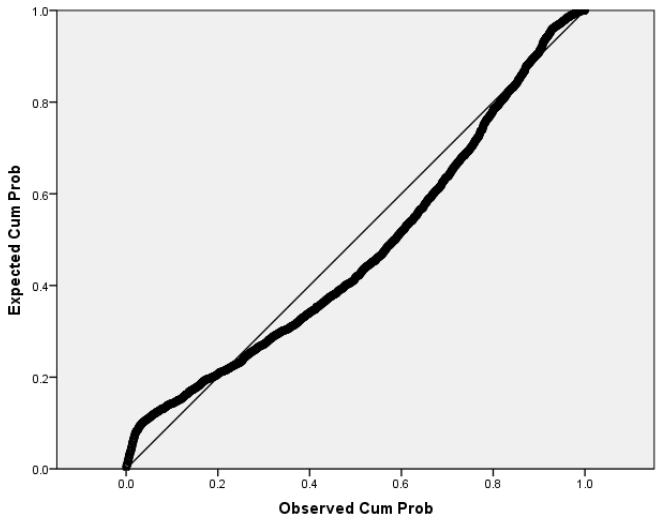
Robust analysis requires the residuals to be reasonably normally distributed (Laerd Statistics, 2013). Failure to meet this assumption can impact the validity of t-tests by impacting p-values (Institute for Digital Research and Education, UCLA, 2013). To assess if the residuals are reasonably normally distributed, it is instructive to look at a histogram of the residuals as in Figure 7. As Figure 7 illustrates, the residuals are approximately normally distributed.

Figure 7: Histogram of the Standardized Residuals: Research Question Two - The Impact of Personal Characteristics on Level of Employment



This is confirmed in Figure 5 which presents the corresponding Normal P-P Plot. The points are approximately aligned along the line indicating that the residuals are approximately normally distributed (Laerd Statistics, 2013).

Figure 8: Normal P-P Plot of Regression Standardized Residual: Research Question Two - The Impact of Personal Characteristics on Level of Employment



Having met all of the assumptions associated with multiple regression, an investigation into the results of the model was warranted (Laerd Statistics, 2013).

Model Summary

As Table 19 illustrates, the regression model is a good fit for the data overall at $F(6,2378)=69.663$, $p < 0.001$ (Laerd Statistics, 2013). That is, gender, marital status, number of children, age, and place of residence help predict mean monthly employment income and this relationship is statistically significant. "The null hypothesis of this test is that the multiple correlation coefficient, R, is equal to 0. What this also means, is that at least one regression coefficient (except the intercept) is statistically… different to zero" (Laerd Statistics, 2013).

Table 19: Statistical Significance of the Model: Research Question Two - The Impact of Personal Characteristics on Level of Employment

Model	Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Regression	40,442,634.98	6	6740439.165	69.663	0.000
Residual	2.301E8	2378	96758.108		
Total	2.705E8	2384			

However, as Table 20 shows, the square of the multiple correlation coefficient (R^2) for the model was 0.149. This indicates that the proportion of the variance in the dependent variable explained by all of the independent variables was poor. In short, the model does not fit the data very well.

Table 20: Explained Variance: Research Question Two - The Impact of Personal Characteristics on Level of Employment

R	R^2	Adjusted R^2	Standard Error of the Estimate
0.387	0.149	0.147	311.060

Table 21 presents the summary of the multiple regression analysis for research question two. As the table highlights, marital status, number of children, age, and the first and second dummy covariates for place of residence are statistically significant at the level $p<0.05$. Thus, for AISH recipients with a primary medical condition of schizophrenia, mean monthly employment income is predicted my marital status, number of children, age and place of residence.

Table 21: Summary of Multiple Regression Analysis: Research Question Two - The Impact of Personal Characteristics on Level of Employment

	Unstandardized Coefficients			**95% Confidence Interval for b**	
Variable	**b**	**Std. Error**	**Sig.**	**Lower Bound**	**Upper Bound**
Constant	611.592	30.928	0.000	550.944	672.241
Gender Dummy	-3.356	13.622	0.805	-30.068	23.356
Marital Status Dummy	383.000	23.49	0.000*	336.931	429.059
Number of Children	36.681	15.332	0.017*	6.634	66.727
Age	-3.228	0.577	0.000*	-4.361	-2.096
First dummy covariate for place of residence (EDM)	-84.300	15.917	0.000*	-115.512	-53.087
Second dummy covariate for place of residence (RURAL)	-59.652	16.069	0.000*	-91.164	-28.141

*Notes: * indicates statistical significance at the 0.05 level.*

The regression coefficient for marital status was positive indicating that those who were married or had a cohabitating partner had higher mean monthly employment incomes than those who were single. The regression coefficient for number of children was also positive indicating that those who had children earned more, on average, than those who did not. The regression coefficient for age was negative indicating that as one's age increased employment earnings were less. Likewise the regression coefficients for the first and second dummy covariates for place of residence (EDM and RURAL) were also negative. This indicates that those who lived in Edmonton earned less as compared to those who lived in Calgary. Similarly, those who lived in rural Alberta earned less as compared to those who lived in Calgary.

CHAPTER FOUR: DISCUSSION

This section will discuss the results as presented in the previous chapter. First, results will be discussed in terms of research questions one and three. Second, results will be discussed in terms of research question two. Throughout the discussion of all three research questions, insight will be provided as to the importance and relevance of the findings.

Research Questions One and Three – The Impact of the Policy Amendment

This study sought to answer the question: Did the July 1, 2008 policy amendment to the AISH employment income exemption limits change the level of employment among AISH recipients with schizophrenia? It was hypothesized that increased exemption limits would incent increased levels of employment among AISH recipients with schizophrenia. The primary hypothesis was that, looking at the entire group, the policy amendment would provide an incentive for individuals to increase their level of employment. The second hypothesis was that the policy amendment would only have a positive effect on individuals who were earning employment income within the 50% exemption limit. In this study, employment income was used as a surrogate measure for employment status (employed versus unemployed) and level of employment (number of hours worked).

Primary Hypothesis

At all levels of analysis the evidence did not support the primary hypothesis that employment would increase following the policy amendment. At the aggregate level, for AISH recipients whose primary medical condition was coded as schizophrenia, 81.30% were employed for at least one month over the 30 months before the policy amendment and 73.38% were employed for at least one month over the 30 months after the policy amendment. Looking at behaviour as measured by the difference of the logarithm of mean monthly employment income

(specified as the logarithm of mean monthly employment income after the policy amendment minus the logarithm of mean monthly employment income before the policy amendment), the decrease in employment level is also evident. That is, the mean difference of the logarithm of mean monthly employment income was negative indicating that mean monthly employment income decreased from the pre-amendment period to the post-amendment period. The level of relative decrease for both the unadjusted (-1.77%, $p=0.038$) and adjusted (-2.66%, $p<0.001$) values were small but both were statistically significant at the level $p<0.05$.

So the behaviour of AISH recipients with schizophrenia was not looked at in isolation, research question three was derived, namely: Did the policy amendment change the level of employment among AISH recipients with other mental health disorders, excluding schizophrenia? The specified comparison group was selected for two reasons. First, the literature is not clear on whether individuals with schizophrenia respond differently to social welfare policy as compared to individuals with other mental health disorders, excluding schizophrenia. Second, the comparison group that was selected helped to strengthen the internal validity of the study. That is, because the comparison group and the primary study group share barriers to obtaining employment, differences between the two groups could more reasonably be attributed to how the two groups responded to the policy amendment rather than to other factors such as barriers to becoming employed. This would not have been the case if the comparison group selected was another disability group outside of mental health.

The null hypothesis that the mean difference of the logarithm of mean monthly employment income for AISH recipients with schizophrenia is the same as the mean difference of the logarithm of mean monthly employment income for AISH recipients with a mental health disorder, excluding schizophrenia was not rejected ($b=-0.005$, $p=0.702$). That is, there appears to

be no difference in how AISH recipients with schizophrenia responded to the policy amendment as compared to AISH recipients with other mental health disorders, excluding schizophrenia. For both groups, mean monthly employment income decreased from the pre-amendment period to the post-amendment period (-1.77% and -1.30% respectively), although only for AISH recipients with schizophrenia was the decrease statistically significant (p=0.038 and p=0.143 respectively). By all accounts, the analysis suggests that neither group responded positively to the policy amendment.[24]

Covariates for the regression model specified for research questions one and three were selected based on the literature in this area of policy analysis. Effects by age (Gonzalez, 2008), number of dependent children (Averett, Warner, Little, & Huxley, 1999) (Gonzalez, 2008), place of residence (Gonzalez, 2008), and marital status (Organization for Economic Co-operation and Development (OECD), 2005) were expected; no significant effect based on gender was expected (Averett, Warner, Little, & Huxley, 1999).

The effect of marital status was confirmed. That is, for AISH recipients with a mental health disorder who had a cohabitating partner or were married, the logarithm of mean monthly employment income increased, on average, by 0.095 from the pre-amendment to the post-amendment period. That is, on average, mean monthly employment income for this group increased by 9.5% from the pre-amendment to the post-amendment period (95% confidence interval: 5.8%, 13.2%). No effects based on age, number of dependent children, or place of residence were found however. Also, as expected, no gender effect was present.

[24] When adjusting for gender, marital status, number of children and place of residence the decrease for both groups was verified and, as reported previously, the decrease for AISH recipients with other mental health disorders, excluding schizophrenia became statistically significant.

Second Hypothesis

The data suggests that the negative effect of the policy amendment was even more pronounced for individuals earning employment income within the 50% exemption limit in the pre-amendment time period (specifically single recipients without children earning between $401 and $1,000 and single parents and couples earning between $976 and $2,000). For this group, from the pre-amendment period to the post-amendment period, mean monthly employment income decreased for individuals, on average, 6.49% ($p<0.001$, 95% confidence interval: -8.0%, -4.99%).[25] Again, there appeared to be no difference in how AISH recipients with schizophrenia responded to the policy amendment as compared to AISH recipients with other mental health disorders, excluding schizophrenia ($b=0.021$, $p=0.187$). As well, no other effects were present.

Looking just at AISH recipients with a mental health disorder earning at the top end of the 50% exemption limit in the pre-amendment time period (specifically single recipients without children earning between $900 and $1,000 and single parents and couples earning between $1,800 and $2,000) reduced the sample size considerably (from 988 to 59 individuals). Nevertheless, a statistically significant effect was still present; mean monthly employment income decreased from the pre-amendment to the post-amendment period, on average, by 8.07 % ($p=0.001$, 95% confidence interval: -12.85%, -3.3%).[26] Again, within this group, there was no difference in how AISH recipients with schizophrenia responded to the policy amendment as compared to AISH recipients with other mental health disorders, excluding schizophrenia. As well, no other effects were present.

[25] When adjusting for gender, marital status, number of children and place of residence the decrease was verified.
[26] When adjusting for gender, marital status, number of children and place of residence the decrease was verified.

Summary and Analysis

Given the results, as summarized in Table 22, it would seem that the incentive created by the policy amendment was not successful in incenting increased levels of employment. The evidence indicates that this is the case for AISH recipients with schizophrenia and AISH recipients with a mental health disorder, excluding schizophrenia. The evidence also indicates that this is the case for individuals in both of these diagnostic groups earning within the 50% exemption limit prior to the amendment. In interpreting these findings however, it is important to consider the economic climate in Alberta during the period of analysis. That is, around the time of the policy amendment, the economy in Alberta took a downturn. This is illustrated by an increasing unemployment rate from 2006 to 2010 (3.4% in 2006, 3.5% in 2007, 3.6% in 2008, 6.6% in 2009, and 6.5% in 2010 (Statitics Canada, 2013). It is likely that this influenced the availability of jobs for for AISH recipients with schizophrenia and AISH recipients with a mental health disorder, excluding schizophrenia.

The only exception to the negative findings is for individuals in the full sample who were married or had a cohabitating partner. For these individuals the policy did have the intended impact. This effect is interesting. Perhaps the support these individuals received from their partners enhanced their ability to understand the policy amendment. Having an enhanced understanding of the policy amendment may have allowed them to modify their labour decisions in a way that allowed them to take advantage of the policy amendment. This is based on the assumption that, generally, this policy amendment was not easily interpreted by AISH recipients with mental health disorders however. Alternatively, assuming that all AISH recipients with mental health disorders had an equal understanding of the policy amendment regardless of their marital status, perhaps just the general support that partners provide their loved ones accounts for

the positive effect. Or, this may be an indicator of the severity of disease showing that those who are capable of maintaining a committed relationship are also more able to work additional hours and therefore they responded to the policy incentive.

Table 22: Summary of Results: Research Questions One and Three - The Impact of the Policy Amendment

Group	Did the Policy Amendment Have the Desired Impact?	Effects	Direction and Magnitude of Effects
Schizophrenia - All	No	Marital Status	Positive 9.5% (if married) 95% CI: 5.8%, 13.2%
Mental Health Disorder, Excluding Schizophrenia - All	No		
Schizophrenia – Within 50% Exemption Limit Pre-Amendment	No	None	None
Mental Health Disorder, Excluding Schizophrenia – Within 50% Exemption Limit Pre-Amendment	No		

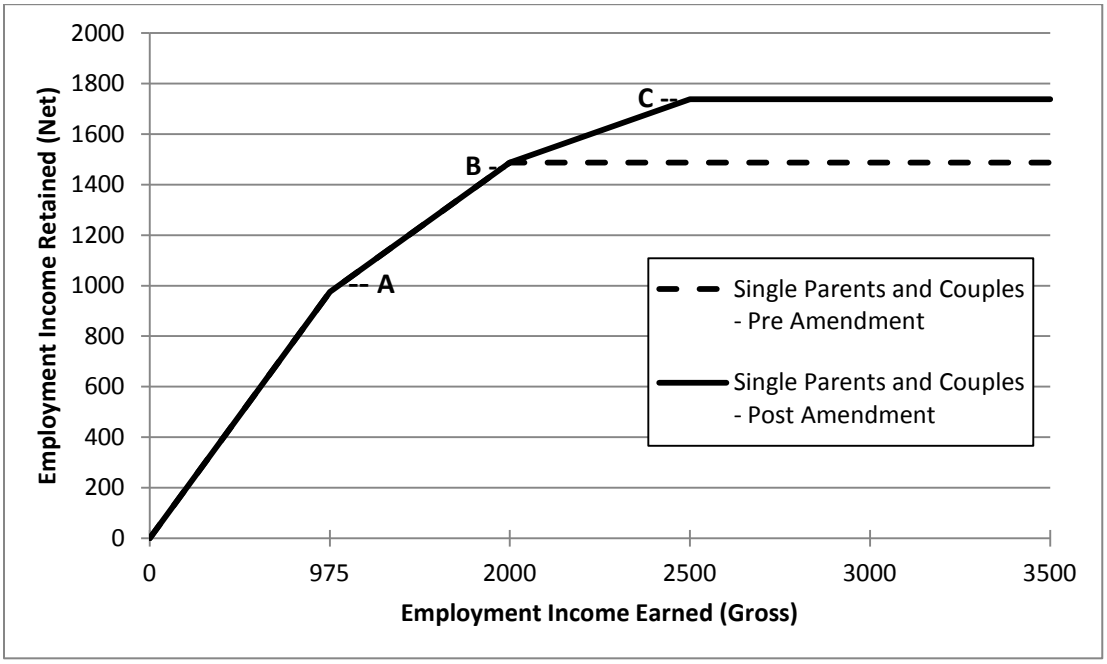
Notes: CI=Confidence Interval.

As Figure 9 illustrates, prior to the policy amendment, single people without children receiving AISH benefits could supplement their AISH benefits by $700 if they utilized the 50% employment income exemption limit to its full potential (that is, if they earned employment income to point B). After the policy amendment this increased to $950 (point C) creating a difference of $250. As Figure 10 shows, for single parents and couples, their employment income potential also increased by $250 with the policy amendment; they could supplement their

income by up to $1,487.50 prior to the policy amendment if they utilized the 50% employment income exemption limit to its full potential (that is, if they earned employment income to point B) and up to $1,737.5 after (point C). Because the policy was of the most benefit to individuals already earning within the 50% exemption limit before the policy amendment (that is, earning employment income between points A and B), it is especially surprising to see no positive effect within this group.

Figure 9: Earning Potential of Single People Without Children Pre and Post Policy Amendment

Figure 10: Earning Potential of Single Parents and Couples Pre and Post Policy Amendment



As noted above, the sample size for AISH recipients earning at the top end of the 50% exemption limit prior to the policy amendment was comparably very small (only 59 individuals). This combined with the negative results seems to indicate that few people were making decisions at the margin. Figures 11 and 12 illustrate this more clearly, showing that very few single people without children were earning just below $1,000, and very few single parents and couples were earning just below $2,000. Based on this, it would seem that very few people were making employment decisions in a way that would maximize their employment income. Rather, employment decisions were being made based on other factors, such as functional ability and the non-financial benefits of work discussed in the Background section above.

Figure 11: Mean Monthly Employment Income Pre-Amendment: Single People Without Children

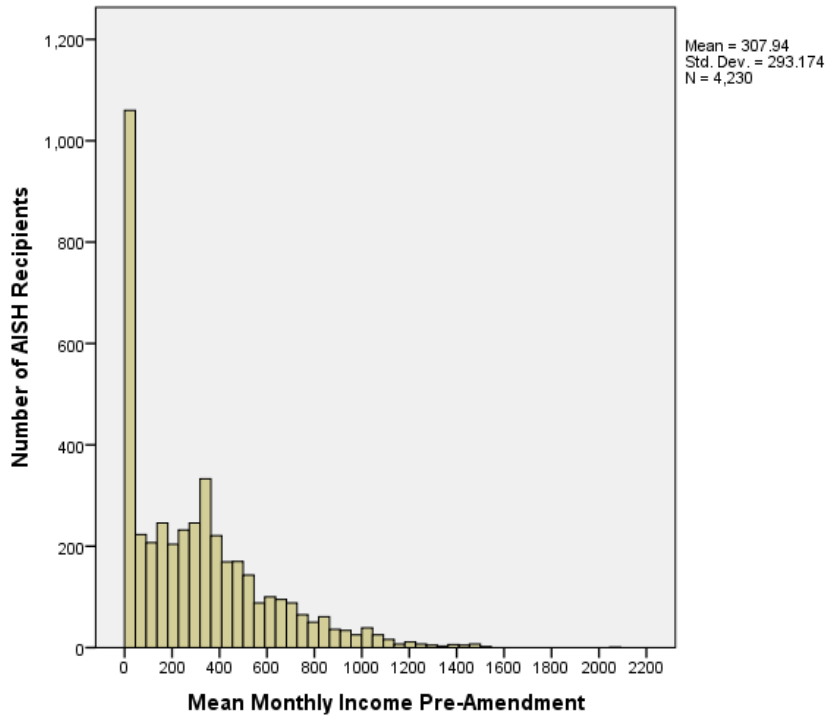
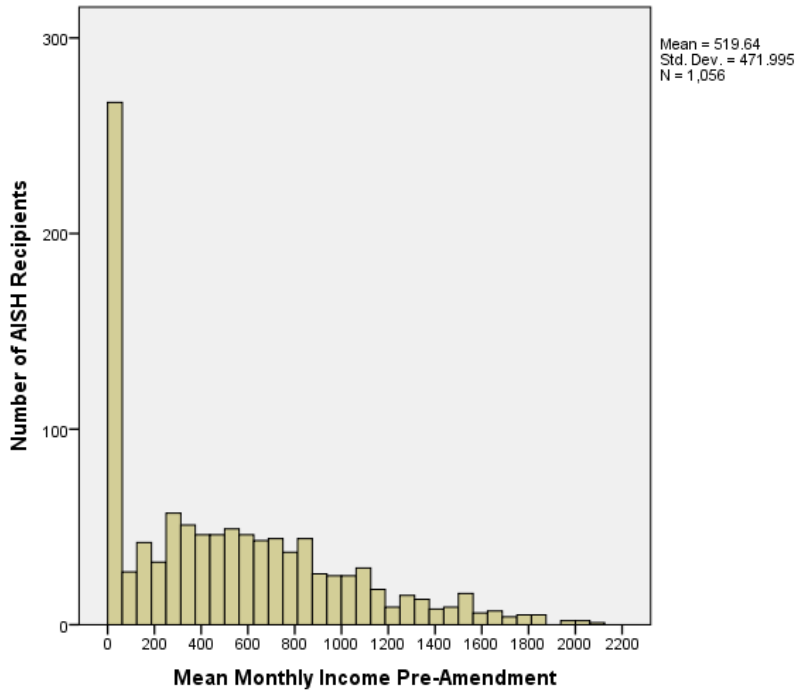


Figure 12: Mean Monthly Employment Income Pre-Amendment: Single Parents and Couples



In summary, the data suggests that the incentive to earn additional income at what is effectively a 50% tax rate was not successful in changing the labour decisions of this population. Future policy development could consider lowering the marginal tax rate on employment income to something below 50%, therefore allowing individuals to retain more of their employment income in the middle range of the exemption limits. Another choice would be to focus on adjusting the amount of employment income that is 100% exempt. As Figures 11 and 12 show this is where the majority of AISH recipients with mental health disorders earn employment income - $400 or less for single people without children and $975 or less for single parents and couples. Earning additional “tax free” income may be more effective in incenting this population to work more. As noted in the Introduction section above, because there are many positive benefits (both financial and health related) that individuals with SMI receive from employment and because public policy has been shown to influence the labour decisions of this population, alternative policies are worth exploring.

Two final thoughts. First, it may be the case that the policy amendment incented some individuals to gain additional employment immediately post-amendment when, in fact, they were too ill to maintain this employment in the long-term. That is, the stress associated with increased employment may have reduced their level of functioning to a point where they were less able to work than before the policy amendment. Even one month of increased employment related stress would be enough for some individuals in this population to need to reduce their level of employment to a point below their pre-amendment level for a significant amount of time. Sudden increases in employment income in the post-amendment time period, and then prolonged decreases, could have impacted the mean monthly employment income of these individuals therefore mitigating positive effects experienced by others.

Second, it may be the case that AISH recipients with mental health disorders are working to the full extent possible given the demand for their labour from employers. As noted in the Introduction section above, individuals with SMI do face significant barriers to gaining employment, including stigma from employers. Although the literature notes that these barriers are increasingly being overcome, this may not be the case in Alberta. Perhaps, attitudes among Alberta based employers may not be as progressive as in other jurisdictions. In any event, when all things are considered, it would appear that AISH recipients with mental health disorders are working to the extent that they want or are able to given the nature of their illness and the demands for their labour.

Research Question Two – The Impact of Personal Characteristics on Level of Employment

This study sought to also answer the question: What personal characteristics impact the level of employment among AISH recipients with schizophrenia? It was hypothesised that certain personal characteristics help predict the level of employment obtained by AISH recipients with schizophrenia. This hypothesis was formulated based on previous work done by González, a study by Averett et al., and work done by the Organization for Economic Cooperation and Development (OECD). Specifically, differences by age (Gonzalez, 2008), number of dependent children (Averett, Warner, Little, & Huxley, 1999) (Gonzalez, 2008), place of residence (Gonzalez, 2008), and marital status (Organization for Economic Co-operation and Development (OECD), 2005) were expected; no significant effect based on gender was expected (Averett, Warner, Little, & Huxley, 1999).

Marital status, number of children, age, and the first and second dummy covariates for place of residence were all found to be statistically significant (at the level $p<0.05$) predictors of mean monthly employment income for AISH recipients with schizophrenia. As expected, gender

did not predict mean monthly employment income for AISH recipients with schizophrenia (b=-3.356, p=0.805, 95% confidence interval: -30.068, 23.356).

A positive effect existed for marital status (b=383.00, p<0.001, 95% confidence interval: 336.931, 429.059), indicating that, on average, AISH recipients with schizophrenia who are married or have a cohabitating partner have a mean monthly employment income that is $383.00 greater than those who are single. A positive effect also existed for number of children (b=36.681, p=0.017, 95% confidence interval: 6.634, 66.727), indicating that for AISH recipients with schizophrenia, on average, mean monthly employment income increased by $36.68 for every dependant child they had. A negative age effect was present (b=-3.228, p<0.001, 95% confidence interval: -4.361, -2.096). This indicated that for AISH recipients with schizophrenia, for every one year increase in age, mean monthly employment income decreases, on average, by $3.23. The regression coefficients for the first and second dummy covariates for place of residence (EDM and RURAL) were also negative (respectively, b=-84.300, p<0.001, 95% confidence interval: -115.512, -53.087 and b=-59.652, p<0.001, 95% confidence interval: -91.164, -28.141). This indicated that AISH recipients with schizophrenia who lived in Edmonton earned, on average, $84.30 less than those who lived in Calgary. Likewise, AISH recipients with schizophrenia who lived in rural Alberta earned, on average, $59.65 less than those who lived in Calgary.

The positive marital status effect aligns with work done by the Organization for Economic Cooperation and Development (OECD). That is, the OECD has found that, for people that are married, creating financial incentives to work positively effects one's transition from part-time to full-time employment (Organization for Economic Co-operation and Development (OECD), 2005). Likely this can be attributed to the enhanced level of support that individuals

receive from a spouse, which can be helpful in interpreting employment related policies and generally in pursuing employment opportunities. Assuming that a transition from part-time to full-time employment also means increasing one's employment income, it would seem that this effect has been confirmed for individuals with schizophrenia.

Looking at the positive effect of children, this lies in contrast to work done by Averett et al. in which it was found that those with mental illness who have children tend to work less (Averett, Warner, Little, & Huxley, 1999). As well, this is contrary to with work done by González in which it was found that, for single and married mothers, "more children in the household" was "significantly associated with a lower probability of work" (Gonzalez, 2008). Assuming that working less also means earning less employment income, it would seem that this effect does not hold for individuals with schizophrenia.

The negative age effect found in this study is contrary to the findings of González. That is, in his study of single and married mothers, González found that "older… mothers are more likely to be employed" (Gonzalez, 2008). For AISH recipients with schizophrenia, age produced a negative effect. As noted in Table 3, the sample consisted of 65.7% males and 34.3% females however. Thus, to test if there was an interaction present between mean monthly employment income, gender, and age a new variable was created multiplying the gender and age variables. Adding this variable to the model did not change the predictive ability of the model. That is, the adjusted R^2 prior to adding the interaction term was 0.147 and the adjusted R^2 after adding the interaction term was 0.147 indicating that there was no change in the proportion of the variance in the dependent variable explained after the interaction term was added. From this it can be concluded that no interaction was present between mean monthly employment income, gender,

and age; that is, the fact that the sample consisted of more males than females did not influence the finding of a negative age effect.

The finding of this study of negative effects based on smaller centres (lower mean monthly employment income in Edmonton versus Calgary and lower mean monthly employment income in rural Alberta versus Calgary) is also contrary to findings by González. That is, in his study of single and married mothers, González found that "living in a city is associated with slightly lower employment probabilities" (Gonzalez, 2008). However, the finding in this study is aligned more with what one would expect, whereas the finding by González is counterintuitive as cities are generally associated with having greater employment opportunities.

Knowing which personal characteristics impact the level of employment among AISH recipients with schizophrenia can be informative for policy makers. For example, it is helpful to know that those with children earn only slightly more employment income (per child) than those without children. This information can be used to design policies aimed at helping parents obtain employment, therefore allowing them to supplement their income to a greater extent. The same is true for AISH recipients with schizophrenia who are not married or do not have a cohabitating partner – the data supports developing employment related policies targeted at this group of individuals given that, on average, they earn much less than those who are married or have a cohabitating partner. Likewise, knowing that mean monthly employment income is greater for those residing in Calgary relative to those residing in Edmonton and rural Alberta can help make a case for greater employment supports outside of Calgary. However, exploring first if there are good reasons for the differences in employment income would be prudent. For example, are wages in the sectors that typically employ AISH recipients with mental health disorders generally higher in Calgary relative to other parts of the province? Or, is there a lower cost of

living in Edmonton and rural Alberta relative to Calgary thereby justifying the lower level of employment income.

CHAPTER FIVE: CONCLUSION

In Alberta, the Ministry of Seniors administers the Assured Income for the Severely Handicapped (AISH) program. AISH provides financial and health-related assistance to adults who have a permanent disability (including those with SMI) that is severe enough to impair his or her ability to enter the labour market. In recognition of the benefits that arise from competitive employment, AISH encourages its clients to work to the extent that they are able. However, employment income that is earned beyond a set exemption limit does impact AISH recipients' benefits. On July 1, 2008 the upper limits of the employment income exemptions increased by $500 to $1,500 per month for single people receiving AISH and to $2,500 per month for couples, couples with dependent children, and single parents (Government of Alberta, 2010).

This study sought to answer three questions:

1. Did the policy amendment change the level of employment among AISH recipients with schizophrenia?
2. What personal characteristics impact the level of employment among AISH recipients with schizophrenia?
3. Did the policy amendment change the level of employment among AISH recipients with other mental health disorders, excluding schizophrenia?

The findings of this study suggests that the policy amendment did change the level of employment for AISH recipients with schizophrenia, but not in a positive direction (this result was statistically significant at the level $p<0.05$). Likewise, the findings suggests that the policy amendment did change the level of employment for AISH recipients with other mental health disorders, excluding schizophrenia but again not in a positive direction (this result was not statistically significant at the level $p<0.05$ until it was adjusted for gender, marital status, number of children, age, and place of residence). The only exception to the negative findings was for

individuals who were married or had a cohabitating partner. For these individuals the findings suggest that the policy did have the intended impact increasing, on average, mean monthly employment income by 9.5% from the pre-amendment to the post-amendment period (95% confidence interval: 5.8%, 13.2%). Testing if there was a difference in how those with schizophrenia and those with other mental health disorders, excluding schizophrenia responded to the policy amendment revealed that there was no statistically significant difference at the level $p<0.05$.

Marital status, number of children, age, and the first and second dummy covariates for place of residence were all found to be statistically significant predictors (at the level $p<0.05$) of mean monthly employment income for AISH recipients with schizophrenia. The effect was positive for marital status and number of children indicating that, on average, AISH recipients with schizophrenia who were married, had a cohabitating partner, or had children had a mean monthly employment income that was greater than those who were single or did not have children. The regression coefficients for age and the first and second dummy covariates for place of residence (EDM and RURAL) were negative. This suggests that, on average, for AISH recipients with schizophrenia mean monthly employment income decreased for every one year increase in age; similarly AISH recipients who lived in Edmonton or rural Alberta had lower mean monthly employment income relative to those who lived in Calgary.

Knowing that the policy amendment to the AISH program's employment income exemption limits did not have the desired positive effect on the level of employment for AISH recipients with schizophrenia is informative for policy makers. Also, knowing which personal characteristics impact the level of employment among AISH recipients with schizophrenia is also instructive. The findings justify policy makers exploring different approaches to providing

employment related supports to AISH recipients with schizophrenia, for example: 1) lowering the marginal tax rate on employment income to something below 50%, 2) adjusting the amount of employment income that is 100% exempt, or 3) targeting policies at specific groups such as the aged and those who reside outside of Calgary. At a minimum, the findings justify further inquiry in this area, for example: 1) exploring if AISH recipients with schizophrenia generally understand the policies that relate to the program, 2) investigating the functional ability of AISH recipients with schizophrenia to gauge their level of employability, or 3) looking at the demand for the types of labour that AISH recipients with schizophrenia typically provide.

Given the potential benefits of employment for AISH recipients with schizophrenia (improved self-esteem, better controlled psychiatric symptoms, creating a sense of self-empowerment and self-actualization, enhanced treatment compliance, improved functional status in activities of daily living, maintenance of living situation, and improved quality of life), future policy development should take a different approach. The evidence provided through this study, whether it is or is not augmented with additional information (as outlined above), can and should be used to inform different approaches to AISH policy. Indeed, this study provides an evidence base for future social welfare reform and the allocation of scarce resources.

BIBLIOGRAPHY

Australian Government: Australian Public Service Commission. (2007, October 25). *Changing behaviour: A public policy perspective.* Retrieved January 25, 2013, from Australian Government: Australian Public Service Commission: http://www.apsc.gov.au/publications-and-media/archive/publications-archive/changing-behaviour

Averett, S., Warner, R., Little, J., & Huxley, P. (1999). Labor Supply, Disability Benefits and Mental Illness. *Eastern Economic Journal* , 279-288.

Bebbington, P., Angermeyer, M., Azorin, J., Brugha, T., Kilian, R., Johnson, S., et al. (2005). The European Schizophrenia Cohort (EuroSC): A naturalistic prognostic and economic study. *Social Psychiatry and Psychiatric Epidemiology* , 707-717.

Beck, N. (2001). Time-Series-Cross-Section Data: What Have We Learned in the Past Few Years? *Annual Review of Political Science* , 271-293.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How Much Should We Trust Differences-In-Differences Estimates? *The Quarterly Journal of Economics* , 249-275.

Boardman, J., Grove, B., Perkins, R., & Shepherd, G. (2003). Work and employment for people with psychiatric disabilities. *The British Journal of Psychiatry* , 467-468.

Bond, G. R. (2004). Supported Employment: Evidence for an Evidence-Based Practice. *Psychiatric Rehabilitation Journal* , 345-359.

Bond, G. R., Resnick, S. G., Drake, R. E., Xie, H., McHugo, G. J., & Bebout, R. R. (2001). Does competitive employment improve nonvacational outcomes for people with severe mental illness? *Journal of Consulting and Clinical Psychology* , 489-501.

Box, G. E., Jenkins, G. M., & Reinsel, G. C. (2008). *Time Series Analysis: Forecasting and Control.* Hoboken: John Wiley & Sons, Inc.

Bryman, A., Teevan, J. J., & Bell, E. (2009). *Social Research Methods.* Toronto: Oxford University Press.

Canadian Mental Health Association Ontario and Centre for Addiction and Mental Health. (2010). *Employment and Education for People with Mental Illness.* Canadian Mental Health Association Ontario and Centre for Addiction and Mental Health.

Clark, R. E., Dain, B. J., Xie, H., Becker, D. R., & Drake, R. E. (1998). The Economic Benefits of Supported Employment for Persons with Mental Illness. *The Journal of Mental Health Policy and Economics* , 63-71.

Cook, J. A., & Razzano, L. (2000). Vocational Rehabilitation for Persons With Schizophrenia: Recent Research and Implications for Practice. *Schizophrenia Bulletin* , 87-103.

Crowther, R., Marshall, M., Bond, G., & Huxley, P. (2001). Helping people with severe mental illness to obtain work: systematic review. *British Medical Journal* , 204-208.

Dalton, T., & Ong, R. (2007). Welfare to Work in Australia: Disability Income Support, Housing Affordability and Employment Incentives. *European Journal of Housing Policy* , 275-297.

Emery, J. C. H., & Matheson, J. A. (2011). Should income transfers be targeted or universal? Insights from public pension influences on elderly mortality in Canada, 1921-1966. *Canadian Journal of Economics* , 247-269.

Euser, A., Zoccali, C., Jager, K., & Dekker, F. (2009). Cohort studies: prospective versus retrospective. *Nephron Clinical Practice* , 214-17.

Gonzalez, L. (2008). Single Mothers, Welfare, and Incentives to Work. *Labour* , 447-468.

Gordis, L. (2009). *Epidemiology.* Philidelphia: Sanders Elsevier.

Government of Alberta. (2008, July 21). *Alberta News Release.* Retrieved August 2, 2013, from Alberta Human Services: http://alberta.ca/ACN/200807/240414613D6E2-BAE7-B50B-0A409FB89CFA406E.html

Government of Alberta. (2010). *Assured Income for the Severely Handicapped (AISH)*. Retrieved February 9, 2010, from Government of Alberta, Ministry of Seniors and Community Supports: http://www.seniors.gov.ab.ca/AISH/

Henry, A., Lucca, A., Banks, S., Simon, L., & Page, S. (2004). Inpatient hospitalizations and emergency service visits among participants in an Individual Placement and Support (IPS) model program. *Mental Health Services Research* , 227-237.

Institute for Digital Research and Education, UCLA. (2013). *Statistial Computing*. Retrieved May 31, 2013, from Institute for Digital Research and Education, UCLA: http://www.ats.ucla.edu/stat/spss/webbooks/reg/chapter2/spssreg2.htm

Institute for Work & Health. (2009, August). Unemployment and mental health. *Issue Briefing* .

Kendall, J. (2003). Designing a research project: randomised controlled trials and their principles. *Emergency Medicine Journal* , 164-168.

Kooyman, I., Dean, K., Harvey, S., & Walsh, E. (2007). Outcomes of public concern in schizophrenia. *British Journal of Psychiatry* , s29-s36.

Kostol, A. R., & Mogstad, M. (2013). *How Financial Incentives Induce Disability Insurance Recipients to Return to Work.* Cambridge: National Bureau of Economic Research.

Laerd Statistics. (2013). *Multiple Regression Analysis Using SPSS*. Retrieved May 24, 2013, from Laerd Statistics: https://statistics.laerd.com/spss-tutorials/multiple-regression-using-spss-statistics.php

Lehman., A. F. (1995). Vocational Rehabilitation in Schizophrenia. *Schizophrenia Bulletin* , 645-656.

Linhorst, D. (2006). *Empowering People with Severe Mental Illness: A Practical Guide.* New York: Oxford.

Mann, C. J. (2003). Observational research methods. Research design II: cohort, cross sectional, and case-control studies. *Emergency Medicine Journal* , 54-60.

Manning, C., & White, P. (1995). Attitudes of employers to the mentally ill. *Psychiatric Bulletin* , 541-543.

Marden, J. I. (2004). Positions and QQ Plots. *Statistical Science* , 606-614.

McClennen, E. F. (2010). Rational Choice and Moral Theory. *Ethical Theory and Moral Practice* , 521-540.

McGurk, S. R., Twamley, E. W., Sitzer, D. I., McHugo, G. J., & Mueser, K. T. (2007). A Meta-Analysis of Cognitive Remediation in Schizophrenia. *The American Journal of Psychiatry* , 1791-1802.

McQuilken, M., Zahniser, J. H., Novak, J., Starks, R. D., Olmos, A., & Bond, G. R. (2003). The work project survey: Consumer perspectives on work. *Journal of Vocational Rehabilitation* , 59-68.

New Freedom Commission on Mental Health. (2003). *Achieving the Promise: Transforming Mental Health Care in America. Final Report.* Rockville: United States Department of Health and Human Services.

Noble, J. H. (1998). Policy Reform Dilemmas in Promoting Employment of Persons With Severe Mental Illnesses. *Psychiatric Services* , 775-781.

Norman, G. R., & Streiner, D. L. (2008). *Biostatistics: The Bare Essentials Third Edition.* Shelton: People's Medical Publishing House.

O'Day, B., & Killeen, M. (2002). Does U.S. federal policy support employment and recovery for people with psychiatric disabilities? *Behavioral Sciences and the Law* , 559-583.

Organization for Economic Co-operation and Development (OECD). (2005). *OECD Employment Outlook - Increasing financial incentives to work: the role of in work benefits.* Paris: Organization for Economic Co-operation and Development.

Osborne, J. W., & Waters, E. (2002). Four Assumptions of Multiple Regression that Researchers Shoulod Always Test. *Practical Assessment, Research, and Evaluation* , 1-5.

Priebe, S., Warner, R., Hubschmid, T., & Eckle, I. (1998). Employment Attitudes Toward Work, and Quality of Life Among People With Schizophrenia in Three Countries. *Schizophrenia Bulletin* , 469-477.

Roe, B. E., & Just, D. R. (2009). Internal and External Validity in Economics Research: Tradeoffs Between Experiments, Field Experiments, Natural Experiments, and Field Data. *American Journal of Agricultural Economics* , 1266-1271.

Ruggeri, M., Leese, M., Thornicroft, G., Bisoffi, G., & Tansella, M. (2000). Definition and prevalence of severe and persistent mental illness. *British Journal of Psychiatry* , 149-155.

Sevier, F. A. (1957). Testing the Assumptions Underlying Multiple Regression. *The Journal of Experimental Education* , 323-330.

Stapleton, D., O'Day, B., Livermore, G., & Imparato, A. (2006). Dismantling the Poverty Trap: Disability Policy for the Twenty-First Century. *The Milbank Quarterly* , 701-732.

Statistics Canada. (2010, March 23). *Publications: Section 2: Determining labour force status*. Retrieved June 4, 2013, from Statistics Canada: http://www.statcan.gc.ca/pub/71-543-g/2010001/part-partie2-eng.htm

Statitics Canada. (2013, August 2). *Table 1095324, v53857370 Alberta [48]; Unemployment rate, 15 years and over*. Retrieved August 2, 2013, from CANSIM at CHASS: http://dc.chass.utoronto.ca.ezproxy.lib.ucalgary.ca/chasscansim/

Vera-Toscano, E., Phimister, E., & Weersink, A. (2004). Short-term employment transitions of the Canadian labour force: rural-urban differences in underemployment. *Agricultural Economics* , 129-142.

Warner, R. (2000). Supported education for people with psychiatric disabilities: A practical manual. *Psychiatric Rehabilitation Journal* , 3-9.