

# Mental and physical health: reconceptualising the relationship with employment propensity

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## **Abstract**

While there has been significant research demonstrating the labour-market disadvantage experienced by people with mental health and physical disabilities, influential medical concepts of disability continue to shape explanations of such patterns. From this perspective, a higher rate of unemployment for people with health conditions is rational; they are impaired and are inherently less employable. The evidence from this paper challenges such conceptualisations of disability. It adopts a social model of disability and presents an empirical investigation into the impacts of mental and physical health on the propensity to be employed, yet recognises and addresses its distinct limitations in the case of mental health. Our results indicate that activity-limiting physical health and accomplishment-limiting mental health issues significantly affect the propensity to be employed. Further investigations reveal gender and ethnicity divides and that mental health is mostly exogenous to employment propensity. The empirical evidence provides quantitative and qualitative evidence that mental and physical health-related issues lead to economic exclusion.

**Keywords:** Mental health; Physical health; Employment status; Ethnicity; Gender

**JEL Classification:** I1; J29; J16

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## 1. Introduction

It is now virtually accepted in the literature that there is a relationship between employment status and people's health, with striking differences observable in labour-market outcomes between disabled and non-disabled people (Jones *et al.*, 2006). Evidence from contemporary research indicates employment rates of around 32 percent for the disabled community, in contrast to rates of approximately 80.3 percent for individuals without disabilities. Studies have consistently identified a negative impact of disability on labour-market outcomes, and in particular on levels of employment (Blackaby *et al.* 1999; Kidd *et al.* 2000). This relationship has been historically well documented, and on average people in lower socioeconomic groups are found to be less healthy (Fox, 1989; Illsley, 1990). The concept of social exclusion has been used to demonstrate social stratification and the impact that health can have upon individuals' positions within society, not least because of their propensity to be in employment. Blaxter (1990) concludes that the primary cause of the apparent health inequalities along class lines is income inequality, and hence employment status.

This paper examines the relationship between employment propensity and health status. It is an important area of research, as poor health may diminish labour productivity, reduce labour-force participation and impose additional costs on society. There is strong evidence that health and labour-market inequality are inextricably linked, yet understanding the relationship between health and employment is complex for a number of reasons. First, there are two potentially non-mutually exclusive categories of health status that should be considered: physical and mental. Importantly, the direction of the relationship is disputed: while work may impact upon health, so too might an individual's health status impact upon the likelihood of being in employment. This presents further problems as to why health might impact upon employment propensity. Dominant explanations focus on health as a 'medically classified condition' (Oliver, 1990, p. 11) and subsequently the impact of clinical factors on an individual's 'employability'.<sup>1</sup> The key criticism that emerges from orthodox explanations of disadvantage is that the worker attributes valued by employers, and which therefore constitute 'human capital,' are not limited to technical skills and abstract productive capacities. In particular, attributes like race, sex, age, ethnicity and, in this case, disability, which are perceived as irrelevant in the 'logic' of capitalist production, serve to segregate the workforce, and hence represent a source of social and economic exclusion (Bowles and Herbert, 1975; Foster and Fosh, 2010). Arguably, the allocation of workers to jobs, the structure of the jobs available, and the definition of a 'productive' worker, cannot be explained simply by market-mediated matching of people and jobs when it comes to those experiencing poor health. Hence issues of power, exclusion, and ultimately discrimination, are apparent in the absence of these attributes. As a result, a growing disability movement has challenged dominant conceptualisations of disability.

This paper contributes to this literature by exploring the nature of the relationship between labour-market participation and health. Analysis of the link between health status and labour-market activity is strongly influenced by the ability to measure health indicators and, perhaps owing to data limitations, much of the past international literature focuses on *either* physical *or* mental health, and does not control for both. For example, Ojeda *et al.* (2010) analyzed the impact of mental health on labour

supply in the US, but did little to control for the physical health characteristics of the individuals in their sample.<sup>ii</sup> In contrast to many other studies that have used a limited number of health identifiers (Cai and Kalb, 2006; Pelkowski and Berger, 2004; Hamilton *et al.* 1997), which probably capture only one part of the multidimensional health issue, this study makes use of six self-assessed health variables that encompass both physical and mental health status. This paper also makes a contribution to the extant literature by testing the direction of the relationship between mental health and employment propensity.

The remainder of the paper is organized as follows. Section 2 presents a review of the existing theoretical and empirical literature regarding health and labour-market inequality. Section 3 outlines the rich data source, details all six health identifiers that are used in this study and briefly explains the adopted econometric strategies. Section 4 reports the results of the standard models and the tests for endogeneity. Section 5 concludes and reflects upon the implications of the data presented on the conceptualisation of the relationship between health and labour-market participation.

## **2. Conceptualising the relationship between health and labour-market participation**

Prevalence and trends of mental health disabilities at work have been reviewed extensively by Seymour and Grove (2005). They were able to draw out a number of important findings in the existing literature. For instance, Carter (1999) found 10.2 percent of full-time workers were diagnosed with anxiety and/or depression. The Department of Health (2002) found that between 15 and 20 percent of employees would experience some form of mental health difficulty during their working lives, with depression featuring as the largest problem.

In spite of the high numbers of workers behind these percentage figures, the relationships between health status and the labour-market have received relatively poor coverage in the literature and there is an urgent need to fill this significant gap. The limited amount of research that currently exists suggests an association between poor health and both poverty and deprivation. For instance, striking differences in labour-market outcomes can be identified between disabled and non-disabled people (Jones *et al.*, 2006) and studies have consistently identified a negative impact of disability on labour-market outcomes, and in particular on levels of employment (rather than earnings) (Blackaby *et al.*, 1999; Kidd *et al.*, 2000). While patterns of employment in the wider disabled community are relatively well established, the relationships between mental health, physical health and social inequalities are relatively poorly investigated.

The causal direction of these related issues remains a significant moot point, as social disadvantage can be seen as both a cause and a consequence of poor mental and physical health. While the literature suggests that health status and economic exclusion are inexorably linked, this relationship has to date lacked detailed research. Hence it would seem vital to test the claims that health is directly related to disadvantage in the labour-market and, in this case, the propensity to be in work.

There is no doubt that those with disabilities fare poorly in the labour-market when compared with their non-disabled counterparts. However, medical sociologists who

examine inequality as an issue in mental health and psychiatric research are divided in their views as to whether people become poor because they are mentally ill and thus unable to function (social selection) or whether they become mentally ill because of being poor (social causation) (Beresford, 2002). Waddell and Burton's (2006) review of the relationship between work and well-being firmly concludes that there is strong evidence that unemployment is generally harmful to health, by leading to poorer mental health, psychological distress, minor psychological/psychiatric morbidity and general health status.<sup>iii</sup> They also conclude that there is strong evidence that re-employment leads to improved self-esteem, improved general and mental health, reduced psychological distress and minor psychiatric morbidity.

This focus on concepts of social selection and social causation continues to reflect the dominance of an approach underpinned by a concept of impairment. The specific factors perceived as impacting on mental health (in this case, work circumstances) are described as contributing factors to one's social position, while the reverse is also true thereby resembling the conventional 'individualist ... views of health' (Barton, 1993, p. 235). Analysis is still firmly placed on the individual, particularly in terms of the impact of poor mental health on social position. The assumption most commonly made is that exclusion has a negative impact on mental health or that psychologically vulnerable people may be unable to cope with full-time employment (inherently driven by a medical model of mental health). Therefore, the analysis of this relation between health and employment may be built on the presumption that employment status may cause poor health or that poor health may affect employment propensity. This research also tackles this endogenous aspect of the relationship between health and employment. Very few previous empirical studies account for the possibility of such reverse causality, and consequently the debate regarding the flow of causality between various labour-market outcomes and health status is ongoing.

A review of the literature reveals a number of gaps within mental health research. Research on the link between mental health and inequality in the labour-market is sparse, to the detriment of our understanding of those experiencing mental distress. Importantly, understanding of the complex relationship between employment status and health is still in its infancy, particularly when compared with the advances made within the disability studies movement addressing physical illness. The assertion that those experiencing mental health disabilities are economically *excluded* needs empirical and analytical assessment. In addition, the complexity of health has been often overlooked. For instance, Bellaby and Bellaby (1999) investigated the relationship between unemployment and ill-health, and found that increasing levels of unemployment affect job-stress levels and high levels of unemployment impact on self-assessed health. Lewchuk *et al.* (2008) examined the impact of employment on health, and did use physical and mental health variables in an investigation. Their results show an association between characteristics of the employment relationship and health, with weak commitments between employers and employee potentially impacting on the health and well-being of individual workers, their families and on society. Taylor *et al.* (2003) researched occupationally induced ill-health and found that industry-specific effects (in their case call handling in call centres) require radical job redesign. Recent developments in the causality literature include Cai (2009), who confirmed that a better health status has a positive and significant impact on wages, found an insignificant reverse effect from wages to health, and Schmitz (2011), who focused on the link between unemployment and mental health and found no evidence

of a reverse impact. At the very least, this adds weight to the argument that individuals' health status has a direct impact on their positions within the labour-market. This paper also contributes to this part of the literature by assessing the endogeneity of mental health and employment propensity across gender and ethnicity, and engages in the explanations for subsequent labour-market experiences.

Controversy remains over the strength of the relationships. For example, Grove *et al.* (2005) argued that workplace discrimination, a lack of workplace accommodation and limited workplace support for those with health conditions are stronger predictors of individuals' ability to maintain employment than their health status. Anthony *et al.* (1995) demonstrated that a diagnosis of poor mental health is not a reliable predictor of work capacity but may predict the likelihood of being in employment. The necessary conclusion is that people experiencing health problems face a number of barriers to gaining meaningful employment, which are unrelated to the medical impact of poor health on the individual. This is not to deny that social disadvantage causes mental distress, or that poor mental and physical health represents an impairment or barrier in itself to accessing the labour-market. However, social disadvantage is both a cause and a consequence of poor health (Horwitz and Scheid, 1999) and health in all its forms is intrinsically social. This is reflected in the current efforts to promote social inclusion among those with poor mental and physical health, on the basis that they are among the most excluded in society (Social Exclusion Unit, 2004).

Furthermore, the links between employment propensity and both physical and mental health cannot easily be generalised across a population. The mechanisms by which a range of health indicators affect individuals may depend on their gender, ethnicity and other demographic and socio-economic characteristics. This concept of multiple disadvantages is relatively well rehearsed within feminist sociology and the recent literature regarding intersectionality (see Durbin and Conley, 2010) yet health is rarely considered. Although previous studies have focussed on a range of covariates (including education, experience, training and individual characteristics) and their impacts on labour-market activity, few have accounted for measures of both physical and mental health. This paper also fills this gap in the literature.

### **3. Data**

There is a significant gap in the literature in terms of a lack of studies that focus on the effects of mental *and* physical health on employment propensity. Although many studies do analyse one or the other health status in various countries, no study has attempted to appreciate the *multidimensional* impacts of health on employment propensity. The primary reason for a lack of such an analysis is the availability of data.

New Zealand (NZ) appears to be similar to many other developed countries in that she has a growing awareness of the importance and consequences of physical and mental illness.<sup>iv</sup> For instance, the Mental Health Commission (which is tasked with promoting mental health awareness and advocating the needs of the mentally ill) and the District Health Boards have recently been provided with additional funding from the government, with the aim of improving mental health.<sup>v</sup>

The data used in this study are from the New Zealand General Social Survey 2008 (NZGSS), which is a relatively new source of information on physical and mental health characteristics.<sup>vi</sup> It provides data on a wide range of social and economic outcomes of individuals aged 15 years and over. This multidimensional survey was carried out between April 2008 and March 2009 and a total of 8,721 people were interviewed regarding several aspects of their lives, such as education, paid work, income, social relationships and health. Respondents were randomly selected using a multi-stage sample design and interviewed face-to-face. In our final sample, respondents above the age of 65 were excluded to enable a focused analysis on the working-age population of NZ.

For the purpose of our study, the outcome variable of interest, and our dependent variable in the upcoming empirical analysis, is the employment status of the individual. This employment variable, the six health status indicators, and the other covariates used in our analysis are described in Table 1.<sup>vii</sup>

< Insert Table 1 about here >

There are three physical health indicators (Health limiting, Pain and Energy) and three mental health indicators (Depression, Health social, Health accomplishment). All six variables have been coded in an analogous fashion (ordinal categorical variables ordered from one to five) such that the higher the value of the variable, the worse the health of the individual. For example, a value of five for the Health-limiting variable signifies that, during the past four weeks, the respondents felt that they were limited *all of the time* in their regular daily activities as a result of their physical health. Similarly, a value of five for the Health-social variable indicates that, during the past four weeks, the respondents felt that emotional problems interfered with their social activities *all of the time*. *A priori* reasoning of the effect of all six health variables on employment propensity suggests that their expected signs should all be negative.<sup>viii</sup>

There is the possibility of overlap between these physical and mental health variables which can best be illustrated with an example: suppose that the interviewee was asked the question relating to the pain variable. Depending on the issues that the respondent had experienced recently, (s)he could mistake the motive for the question as either physical pain or emotional pain.<sup>ix</sup> Table 2 presents the correlation coefficients across all six health variables, as well as the employment status variable. The highest correlation is between depression and accomplishment, at 0.600, which can both be considered as mental health issues. As would be expected, all physical health variables are positive correlated, and the same is true for mental health variables. Also of interest is that all health variables are negatively correlated with employment status, suggesting that, from a non-causal perspective, unemployment is positively correlated with poorer physical and mental health status.

< Insert Table 2 about here >

In terms of the descriptive statistics provided in Table 1, some interesting patterns are immediately evident. First, in comparison with males, females' health perceptions are worse across all facets of physical and mental health (bar the energy variable), which is consistent with several previous studies on the topic of self-rated health (Green and Pope, 1999; Parslow *et al.*, 2004).<sup>x</sup> This gender difference is most visible when

investigating self-rated reports of mental health, and particularly psychological distress (Gove and Tudor, 1973; Chesler, 1971). Previous research investigating gender differences in physical illnesses show a more convoluted story. For instance, while morbidity rates tend to be higher for women (Marcus and Siegel, 1982), mortality rates and serious incapacitations are found to be higher for men (Verbrugge, 1976; Gove and Hughes, 1979).

While many arguments have been advanced to explain why women report having poorer health than men, there are two that have become most prevalent in recent debates. First, the perception-reporting hypothesis states that the differences are due to perceptual differences, such as women being more aware of their symptoms and being more likely to recall and report them (Gijbbers van Wijk and Kolk, 1997). On the other hand, the 'social construction of gender' hypothesis suggests that the differences stem from relative social roles and expectations regarding labour force participation patterns (Anson *et al.*, 1993). For example, when Verbrugge (1989) accounted for the lower rate of paid labour involvement and the greater stress and unhappiness that women tend to feel, gender differences in morbidity disappeared.

Another pattern which emerges from Table 1 is that, while it appears that most New Zealanders rated their different aspects of health status relatively well (evidenced by mean values closer to unity, rather than five), the energy variable again seems to stand out as being different. Specifically, all other health variable means range from 1.429 to 1.742, whereas the Energy variable has means of 3.682 and 3.501 for males and females, respectively.

In terms of the remaining descriptive information in Table 1, the sample is fairly evenly divided along the gender line (46.4% male) and there are three distinct ethnic groups (Maori, Pacific Islanders and NZ European – also termed Pakeha in much NZ literature). Since the early 1990s, Statistics NZ has moved away from prioritising ethnicity data and instead affords respondents the opportunity to co-select a number of ethnicities to describe their background; consequently, the sum of the ethnic groups surpasses 100%. This is truly reflective of the culturally diverse backgrounds in NZ and is the reason why Statistics NZ continues to emphasize the need to maintain multiple ethnicity responses in many of their surveys (Statistics NZ, 2005).

Also of importance is the percentage of respondents who are employed. Table 3 presents percentages of respondents split by gender and ethnicity. There are asymmetries in employment propensity across ethnicity and gender. The highest employment propensity is for NZ European males, where nearly 86 percent were in employment; this contrasts strongly with Pacific Islander females, where fewer than 57 percent were in employment.<sup>xi</sup>

< Insert Table 3 about here >

### *Modelling approaches*

In its simplest form, whether an individual is in employment or not can be represented by a dichotomous variable taking a value equal to 1 (one) if the individual is employed and a value of 0 (zero) otherwise. Econometric modelling of the determinants of employment in this sense will require a limited dependent variable

approach. We apply the standard probit and logit modelling approaches, and standard textbooks illustrate that the probit and logit approaches assume that, when the probability of success (i.e. being employed) is equal to 0.5, then the results are most sensitive to changes in the values of independent variables. However, if the probabilities under scrutiny have slightly different sensitivity values, as are the probabilities of being employed across ethnicities and gender, as illustrated in Table 3, then a skewed limited dependent variable approach may be more appropriate, such as the scobit (sometimes called skewed logit) approach.<sup>xii</sup>

All three limited dependent variable approaches will be applied in the econometric estimation process presented below. Probits will be employed because of the underlying assumption that the cumulative distribution is normal. Logits will be employed because, although the underlying distribution assumes a logistic distribution, this approach permits greater interpretation through the use of odds-ratios.<sup>xiii</sup> Finally, scobits are employed because of the potential for the effects of the variables to be more sensitive at different points in the distribution to differences in ethnicities and gender.<sup>xiv</sup> The application of all three approaches can be seen as an attempt to identify whether the effects of explanatory variables on the employment decision are sensitive to the econometric functional form.

Finally, although the application of probit estimations may seem slightly constraining, owing to its underlying cumulative normal distribution and relatively problematic interpretation, tests for exogeneity through the use of instrumental variables can be relatively easily executed with probits and be used to inform us whether the assumption that health is exogenous to employment status can be rejected.

#### **4. Results**

Tables 4 and 5 present the results for the full sample and the gender sub-samples, respectively. Initially we present the results of the models with only the physical health variables included and then subsequently add the physical and mental health variables. As can be seen from Table 4, the omission of mental health variables inflates the magnitudes of the effects of the physical health variables, suggesting the exclusion of mental health variables in such equations may result in important omitted-variable bias.

< Insert Table 4 about here >

< Insert Table 5 about here >

It is important to recognise the stability of results across all three modelling approaches and sub-samples; note, for example, the positive impact on employment propensity if the individual is male, the inverted-U shaped effect of age, and the negative impact of all ethnicities (Maori, Pacific Islanders and others) relative to the control group of NZ European. Specifically, the logit model illustrates that Maoris are approximately 53 percent less likely to be employed (odds ratio of 0.654) relative to NZ European. This negative and highly statistically significant effect is also stronger for male versus female Maoris (odds ratios of 0.562 versus 0.674, respectively).

Many of the other covariates also yield expected results. For example, a child present in the household significantly reduces the employment propensity of the individual,



and this impact is much stronger for females than for males. Having a partner increases the probability of being employed and, in general, the higher the educational attainment, the better the chance of being employed.

Turning our attention to the health variables presented in Table 4, all six variables have the expected negative effect on employment status, in terms of the whole sample. However, not all health-related variables have an impact on employment status when referring solely to their statistical significance. The two variables with the strongest effects are health-limiting and health-accomplishing, which are both statistically significant at the 1 percent level. According to the odds ratios that are the result of our fitted model, a one-unit increase in the health-accomplishing variable would reduce the employment propensity by 18 percent on average for the whole sample (approximately 11 percent and 22 percent for males and females, respectively). Similar results for health-limiting are obtained where a one-unit increase in the health-limiting variable is associated with a reduction of employment propensity by 38 percent on average for the whole sample (approximately 61 percent and 25 percent for males and females, respectively). These results indicate the importance of both physical and mental health issues for employment status.

The presence of a mental health issue reduces the probability of being employed; for the full sample, the strongest effect appears to be attributable to the health accomplishing variable. If associated active labour-market policy were implemented for the whole population, then it appears that providing emotional support to those reporting mental health issues may result in enhanced accomplishment and an increased probability of being employed. Furthermore, employers must be supported in understanding the accommodations and workplace adjustments needed to ensure that those with health conditions are able to maintain employment.

Moreover, based on the generalised results for the whole sample, it appears that poor mental health has an important impact on labour-market outcomes, in addition to physical health issues. There is evidence via the scobit results, which indicate that all three mental health issues have statistically significant effects on employment propensity, yet the same cannot be said for the physical health variables. These results suggest that, from a policy perspective, improving mental health awareness is of vital importance when attempting to improve labour-force participation.<sup>xv</sup>

Some results that are worthy of further investigation. For instance, although the physical health-limiting issue is consistently statistically significant across all results, the health-accomplishing issue appears to be less important for males. Also, there is evidence that pain influences the female employment propensity but the same finding is not confirmed for males, and there appears to be no statistically significant role for energy. In general, males' employment propensity appears to be hindered significantly by only one of the health variables: physical health-limiting. In contrast, the probability of being employed for women is significantly negatively influenced by three health aspects: physical health-limiting, physical pain and mental health-accomplishing. These findings illustrate the importance of investigating gender differences with respect to the relationship between health and labour-market activity. Research by Pelkowski and Berger (2004), which focussed on wages rather than employment propensity in the United States, also found evidence to suggest that poor health conditions had a larger negative impact on females rather than males. Research

from Europe by Gambin (2005) concentrated on physical health and their results showed self-assessed general health as having a greater impact on men's wages, while chronic health conditions in particular had more of an effect on women's wages. Similarly, an Australian study by Cai and Kalb (2006) found better health increased labour-market participation more for women and older age groups. Again, there is a variety of theoretical explanations for such patterns. However, the data do provide evidence that women may face 'double discrimination' in the labour-market.

#### *Gender and ethnicity demarcations*

Tables 6 and 7 present results further disaggregated by ethnicity and split between males and females, respectively.<sup>xvi</sup> Table 6 reveals that there is an asymmetry across ethnic backgrounds in terms of the effect of health variables on employment propensity. The empirical evidence suggests that Maori and European males' employment propensity is adversely affected by health-limiting physical issues. Although similar coefficients and odd ratios are found for Pacific Islander males, the results are not statistically significant; future research could address this issue.<sup>xvii</sup>

< Insert Table 6 about here >

Of particular interest is the mental health variable capturing depression. While it was weakly statistically significant for the whole sample (under the scobit specification), it was not significant when looking at the gender sub-samples in Table 5, even though it was more negative for males relative to females. However, Table 6 reveals the individual characteristic that was driving the negative impact of depression on males' employment status: Pacific Islander ethnicity. Specifically, for male Pacific Islanders, the logit and scobit odds ratios indicate that a one-unit increase in the depression variable would result in 114 percent and 72 percent increases in their propensity not to be employed, respectively. Jensen *et al.* (2005) also found that the likelihood of employment of people within the Pacific ethnicity category was more affected by disabilities (which included experiencing mental illness) than either Maori or NZ European.<sup>xviii</sup> In terms of international evidence on mental health issues impacting on employment propensity dissimilarly across ethnicities, the limited evidence available is mixed. While Chatterji *et al.* (2007) found significant negative associations between being employed and psychiatric disorders for Latinos, their figures were comparable to similar studies conducted in the United States on mostly white samples. However, the impact on the probability of employment was found to be larger for Latinos in comparison to Asians. Research by Ojeda *et al.* (2010) also focussed on the impact of mental distress on employment (namely, labour supply) and, although their results were not strictly ethnic based, they did compare immigrants with U.S. born citizens and found that there was an insignificant difference in the likelihood of being employed between healthy immigrants and those affected by mental illness. Future research should further investigate the likelihood of ethnic minorities being more at risk of encountering mental health issues, and, in particular, the mechanisms by which these issues would impact on their labour-market activity.

Table 7 presents comparable results for females. They corroborate the effect of the health-limiting physical issue on employment propensity, and with it having different strengths across ethnicities, albeit with a smaller negative effect for females than for males. There is no statistically strong evidence that depression has an adverse effect

on employment propensity for females. However, there is evidence that female employment propensities are significantly influenced by the limiting effects of mental health for different reasons across ethnicities. For instance, the social-limiting health effect is particularly strong for Pacific Islander females but is non-existent for Maoris. Although the odds ratios suggest similar effects of health-accomplishing on employment propensity across ethnicities, they are only highly statistically significant for Maoris and Europeans. Further research should investigate whether similar effects are present across different ethnicities in other countries.

< Insert Table 7 about here >

### *Endogeneity*

The results presented above implicitly assume that the direction of causality is from health to employment status. This assumption may be incorrect if being in employment reduces the severity of mental and physical health issues or if being unemployed accentuates an individual's physical or mental health status. Although this issue has not been the focus of a substantial amount of empirical research, three recent contributions to this literature are noteworthy. Cai's (2009) results illustrate that better health status positively impacts on wages and he finds no evidence of a reverse effect from wages to health. In contrast, when Cai (2010) conducts similar research in terms of labour-force participation, he finds that the reverse effect from labour-force status to health was different across the genders. In particular, his results indicate that there is a negative and strong reverse effect for males, and a positive and weakly significant reverse effect for females. Schmitz (2011) also attempts to investigate the causal effect of labour-force status (specifically, unemployment) on health and finds no evidence of the reverse impact that unemployment influences mental health.

Instrumental variable probit regression is an econometric method that permits the investigator to identify empirically whether there is the statistical presence of endogeneity of specific explanatory variables. The statistical validity of the results from instrumental variable regressions rest, at least in part, on the appropriateness of the instrument. While the NZGSS does provide a wide range of variables, our inspection did not provide us with a variable that would convincingly be correlated with *physical* health status and, at the same time, uncorrelated with employment status and hence the errors. Nevertheless, our examination of the data did provide us with a variable that could be employed as an instrument for *mental* health, called *Calm*, as described in Table 1.

Our selected instrumental variable for mental health corresponds to whether the respondent felt relatively calm and peaceful during the last four weeks. In order to examine this endogeneity issue a new variable was created with a value equal to 1 (one) if there was at least one mental health issue indicated by the respondent, and equal to 0 (zero) otherwise. This variable was then instrumented by *Calm*. Note from Table 2 that the absolute values of the correlations between *Calm* and the mental health-related variables range between 0.37 and 0.41, but that the correlation between *Calm* and Employment is only 0.07. A further consideration behind the justification of this instrumental variable selection of *Calm* is based on the supposition that calmer people are no more or less likely to be employed than less-calm people. Although

there are reasons to suggest that a person's calmness may be related *to the industry* in which (s)he self-selects and becomes employed,<sup>xix</sup> to the authors' knowledge the extent of being calm is not necessarily related to the selection into or out of employment *per se*.

Given the difficulty in selecting an instrumental variable, the subsequent regressions conducted below require the instrument to be appropriate for *all* mental health variables. Accordingly a variable is constructed, *Mental Health*, which is equal to 1 (one) if the individual states that (s)he has any of the three mental health issues (Depressed, Health social, Health accomplishing) and equal to 0 (zero) otherwise. This variable is then instrumentalised with *Calm*. Given this transformation of three variables into one, the aforementioned results in Section 4 and the instrumental variable probit results that follow are not strictly comparable. Nevertheless, the main purpose of this sub-section is to attempt to identify whether mental health issues are exogenous to employment under the fitted model.

Application of the instrumental variable probit regressions to the full sample, and for males and females separately, are presented in Table 8. The corresponding Wald statistical tests (see Wooldridge, 2002, pp. 472-477), where the null hypothesis is that the mental health variable is exogenous to employment, are provided at the bottom of the table. They are never significant at the 5 percent significance level, indicating that we cannot reject this null hypothesis at traditional levels of statistical significance.<sup>xx</sup> Given the important gender-ethnicity issues revealed above, we re-estimated the instrumental variable models for each sub-group and present only the Wald test statistics in Table 9 for brevity. It is reassuring to note that the cautious conclusion of exogeneity of mental health related issues from employment probabilities is sustained across all the sub-groups demarcations; the only exception is for Pacific Islander males at the 5 percent significance level, although this may be a result of the small sample size ( $N = 169$ ), suggesting that a low employment propensity may cause mental health-related issues. Thus, the majority of this empirical evidence suggests that mental health is not endogenous to employment propensity.<sup>xxi</sup> Such evidence corroborates similar results of Cai (2009) and Schmitz (2011) that health status is exogenous to wage and unemployment status, respectively.

< Insert Table 8 about here >

< Insert Table 9 about here >

### *Discussion*

This paper has presented an extension of the literature by considering the effects of both physical *and* mental health issues on the propensity of being employed, yet theoretical explanations for such relationships remain the subject of some significant controversy. The dual labour-market approach deals with discrimination as a factor in labour-market segmentation, although it does not provide a special theory on discrimination (Kirton and Greene, 2000) or specific health aspects. Theoretically, it resembles underclass arguments and proposes that the 'life-styles' of workers may make them prone to occupying certain jobs, thereby maintaining elements of orthodox explanations for labour-market differences between groups, as is apparent in the concept of the benefits trap. Such theory usefully identifies that the labour-market is

segmented but predominantly relies upon derivatives of human capital theory to explain such continued outcome differences.

In response, authors such as Reich, Bowles and Gintis, and Edwards presented considerably more radical challenges to the conventional approaches to labour-market theory. For such writers the continuing importance of groups in the labour-market remains poorly explained and cannot be predicted by orthodox theory (Reich *et al.*, 1972); they accordingly presented a number of key questions, including:

- Why is the labour force in general still so fragmented?
- Why are group characteristics (in our case mental and physical health-related) so important in the labour-market?

In reply to the inherent limitations and failures of orthodox labour-market theory in answering these questions, such writers presented a more explicit critique of capitalism, with strong ties to Marxian dialectical analysis, thereby offering a more radical and critical theory of a dual labour-market. They placed more emphasis on historically rooted class-based motivations of behaviour and argued that:

Political and economic forces within American capitalism have given rise to and perpetuated segmented labour markets, and ... it is incorrect to view the sources of segmented markets as exogenous to the economic system. (Reich *et al.*, 1972, p. 360)

Here, labour-market segmentation is defined as the historical process whereby political and economic forces encourage the division of the labour-market into separate sub-markets, or segments distinguished by different labour-market characteristics and behavioural rules. Hence, from this Marxist perspective, employers are presented as consciously exploiting race and ethnicity to undermine union strength and thereby creating dual labour-markets. Evidence of such strategies is identifiable within the UK in the 1940s and 1950s immigration legislation and the use of migrant workers as a reserve army of labour in low-paid and low-skilled employment. From this perspective, labour-market segmentation is intimately related to the dynamics of monopoly capitalism because it facilitates the operation and perpetuation of capitalist institutions and causes inequality and lower wages in the labour-market.

In addition to such explanations of discrimination, a broad range of alternative sociologically informed theories of discrimination has been developed. In relation to mental health, this set of theories has predominantly focused on stigmatization and labelling theory (see Goffman, 1963) and, more generally, these have focused on issues of social identity and stereotyping. Jenkins (1996, cited in Kirton and Greene, 2000) states that the concept of social identity has been apparent within philosophy for many hundreds of years but it has been used predominantly in the explanation of the subordinate position of women since the rise of radical women's movements in the 1960s (Giddens, 1998). Concepts of social identity have given rise to patriarchal theories of discrimination that are informed by criticisms of the gendered nature of the labour force presented by Marxist theory. Such theory rejects economic variables at the heart of both orthodox and segmented labour-market theory and instead focuses on the social construction of discrimination and disadvantage. Despite criticism (see Pollert, 1996) such an approach has enabled the analysis of societal attitudes on the

exclusion of groups in society. However, explanations of the relationship between employment status and health, and particularly mental health, continues to be underdeveloped. Further research is required but adopting a ‘social model’ may provide a solution to many of the limitations of dominant explanations for the relationships identified (Barnes, 2010).

The data presented and analysed above have clear policy implications. Policy drawn from empirical studies of whole populations will not identify the nuances that are present between sub-groups of the population. For example, the above results suggest that the effects of depression and health-social on the probability of being employed is greater for Pacific Islander males and females, respectively, than for other social groups, and that health-accomplishing factors are much stronger for Maori and NZ European females than for corresponding males. However, the majority of extant policy responses have tended to use broad homogenous definitions of disability which fail to recognise the complexity of health and ill health. While the causes of social exclusion may be structural, the attitudes, activities and policies of governmental bodies are integral to the continuation or otherwise of this exclusion – for example, Conservative free-market ideology and the related policies arguably eroded the citizenship rights of individuals by supporting organisational power (Mandanipour *et al.*, 1998). This is a multidimensional and complex issue but understanding it is vital in order to inform appropriate strategies to reduce or tackle social exclusion.

From the perspective of health, the social model of disability presents an opportunity to identify the ‘sites and the mechanisms of institutionalised oppression’ (Mulvany, 2000, p. 585). This approach provides a framework from which we can analyse the relevance of both legislation and social policy from the perspective of people with mental health disabilities. It has been a central tenet of disability writers (such as Barnes and Oliver, 1995; Barnes, 2010) to draw out the implications of their analysis for existing and future developments in policy. In addition, this approach provides a framework by which to analyse the success of existing legislation in terms of its potential for social change in addressing the exclusion of particular groups – in this case, on the basis of health status. Finally, it highlights the pressing need for accommodation and adjustment to the workplace to ensure fair access to employment (Foster, 2007).

Several methodological issues also emerge. This study splits mental and physical health issues into clear and separable issues. This may not be the case for some, as physical impairment may affect mental issues; for example, physical constraints may result in depression if individuals are unable to participate fully or be included in activities with others. The reverse effect (from mental to physical health) is also possible, such as when depression results in low energy levels. Moreover, there may be a circularity issue, whereby, for example, depression results in lower energy levels, which then result in greater depression. Further research should continue to disentangle the relationship between physical and mental health in order to identify their separate and combined effects on employment propensity.

Finally, our evidence suggests that estimations of the effects of physical health variables on the probability of being employed are affected by omitted-variable bias attributable to the exclusion of mental health variables – in other words, it appears that

the importance of various issues on employment propensity are biased if we ignore the roles that mental health issues can have on employment propensity.

## 5. Conclusions

This paper has presented an investigation into the impacts of mental and physical health issues on employment propensity across gender and ethnicity. As far as we are aware, this is the first paper to explore the effects on employment of both health issues simultaneously.

The econometric results illustrate that both mental and physical health issues significantly affect employment propensity. Labour-market participation is a key predictor of economic participation and consequently poverty. The evidence presented here demonstrates that health, both physical and mental, impacts upon an individual's likelihood of being in employment. However, little evidence of reverse causality was found. The results were consistent across different limited dependent variable model specifications.

In general, the results emphasise three important themes. First, across all ethnicities, there is a substantial impact of the physical health-limiting variable for males. Future research should focus on what specific type of physical health problems this variable encompasses and their severity. For example, it would be useful to know whether this variable signifies more short- or long-term physical ailments and consequently the likely barriers to participating in the labour-market for males. Second, there is a considerable impact of mental health issues (in particular, health-accomplishing) on employment of females. Again, the direction for future work should be to investigate the mechanisms by which females' labour-market activities are more affected by mental health problems in comparison to males. Third, depression has a sizeable negative effect on employment propensity, and this was especially statistically significant in our sample for Pacific Island males.

Our results strongly suggest that health status influences employment status, but there is also the theoretical possibility that causality in only this direction is incorrect. Instrumental variable probit regression was applied to test for this endogeneity, and the results indicated that the direction of causality, at least for mental health status, was from health to employment. Awareness that mental and physical health issues influence different groups in society in different ways should lead to more appropriate policy.

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**Table 1: Descriptive statistics**

Variable	Definition	Mean (Standard deviation)		
		All	Males	Females
Employed	Dummy variable: 1 for employed; 0 otherwise.	0.775 (0.418)	0.839 (0.367)	0.718 (0.450)
Health limiting	Question: During the past four weeks, how much of the time were you limited in the kind of work or other regular daily activities you do as a result of your physical health? Categorical variable: 1 = none of the time; 2 = a little of the time; 3 = some of the time; 4 = most of the time; and 5 = all of the time.	1.521 (0.967)	1.474 (0.936)	1.563 (0.991)
Pain	Question: During the past four weeks, how much did pain interfere with your normal work including both work outside the home and housework? Categorical variable: 1 = not at all; 2 = a little bit; 3 = moderately; 4 = quite a bit; 5 = extremely.	1.729 (1.134)	1.713 (1.118)	1.742 (1.147)
Energy	Question: How much of the time during the past four weeks did you have a lot of energy? Categorical variable: 1 = all of the time; ..., 5 = none of the time.	3.586 (0.912)	3.682 (0.881)	3.501 (0.930)
Depressed	Question: How much of the time during the past four weeks have you felt downhearted and depressed? Categorical variable: 1 = none of the time; ..., 5 = all of the time.	1.680 (0.902)	1.620 (0.876)	1.733 (0.920)
Health social	Question: During the past four weeks, how much time has your physical health or emotional problems interfered with your social activities, such as visiting friends, relatives, etc. Categorical variable: 1 = none of the time; ..., 5 = all of the time.	1.487 (0.917)	1.429 (0.875)	1.538 (0.948)
Health accomplishing	Question: During the past four weeks, how much of the time have you accomplished less than you would like as a result of any emotional problems, such as feeling depressed or anxious? Categorical variable: 1 = none of the time; ..., 5 = all of the time.	1.541 (0.887)	1.490 (0.860)	1.585 (0.906)
Maori	Dummy variable: 1 = Maori; 0 otherwise	0.131 (0.337)	0.121 (0.326)	0.139 (0.346)
Pacific Islanders	Dummy variable: 1 = Pacific Islander; 0 otherwise	0.053 (0.224)	0.055 (0.228)	0.051 (0.219)
NZ European	Dummy variable: 1 = NZ European; 0 otherwise	0.812 (0.391)	0.818 (0.386)	0.806 (0.396)
Other ethnicities	Dummy variable: 1 = Ethnicities other than Maori, Pacific Islander and NZ European; 0 otherwise	0.072 (0.259)	0.067 (0.250)	0.077 (0.267)
Male	Dummy variable: 1 = Male; 0 = Female	0.464 (0.499)	-	-
Children	Dummy variable: 1 = presence of children in household; 0 otherwise	0.433 (0.496)	0.406 (0.491)	0.457 (0.498)
Older children	Dummy variable: 1 = presence of adult children in household; 0 otherwise	0.076 (0.265)	0.078 (0.268)	0.075 (0.263)
Partnered	Dummy variable: 1 = non-partnered; 0 = partnered	0.586 (0.493)	0.617 (0.486)	0.559 (0.497)
Qual Cert	Dummy variable: 1 = highest educational qualification is a school certificate; 0 otherwise	0.458 (0.498)	0.490 (0.500)	0.429 (0.495)
Qual Diploma	Dummy variable: 1 = highest educational qualification is a post-school Diploma; 0 otherwise	0.132 (0.338)	0.106 (0.308)	0.154 (0.361)
Qual Degree plus	Dummy variable: 1 = highest educational qualification is at least a degree; 0 otherwise	0.082 (0.274)	0.077 (0.267)	0.085 (0.279)
Calm	Dummy variable: 1 = if the respondent has felt calm and peaceful in the last four weeks some, most or all of the time; 0 = otherwise	0.650 (0.477)	0.684 (0.465)	0.620 (0.485)
<i>Sample size</i>		<i>6737</i>	<i>3130</i>	<i>3607</i>

**Table 2: Health variables correlations**

	Health Limiting	Pain	Energy	Depression	Health Social	Health Accomplishing	Employed	Calm
Health Limiting	–	–	–	–	–	–	–	–
Pain	0.463	–	–	–	–	–	–	–
Energy	0.396	0.272	–	–	–	–	–	–
Depression	0.269	0.189	0.344	–	–	–	–	–
Health Social	0.481	0.332	0.403	0.496	–	–	–	–
Health Accomplishing	0.351	0.204	0.350	0.600	0.534	–	–	–
Employed	-0.202	-0.112	-0.128	-0.144	-0.172	-0.177	–	–
Calm	-0.188	-0.148	-0.383	-0.409	-0.324	-0.373	0.070	–

**Table 3: Percentage employed**

	All	Males	Females
All	77.46	83.94	71.83
NZ European	80.14	85.92	75.05
Maori	65.99	72.63	60.99
Pacific Islanders	65.27	74.14	56.83

**Table 4: Regression results for whole sample**

Variable	Probit		Logit				Scobit			
			OR		OR		OR		OR	
<i>N</i>	6753	6737	6753		6737		6753		6737	
Health limiting	<b>-0.228**</b> (0.021)	<b>-0.190**</b> (0.022)	<b>-0.386**</b> (0.036)	0.680	<b>-0.322**</b> (0.038)	0.725	<b>-0.260**</b> (0.037)	0.771	<b>-0.220**</b> (0.035)	0.803
Pain	-0.029 (0.018)	-0.022 (0.018)	-0.053 (0.031)	0.948	-0.041 (0.032)	0.961	-0.029 (0.020)	0.971	-0.021 (0.021)	0.979
Energy	<b>-0.077**</b> (0.022)	-0.028 (0.023)	<b>-0.138**</b> (0.038)	0.871	-0.056 (0.040)	0.946	<b>-0.076**</b> (0.027)	0.927	-0.026 (0.026)	0.975
Depressed	-	-0.049 (0.026)	-	-	-0.082 (0.044)	0.922	-	-	<b>-0.060*</b> (0.030)	0.941
Health social	-	-0.045 (0.025)	-	-	-0.074 (0.043)	0.929	-	-	<b>-0.053*</b> (0.029)	0.948
Health accomplishing	-	<b>-0.095**</b> (0.026)	-	-	<b>-0.165**</b> (0.045)	0.848	-	-	<b>-0.100**</b> (0.033)	0.904
Male	0.418** (0.038)	0.418** (0.039)	0.707** (0.068)	2.029	0.709** (0.068)	2.033	0.466** (0.069)	1.608	0.475** (0.068)	1.608
Age: 15-19 years	-0.579** (0.087)	-0.610** (0.087)	-0.953** (0.148)	0.385	-1.006** (0.149)	0.366	-0.696** (0.114)	0.476	-0.743** (0.118)	0.476
20-24 years	-0.076 (0.090)	-0.091 (0.090)	-0.124 (0.156)	0.884	-0.144 (0.157)	0.866	-0.085 (0.097)	0.900	-0.105 (0.100)	0.900
25-29 years	-0.041 (0.083)	-0.039 (0.084)	-0.077 (0.145)	0.926	-0.066 (0.146)	0.936	-0.038 (0.089)	0.960	-0.041 (0.092)	0.960
30-34 years										
35-39 years	0.267** (0.078)	0.276** (0.079)	0.473** (0.138)	1.605	0.496** (0.139)	1.642	0.281** (0.093)	1.342	0.294** (0.095)	1.342
40-44 years	0.338** (0.080)	0.339** (0.080)	0.595** (0.142)	1.813	0.599** (0.143)	1.820	0.360** (0.098)	1.445	0.368** (0.100)	1.445
45-49 years	0.301** (0.081)	0.305** (0.081)	0.540** (0.144)	1.717	0.543** (0.145)	1.722	0.317** (0.098)	1.392	0.330** (0.100)	1.392
50-54 years	0.117 (0.084)	0.105 (0.085)	0.200 (0.149)	1.221	0.185 (0.149)	1.204	0.130 (0.090)	1.121	0.114 (0.093)	1.121
55-59 years	-0.119 (0.087)	-0.131 (0.088)	-0.193 (0.154)	0.824	-0.209 (0.155)	0.811	-0.139 (0.093)	0.854	-0.158 (0.096)	0.854

60-64 years	-0.508** (0.083)	-0.535** (0.084)	-0.882** (0.144)	0.414	-0.925** (0.145)	0.397	-0.538** (0.116)	0.555	-0.589** (0.119)	0.555
Children	-0.475** (0.046)	-0.480** (0.047)	-0.850** (0.082)	0.427	-0.854** (0.083)	0.426	-0.501** (0.092)	0.592	-0.525** (0.091)	0.592
Older children	0.008 (0.074)	-0.003 (0.075)	-0.009 (0.132)	0.991	-0.027 (0.132)	0.974	0.021 (0.079)	1.006	0.006 (0.081)	1.006
Partnered	0.366** (0.041)	0.322** (0.042)	0.637** (0.072)	1.890	0.560** (0.073)	1.751	0.391** (0.069)	1.428	0.356** (0.064)	1.428
Smoker	-0.123* (0.044)	-0.099* (0.045)	-0.214* (0.077)	0.807	-0.170* (0.078)	0.844	-0.132* (0.052)	0.891	-0.116* (0.052)	0.891
<i>Control variable</i>										
NZ European										
Maori	-0.259** (0.053)	-0.253** (0.054)	-0.434** (0.091)	0.648	-0.425** (0.092)	0.654	-0.285** (0.067)	0.755	-0.281** (0.068)	0.755
Pacific Islanders	-0.333** (0.077)	-0.315** (0.078)	-0.581** (0.131)	0.559	-0.558** (0.132)	0.572	-0.368** (0.099)	0.706	-0.347** (0.101)	0.706
Other ethnicities	-0.448** (0.069)	-0.435** (0.069)	-0.774** (0.119)	0.461	-0.751** (0.120)	0.472	-0.487** (0.099)	0.614	-0.487** (0.098)	0.614
<i>Control variable</i>										
No school qualifications										
Qual Cert	0.174** (0.042)	0.170** (0.042)	0.306** (0.072)	1.357	0.298** (0.072)	1.347	0.176** (0.052)	1.195	0.178** (0.053)	1.195
Qual Diploma	0.362** (0.064)	0.356** (0.064)	0.645** (0.114)	1.905	0.634** (0.115)	1.886	0.372** (0.088)	1.457	0.376** (0.088)	1.457
Qual Degree plus	0.443** (0.083)	0.435** (0.083)	0.791** (0.153)	2.205	0.779** (0.154)	2.180	0.452** (0.110)	1.581	0.458** (0.111)	1.581
Constant	1.203** (0.094)	1.344** (0.097)	2.055** (0.164)	-	2.293** (0.170)	-	-0.487 (1.039)	-	-0.139 (0.912)	-

Notes: OR = odds ratios; Standard errors in parentheses; \* and \*\* signify statistical significance at the 5% and 1% levels, respectively. All other variables included in the regressions presented in Table 4 were also included in these regressions but are not reported for brevity.

**Table 5: Regression results by gender**

Variable	Probit		Logit				Scobit			
	Males <i>N</i> 3130	Females 3607	Males 3130	OR	Females 3607	OR	Males 3130	OR	Females 3607	OR
Health limiting	<b>-0.269**</b> (0.036)	<b>-0.137**</b> (0.049)	<b>-0.476**</b> (0.064)	0.621	<b>-0.227**</b> (0.049)	0.797	<b>-0.344**</b> (0.081)	0.709	<b>-0.182**</b> (0.048)	0.833
Pain	0.024 (0.030)	<b>-0.051*</b> (0.039)	0.044 (0.055)	1.045	<b>-0.088*</b> (0.039)	0.916	0.033 (0.040)	1.033	-0.065 (0.034)	0.937
Energy	-0.035 (0.037)	-0.024 (0.050)	-0.069 (0.067)	0.933	-0.047 (0.050)	0.954	-0.044 (0.049)	0.957	-0.027 (0.040)	0.973
Depressed	-0.054 (0.043)	-0.044 (0.056)	-0.088 (0.076)	0.916	-0.072 (0.056)	0.930	-0.074 (0.056)	0.929	-0.060 (0.044)	0.942
Health social	-0.067 (0.042)	-0.033 (0.054)	-0.120 (0.073)	0.887	-0.053 (0.054)	0.949	-0.087 (0.056)	0.917	-0.045 (0.043)	0.956
Health accomplishing	-0.060 (0.044)	<b>-0.118**</b> (0.057)	-0.107 (0.078)	0.898	<b>-0.196**</b> (0.057)	0.822	-0.077 (0.058)	0.926	<b>-0.152**</b> (0.052)	0.859

Notes: OR = odds ratios; Standard errors in parentheses; \* and \*\* signify statistical significance at the 5% and 1% levels, respectively.

All other variables included in the regressions presented in Table 4 were also included in these regressions but are not reported for brevity.

**Table 6: Regression results: Males only by ethnicity**

	Maori N = 376			Pacific Islander N = 169			NZ European N = 2565		
	Probit	Logit OR	Scobit OR	Probit	Logit OR	Scobit OR	Probit	Logit OR	Scobit OR
Health limiting	<b>-0.346**</b> (0.103)	<b>0.549**</b> (0.101)	<b>0.719**</b> (0.073)	-0.370 (0.212)	0.530 (0.196)	0.651 (0.145)	<b>-0.261**</b> (0.040)	<b>0.624**</b> (0.045)	<b>0.620**</b> (0.079)
Pain	0.141 (0.079)	1.293 (0.185)	1.152 (0.084)	0.150 (0.133)	1.276 (0.289)	1.250 (0.188)	-0.009 (0.035)	0.984 (0.062)	0.984 (0.063)
Energy	0.029 (0.103)	1.036 (0.183)	1.055 (0.108)	-0.077 (0.191)	0.890 (0.301)	0.986 (0.196)	-0.028 (0.043)	0.947 (0.074)	0.946 (0.077)
Depressed	0.023 (0.112)	1.039 (0.203)	1.011 (0.113)	<b>-0.428*</b> (0.182)	<b>0.467*</b> (0.153)	<b>0.583*</b> (0.132)	-0.062 (0.050)	0.895 (0.080)	0.894 (0.084)
Health social	0.047 (0.109)	1.074 (0.206)	1.052 (0.109)	0.040 (0.202)	1.133 (0.396)	1.031 (0.247)	-0.086 (0.048)	0.855 (0.074)	0.853 (0.080)
Health accomplishing	-0.080 (0.106)	0.903 (0.172)	0.878 (0.095)	-0.214 (0.198)	0.692 (0.236)	0.843 (0.182)	-0.052 (0.052)	0.914 (0.087)	0.913 (0.089)

Notes: OR = odds ratios; Standard errors in parentheses; \* and \*\* indicate statistical significance at the 5% and 1% levels, respectively. All other variables included in the regressions presented in Table 4 were also included in these regressions but are not reported for brevity.



**Table 7: Regression results: Females only by ethnicity**

	Maori N = 485			Pacific Islander N = 180			NZ European N = 2907		
	Probit	Logit OR	Scobit OR	Probit	Logit OR	Scobit OR	Probit	Logit OR	Scobit OR
Health limiting	-0.075 (0.080)	0.878 (0.119)	0.868 (0.150)	-0.083 (0.122)	0.861 (0.176)	0.901 (0.125)	<b>-0.153**</b> <b>(0.033)</b>	<b>0.776**</b> <b>(0.043)</b>	<b>0.830**</b> <b>(0.044)</b>
Pain	-0.012 (0.067)	0.968 (0.109)	0.924 (0.155)	0.193 (0.120)	1.388 (0.293)	1.238 (0.157)	-0.044 (0.026)	0.925 (0.042)	0.950 (0.032)
Energy	-0.083 (0.078)	0.868 (0.112)	0.830 (0.153)	0.066 (0.137)	1.120 (0.258)	1.092 (0.171)	-0.026 (0.034)	0.949 (0.056)	0.976 (0.041)
Depressed	-0.031 (0.084)	0.952 (0.134)	0.925 (0.172)	-0.031 (0.150)	0.946 (0.241)	0.924 (0.176)	-0.046 (0.038)	0.928 (0.059)	0.948 (0.043)
Health social	-0.005 (0.080)	0.999 (0.132)	1.009 (0.169)	<b>-0.438**</b> <b>(0.167)</b>	<b>0.482**</b> <b>(0.135)</b>	<b>0.626*</b> <b>(0.125)</b>	-0.035 (0.037)	0.944 (0.058)	0.958 (0.043)
Health accomplishing	<b>-0.261**</b> <b>(0.085)</b>	<b>0.641**</b> <b>(0.091)</b>	<b>0.580*</b> <b>(0.151)</b>	-0.158 (0.152)	0.785 (0.201)	0.799 (0.136)	<b>-0.113**</b> <b>(0.039)</b>	<b>0.827**</b> <b>(0.054)</b>	<b>0.876*</b> <b>(0.048)</b>

Notes: OR = odds ratios; Standard errors in parentheses; \* and \*\* indicate statistical significance at the 5% and 1% levels, respectively. All other variables included in the regressions presented in Table 4 were also included in these regressions but are not reported for brevity.

**Table 8: Instrumental variable probit regression results**

	All	Males	Females
<i>N</i>	6736	3130	3606
Mental Health	-0.068 (0.170)	-0.450 (0.289)	0.139 (0.219)
Health limiting	-0.223** (0.026)	-0.266** (0.045)	-0.183** (0.033)
Pain	-0.028 (0.018)	0.023 (0.031)	-0.057* (0.023)
Energy	-0.068* (0.031)	-0.023 (0.050)	-0.097* (0.041)
Male	0.417** (0.039)	-	-
Age: 15-19 years	-0.589** (0.088)	-1.143** (0.158)	-0.281* (0.116)
20-24 years	-0.081 (0.090)	-0.382* (0.160)	0.030 (0.117)
25-29 years	-0.048 (0.084)	-0.284 (0.160)	0.004 (0.104)
30-34 years		<i>Control variable</i>	
35-39 years	0.266** (0.078)	0.077 (0.157)	0.316** (0.096)
40-44 years	0.333** (0.081)	-0.090 (0.154)	0.477** (0.100)
45-49 years	0.301** (0.082)	-0.144 (0.152)	0.479** (0.104)
50-54 years	0.112 (0.085)	-0.128 (0.163)	0.104 (0.106)
55-59 years	-0.120 (0.088)	-0.470** (0.159)	-0.087 (0.114)
60-64 years	-0.511** (0.086)	-0.864** (0.153)	-0.461** (0.114)
Children	-0.479** (0.047)	-0.201* (0.081)	-0.676** (0.061)
Older children	0.001 (0.075)	0.021 (0.116)	-0.030 (0.101)
Partnered	0.357** (0.043)	0.627** (0.077)	0.163** (0.054)
Smoker	-0.126** (0.045)	-0.089 (0.073)	-0.155** (0.059)
NZ European		<i>Control variable</i>	
Maori	-0.254** (0.054)	-0.339** (0.089)	-0.236** (0.070)
Pacific Islanders	-0.330** (0.078)	-0.471** (0.124)	-0.352** (0.104)
Other ethnicities	-0.451** (0.070)	-0.362** (0.121)	-0.503** (0.089)
No school qualifications		<i>Control variable</i>	
Qual Cert	0.168** (0.042)	0.204** (0.069)	0.128* (0.054)
Qual Diploma	0.349** (0.063)	0.539** (0.133)	0.289** (0.074)
Qual Degree plus	0.427** (0.082)	0.331* (0.145)	0.452** (0.102)
Constant	1.240** (0.099)	1.807** (0.166)	1.328** (0.125)
Wald exogeneity tests	0.07	1.77	1.66

Notes: Standard errors in parentheses; \* and \*\* signify statistical significance at the 5% and 1% levels, respectively.

**Table 9: Instrumental variable probit exogeneity tests**

	All	Maori	Pacific Islander	NZ European
All	0.07	0.05	0.07	0.00
Males	1.77	0.81	4.69*	2.14
Females	1.66	0.16	0.71	1.28

Note: \* signifies statistical significance at the 5% level. All other variables included in the regressions presented in Table 8 were also included in these regressions but are not reported for brevity.

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- i This approach to employability, which is a term of some controversy, largely developed in the 1960s as a socio-medical model of employability, quantitatively assesses the distance between an individual's medical characteristics and the requirements of the labour-market (Gazier, 1999). At the time, this was largely utilised to identify market failures and became associated with addressing labour-market disadvantage (Wilton, 2010). However, the individualism at the heart of this model has been contemporarily translated to apply to 'supply-side' labour-market issues: the extent to which someone possesses required 'hard skills' or 'human capital' or the extent to which an individual is capable of or suitable for undertaking paid employment. In contrast, sociologically informed approaches have challenged these claims and highlight that illegitimate causes of power often shape the labour-market experiences of people with health conditions.
- ii Apart from mental illness and mania delusions, the only other health covariate that Ojeda *et al.* (2010) included in their specifications was self-rated health.
- iii Unemployment and underemployment have been shown to consistently harm the health of the general population (Bartley, 1994) as well as being a significant element of the social exclusion faced by those with mental health problems.
- iv While this study tackles the issue of reverse causality, other possible influences such as unobserved heterogeneity cannot be controlled for in this research. The data used in this paper is cross sectional, meaning that an individual fixed effects approach is not possible. This presents a useful future empirical investigation, when a suitable panel data set is available.
- v See, for instance, a description of the mental health priorities and additional funding received by Mid Central District Health Board (2011).
- vi Despite an array of overseas studies on this topic, only Gibb *et al.* (2010) have analysed NZ data. Specifically, they made use of the Christchurch Health and Development Study that began in 1997 and conducted a regression analysis focusing on three outcomes (workforce participation, income and living standard, and educational achievement) dependent on experiencing a psychiatric disorder early in life. Their research had a narrow focus on mental health status and did not control for physical health indicators. As such, the effects of mental *and* physical health on labour-market outcomes for the different genders and ethnicities within NZ have not been studied thus far.
- vii Although not shown in Table 1 for brevity, dummy variables for the age categories 15-19, 20-24, ... 60-64 were also included in the analysis, with 30-34 year olds used as the control group.
- viii We retain this ordering of responses in the subsequent analysis and implicitly assume that a change in response from "not at all" to "a little bit" has the same effect as the change from "quite a bit" to "extremely" on employment propensity. Although this is a restrictive assumption expanding the analysis to accommodate these issues would drastically extend the size of the paper and move attention away from the main and innovative contribution of this paper: that mental and physical health issues both have the potential to affect the employment decision.
- ix Also note, however, that the results presented later do not indicate that the pain variable significantly influences the employment propensity.
- x One concern with self-rated health measures is that their reporting errors may be correlated with employment propensity.
- xi Unfortunately taking account of discrimination and other labour-market factors which may explain these patterns is beyond the scope of this study.
- xii This can be seen as a generalization of the logit approach, as it does not constrain the value of success to be equal to 0.5 when it is most sensitive to changes in the explanatory variables and may be favourable in this case. See Nagler (1994) for details of this econometric approach.
- xiii Calculated by estimating  $e^{\beta}$  (Tarling, 2009).

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- <sup>xiv</sup> Applications of scobits also permit the interpretation of odds-ratios.
- <sup>xv</sup> Of course, increased funding is not necessarily the immediate response here. Rather, future research should delve into the mechanics of how mediating factors can lead poor mental health to a reduced employment propensity.
- <sup>xvi</sup> NZ provides the respondents with the option of multiple ethnicity responses, and this is controlled for in all regression tables.
- <sup>xvii</sup> A limitation of our results with regard to the Pacific Island ethnic group is the small sample size.
- <sup>xviii</sup> Oakley Browne *et al.* (2006) find that Pacific peoples are less likely to access *Child and adolescent mental health services* in NZ due to a number of cultural barriers. These include a lack of culturally appropriate specialists and/or resources, and possibly culturally different definitions of health (Ramage *et al.*, 2005). Plausible reasons for this include Pacific Islanders being less likely to accept mental health issues as a significant factor and/or less likely to seek professional help at a later stage of their depression, relative to other ethnicities.
- <sup>xix</sup> Hogan *et al.* (1996) argue that there is still considerable scepticism regarding the meaning and validity of personality measures on real world performance and conclude that well-constructed measures of normal personality are valid predictors of performance *within* virtually all occupations. Nevertheless, they also argue that such measures do not result in adverse impact for job applicants from minority groups and that well-developed personality measures for pre-employment screening is a way to promote social justice and increase organizational productivity. Whether the extent of being calm has its own distinct effect on employment probability remains a moot point.
- <sup>xx</sup> It is worth noting that while the results in Table 8 are not directly comparable with those in Tables 4 and 5, after controlling for endogeneity, the physical health indicators appear to be more significant. Of course, it is possible that the increased importance of these factors may be due to unobserved mental health issues at play, since our instrumental variable specification necessitates simplification of mental health issues from three variables to one.
- <sup>xxi</sup> As mentioned above, our inspection of the data set did not reveal an appropriate instrument for physical health. The endogeneity issue associated with physical health should be assessed in future research.