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# Mental and physical health: re-assessing the relationship with employment propensity

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**Abstract**

There is significant research demonstrating the labour-market disadvantage experienced by the disabled community. Yet, relationships between wider ill-health concepts and employment are poorly investigated. This paper presents an empirical investigation into the impacts of poor mental and physical health on the propensity to be employed. Our results indicate that activity-limiting physical health and accomplishment-limiting mental health issues significantly affect the propensity to be employed. Further investigations reveal the significance of an interacted variable that captures the multiplicative effect of both physical and mental health, illustrating that the combined effect of both health domains can be more influential than separate pathways. Additional empirical analysis highlights gender and ethnicity divides. We also find that mental health is mostly exogenous to employment propensity. This research provides evidence that mental and physical health-related issues can lead to economic exclusion.

**Keywords**

Mental health; Physical health; Employment status; Ethnicity; Gender

**Introduction**

This paper examines the relationship between employment propensity and health status. It is an important area of research; 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 status are inextricably linked, yet understanding the health-employment relationship 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. Second, 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', however, the worker attributes valued by employers, which constitute 'human capital,' are not limited to technical skills and abstract productive capacities. In particular, attributes like gender, age, ethnicity and, in this case, health status, which are perceived as irrelevant in the 'logic' of capitalist production, serve to segregate the workforce, representing a source of economic exclusion (Foster and Fosh, 2010).

This paper contributes to this literature by exploring the nature of the relationship between labour-market participation and health status. Analysis is 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. (Apart from mental illness and mania delusions, the only other health covariate that Ojeda *et al.* (2010) included was self-rated health.) In contrast to many other studies that have used a limited number of health identifiers (Cai and Kalb, 2006; Pelkowski and Berger, 2004) to capture 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 examines 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 literature regarding health and labour-market outcomes. Section 3 outlines the data source, details all six health identifiers used here and briefly summarises the adopted econometric strategies. Section 4 reports results of the standard models and tests for endogeneity. Section 5 concludes and reflects upon the implications of the results.

## **Literature review**

Before commencing with the relevant theoretical framework and empirical evidence, it is important to note theoretical issues with respect to defining health, illness and disability. Specifically, health problems and disability are certainly not identical concepts, as it is quite possible to be disabled and healthy; although the same cannot be said for vice versa (Jones and Latreille, 2009). There is controversy in the literature regarding the core concepts of health, illness, disease, impairment and disability. The forthcoming analysis utilises six health measures, encompassing both physical and mental health status, that are couched largely in terms of impairment.

Mental health issues have received increasing attention in terms of measurement and government policy in recent years. For an extensive review of prevalence and trends within this health domain, see Seymour and Grove (2005). More specifically, in a UK based study, 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 prominently. Despite this the relationships between health status and the labour-market have received relatively poor coverage in the literature. Much research is focussed solely on disability, rather than general

physical and mental health status. 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 employment outcomes (e.g. Kidd *et al.*, 2000).

There is no doubt that those with poor health are generally worse off in the labour market, relative to their counterparts with good health. 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 leads to poorer mental health, psychological distress, and minor psychological/psychiatric morbidity. They also conclude that there is strong evidence that re-employment leads to improved self-esteem, improved general and mental health, and reduced psychological distress.

While advances have been made theorising the relationship between poor health and labour market outcomes, a review of the empirical literature illustrates that understanding this complex relationship is still in its infancy. Specifically, the assertion that those experiencing mental health issues are economically *excluded* needs empirical and analytical assessment. Moreover, the multidimensionality of health has been 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 self-assessed health while Lewchuk *et al.* (2008) show an association between characteristics of the employment relationship and health, with weak commitments between employers and employees potentially impacting on the health and well-being of individual workers, their families and society.

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 may be 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, which is reflected in the current efforts to promote social inclusion among those with poor mental and physical health (Social Exclusion Unit, 2004).

Overall, empirical evidence appears to point to debatable findings over the strength of the relationship between health status and labour market outcome, and indicates the lack of research focussing on general health, and controlling for both physical and mental health issues. This research therefore contributes to this literature by not only modelling employment propensity with covariates that encompass both the mental and physical health domains, but also by including an interacted variable (using the average of the two health elements). This variable attempts to capture the inextricable links between these two health domains.

*Gender, ethnicity and health*

The links between employment propensity and both physical and mental health cannot easily be generalised across a population. In terms of gender, Walsh *et al.* (1995) highlight that when analysing gender inequalities in health outcomes, in particular mortality, there is a fundamental requirement to understand the processes which apportion economic resources. This is developed by Kawachi *et al.* (1999) who conclude in their US based study that economic autonomy is firmly correlated with better health outcomes. The importance of this becomes clear when considering the work of Crompton (1997) and Hutton (1995, cited in Crompton, 1997: 131). In combination, this work presents a political economy of women's employment post 1950, assessing the impact of marketization and financial capitalism on economic inequality. There is no doubt that women have made huge gains in the labour market of many developed economies, e.g. now representing nearly half of all workers in the UK labour market, and yet they remain over-represented in work that is less likely to offer 'economic autonomy'. Women have been and continue to be disproportionately affected by the casualization and flexibilization of work. In summary, the complex restructuring of employment since the 1970s is likely to have differential impacts on men and women in terms of new forms of inequality; women, it would appear, are more likely to be exposed to a work environment which fails to offer the stability or security of 'good' employment. Such underemployment has been shown to consistently harm the health of the general population (Bartley, 1994).

Brah (1993) emphasises that labour market inequality in terms of occupational status and income are mediated through both gender and ethnicity. Labour market discrimination may act to restrict access to high skilled/high paid employment for ethnic minority workers, thereby confining individual's to certain types of low paid and low status occupations associated with poor working conditions. Research has consistently demonstrated that ethnic minorities are under-represented at senior occupational levels and are more likely than their white counterparts to be employed in low skilled/low paid occupations (Modood *et al.*, 1997). In summary, such labour market experiences, characterised by discrimination and economic exclusion, have consequences for gender and ethnic groups that may ultimately be expressed as inequalities in health outcomes (Krieger, 2000).

In terms of the empirical evidence of the differential impacts of ill-health on employment across gender and/or ethnicity, Pelkowski and Berger (2004) investigated the impact of poor health on wages in the United States, and found a larger negative impact for females relative to males. An Australian study by Cai and Kalb (2006) also found better health increased labour market participation more for women and older age groups. Both studies point to women facing 'double discrimination' in the labour market, in terms of a greater impact on labour market outcomes due to health issues, relative to their male counterparts. On the other hand, research from Europe, by Gambin (2005) concentrated on the impacts of physical health and their results show self-assessed general health had a greater impact on men's wages, while chronic health conditions had more of an effect on women's wages. This illustrates that it is both the type of health issue faced and the gender of the individual that potentially play a role in determining labour market outcome.

### *Endogeneity*

The causal direction of issues related to health and labour market outcomes remains a moot point. Social disadvantage in the labour market can be seen as both a cause and

consequence of poor health. Recent developments in the causality literature include Cai (2009), who confirmed that better health status has a positive and significant impact on wages and found an insignificant reverse effect. Schmitz (2011) 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 divides.

### *Summary*

Overall, the contribution of this research can be seen as three-fold. First, it assesses the impact on employment propensity of both physical and mental health issues, with the use of three measures for each. This multidimensionality has received little attention in the literature, with most studies focussing on just physical health problems or mental health issues but not necessarily controlling for both. One notable exception is García-Gómez *et al.* (2010) who make use of British Household Panel Survey data from 1992 to 2002 and find that both general self-assessed health and a GHQ index to measure psychological well-being are important determinants for employment transitions. We also make use of an interacted variable that captures the influence of having both poor physical *and* mental health. Second, we investigate whether the impact of health status on employment propensity differs by gender, and extend this sub-group type analysis to check for disparities by ethnicities. Third, we tackle the issue of endogeneity and extend the scant literature on this front by focussing on employment propensity as the labour market outcome and instrument for mental health.

### **Data**

There is a significant gap in the literature that examines the *multidimensional* impacts of health on employment propensity. A primary reason for this gap is the lack of appropriate and available data.

New Zealand (NZ) appears to be similar to many other developed countries in that there is a growing awareness of the importance and consequences of physical and mental illness. 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 her government, with the aim of improving mental health (for example, see a description of the mental health priorities and additional funding received by Mid Central District Health Board, 2011).

Despite an array of overseas studies on this topic, only Gibb *et al.* (2010) have analysed NZ data. They make use of the Christchurch Health and Development Study that began in 1997 and conduct regression analysis, focusing on three outcomes (workforce participation, income and living standards, 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 investigated thus far.

Data used in this study are drawn from the NZ General Social Survey 2008 (NZGSS), which is a relatively new source of information on physical and mental

health. It provides data on social and economic outcomes of individuals aged 15 years and over. This multidimensional survey was carried out between April 2008 and March 2009, and 8,721 people were interviewed regarding several aspects of their lives, such as education, paid work, income, social relationships and health. Our final sample excludes respondents over 65, to focus analysis on the working-age population of NZ. For the purpose of this study, the dependent variable is employment status. This variable, the six health status indicators, and all other covariates used in our analysis are described in Table 1.

< Table 1 >

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 effects of all six health variables on employment propensity suggests that their expected signs should all be negative. One concern with self-rated health measures is that their reporting errors may be correlated with employment propensity. In particular, Butler *et al.* (1987) raised the issue of measurement error in self-reported health variables and found evidence (with respect to the 1978 Survey of Disability and Work carried out in the United States) that individuals that are not working tend to report their health incorrectly. They attribute this to a justification bias, in that individuals may report their health in a worse state, in response to the social pressure to justify not working. Although this is a necessary caveat when dealing with self-reported health measures, we take comfort in more recent research which shows this bias is potentially survey-specific. For instance, Bénitez-Silva *et al.* (2000) found no evidence of self-reported disability being exaggerated by disability applicants. A useful advantage in the Health and Retirement Survey that they were analysing is that it was anonymous, as is the NZGSS employed here.

In terms of the descriptive statistics provided in Table 1, some interesting patterns are 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). This gender difference is most visible when investigating self-rated reports of mental health, and particularly psychological distress (Gove and Tudor, 1973). 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 (Gijsbers 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 NZers rated their different aspects of health status relatively well (evidenced by mean values closer to unity, rather than five), the energy variable seems to stand out. 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.

Table 2 provides means for all six health variables for both the employed and non-employed sample, as well as for occupational categories within the employed group. The means for all physical and health variables are higher for the non-employed than for the employed, with Health-limiting exhibiting the largest difference of 0.465. This table illustrates the variation in health status by occupation status. For instance, moving from professionals, to skilled, less-skilled and manual workers, it appears that the mean values of most of the health variables (with the exception of pain) take on an inverted-U shape, where they peak in the less-skilled sub-group, although only about half of the differences in health status between adjacent occupational categories are statistically significant. Nevertheless, future research could investigate whether the impact of health status on employment propensity is non-uniform across the occupational hierarchy. For example, good physical health is likely to be more important in obtaining and retaining employment in labour intensive jobs than for non-manual occupations. When studying the relationship between men's employment and health in Great Britain during different stages of the business cycle, Bartley and Owen (1996) found evidence that as unemployment rises then men in non-manual occupations are more likely to remain in work if they have a limiting longstanding illness relative to men in manual occupations.

< Table 2 >

In terms of the remaining descriptive information in Table 1, the sample is fairly evenly divided by gender (46.4% male) and there are three distinct ethnic groups (Maori, Pacific Islanders and NZ European). 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 why Statistics NZ continues to emphasize the need to maintain multiple ethnicity responses in their surveys (Statistics NZ, 2005).

In terms of the six self-reported health measures, there is the possibility of overlap between the physical and mental health indicators. This can best be illustrated with an example: suppose that the respondent 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. Table 3 therefore presents the correlation coefficients across all six health variables, as well as the employment status variable. As would be expected, all physical health variables are positively correlated, and the same is true for mental health variables (highest correlation of 0.600 between depression and Health-accomplishing). Also of interest is that all health variables are negatively correlated with employment status, suggesting that, from a non-causal perspective, employment is positively correlated with better physical and mental health status.

< Table 3 >



Table 4 illustrates that 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. While taking account of discrimination and other labour-market factors which may explain these patterns is beyond the scope of this study, it is interesting to note that a recent study by Statistics NZ (2012) found racial discrimination was the most common form of discrimination people experienced: one in ten people aged 15 or over reported experiencing some form of discrimination in the last 12 months, and just over half of this sub-group of respondents believed racial discrimination was the reason for them being treated unfavourably. Less than 10 percent of those discriminated believed disability or health issues were the reason behind their unfair treatment. While there was no breakdown according to the setting in which the individual was discriminated within these reasons, overall ‘at work or while working’ was the second most common situation, with approximately 35 percent of those being discriminated indicating it was in an employment situation.

< Table 4 >

### *Methodology*

Employment status can be represented by a dichotomous variable taking a value equal to 1 if the individual is employed and 0 otherwise. We apply the standard probit approach, and report marginal effects. Standard textbooks illustrate that the probit approach assumes 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 may be the probabilities of being employed across ethnicities and gender, then a skewed limited dependent variable approach may be required. Consequently, we also test the robustness of our results, by repeating all estimations with a scobit approach (see Nagler, 1994).

Finally, a further advantage of applying probit estimations is that tests for exogeneity through the use of instrumental variables (IV) can be estimated. IV probits are performed below to inform us whether the assumption that health is exogenous to employment status can be rejected.

### **Results**

Table 5 presents results for the full sample and gender sub-samples. Initially we present results with only the physical health variables included (specification 1) and then add mental health variables (specification 2). The third specification includes an additional variable, denoted ‘Health interacted,’ which is created by interacting average physical health status with the average mental health status of the individual, as show in Table 1. We test for an influence of having both poor physical and poor mental health in excess of the sum of the two separate effects. As can be seen from Table 5, the omission of mental health variables in specification (1) inflates the magnitudes of the effects of the physical health variables, suggesting the exclusion of mental health variables in such equations create omitted-variable bias.

< Table 5 >

In terms of the demographic characteristics provided in Table 5, results are consistent across specifications (1–3). There is a positive impact on employment propensity if the individual is male, an inverted-U shaped effect of age, and a negative impact of all ethnicities (Maori, Pacific Islanders, and others) relative to the control group of NZ European. For instance, according to specification (1), the marginal effect of being Maori (Pacific Island) appears to reduce an individual's likelihood of employment propensity by 6.3 (8.6) percentage points, relative to NZ European.

Many of the other covariates yield expected results: the presence of children in the household significantly reduces the employment propensity of the individual, and this impact is stronger for females compared to males. Having a partner increases the probability of being employed and, in general, the higher the educational attainment then the better the chance of being employed.

Turning our attention to the key independent variables in Table 5, all six health factors appear to impact negatively on employment status in specification (2). The two most significant variables are Health-limiting and Health-accomplishing: the impact on employment propensity of a one-unit increase in Health-limiting is almost double a comparable rise in Health-accomplishing (a drop in employment propensity of 5 percentage points versus 2.6 percentage points).

It is noticeable that under specification (2), all three mental health variables are statistically significant, while just one out of three physical health variables indicate a significant impact on employment propensity. Given the importance of the Health-accomplishing variable, it is expected that associated active labour-market policy that provides emotional support to those reporting mental health issues may result in enhanced accomplishment and an increased probability of being employed. While these results suggest that improving mental health awareness is critical, increased funding is not necessarily the immediate response here; rather, future research should delve into the mechanics of what mediating factors are at play.

In specification (3), an additional variable is included, which encompasses the multiplicative effect of physical and mental health. The inclusion of this variable appears to subsume the significance on individual health indicators (bar Health-limiting). Specifically, 'health interacted' is significant at the 5% level and its marginal effect indicates that a one-unit rise in both average physical and average mental health is associated with a 2.4 percentage point drop in employment propensity. This finding highlights the complex nature of health issues, in that it is not only separate impacts of physical and mental health issues on employment propensity that are important, but also their combined effect.

In additional analysis, we also employed a scobit model, to ensure robustness of results and to investigate whether the effects of explanatory variables on the employment outcome were sensitive to the econometric functional form. These results are qualitatively similar and not reported here for brevity. For instance, the scobit results suggest that the impact of 'health interacted' in the final and full specification is also negative and significant at the 1% level.

### *Gender and ethnicity*

Based on the results presented in Table 5, there are three findings that are worthy of further investigation. First, the influence of the Health-limiting variable is noticeably stronger for males, compared to females. The marginal effects indicate that a one-unit

rise in this variable for males and females results in 3.9 and 2.3 percentage points drop in employment propensity respectively (the former result being statistically significant at the 1% level, while the latter is significant at the 10% level). Second, while there was no evidence of pain being a contributing factor in reducing the probability of being employed in the full sample, it is of significant influence for males. Third, the significance of the health interacted variable is reemphasised here and is consistent between males and females, although the marginal effect is slightly stronger for females.

These findings illustrate the importance of investigating gender differences with respect to the relationship between health and labour-market activity. As described in the literature review above, Pelkowski and Berger (2004) and Cai and Kalb (2006) found the link between health status and labour market outcomes to be stronger for women, relative to men. While their empirical work appears to point to women facing ‘double discrimination’ in the labour market, our results do not confirm this hypothesis, except for the multiplicative variable of health interacted where there is a greater impact on the probability of females being employed, relative to males.

Table 6 presents results disaggregated by ethnicity and reveals an asymmetry across ethnic backgrounds in terms of the effect of health variables on employment propensity. While health interacted was significant for the full sample and gendered sub-samples, this is no longer the case for the ethnic sub-groups of Maori or Pacific Islanders. The full sample result appears to be driven by the ethnic group that form approximately 80% of the total sample – NZ European. It may be that individual ailments have a stronger separate impact on ethnic minorities’ employment propensity rather than the combined influence of both physical and mental health issues.

< Table 6 >

Mental health issues appear to be particularly important for females in ethnic minorities; specifically Health-accomplishing for Maori females, and Health-social for Pacific Islander females. The latter is worthy of further research, as it is by far the largest marginal effect in Table 6, signalling a 16.3 percentage point drop in employment propensity associated with a one-unit rise in emotional issues interfering with a respondents’ social activities. Recent research has highlighted the importance of social capital with respect to gaining employment. For instance, Blyden (2005) explains that employment of individuals with disabilities is lower than their counterparts, and that one of the influences often overlooked in trying to increase potential matches between disabled individuals and employers is the role of social capital. Consequently, Health-accomplishing can have both a direct (via mental health issues) and indirect influence on employment via, for instance, a decrease in the set of social relationships.

A further result worth noting is the statistically significant negative influence of depression on the employment propensity of Pacific Islanders. A one-unit rise in depression is associated with a 10.4 percentage point drop in employment propensity of male Pacific Islanders. Although a limitation of our result is the small sample size of this sub-group, it is a worrying sign that even when robustness results are carried out, via scobit analysis, the odds ratio indicates that a one-unit increase in the depression variable would result in a 81 percent increase in the propensity of Male Pacific Islanders to be unemployed. Corroborating qualitative evidence is provided by Jensen *et al.* (2005) who find that the likelihood of employment of Pacific peoples are more affected by disabilities (including experiencing mental illness) than either Maori or NZ European. Oakley Browne *et al.* (2006) also find that Pacific peoples are less likely to

access mental health services in NZ due to cultural barriers, such as a lack of culturally appropriate specialists and/or resources, and possibly culturally different perceptions/definitions of health (Ramage *et al.*, 2005). Reasons for our significant result for depression within the male Pacific Islanders sub-group include this ethnic minority 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.

The limited evidence on the asymmetric impacts of mental health issues on employment propensity across ethnicities is mixed. While Chatterji *et al.* (2007) found negative associations between being employed and psychiatric disorders for Latinos, their figures were comparable to American studies on mostly white samples. However, the impact on the probability of employment was found to be larger for Latinos in comparison to Asians. 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 an insignificant difference in the likelihood of employment between healthy immigrants and those affected by mental illness. Future research should investigate the likelihood of ethnic minorities being more at risk of encountering mental health issues and, in particular, the mechanisms by which these issues impact on labour market activity. Such research must also consider the potential influence of discrimination, and whether the discrimination is ethnic- or health-based, or a multiplicative impact of both factors.

### *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. Although this issue has not been the focus of a substantial amount of research, three recent contributions to this literature are noteworthy. Cai's (2009) results illustrate that better health status positively impacts *on wages* and there is no reverse effect from wages to health. In contrast, Cai (2010) finds that the reverse effect from *labour-force status* to health differed across genders; his results indicate that there is a strong negative reverse effect for males, and a positive and weakly significant reverse effect for females. Schmitz (2011) finds no evidence of the reverse impact that unemployment influences mental health.

Instrumental variable probit regression is an econometric method that permits investigation of the potential presence of endogeneity. The statistical validity of the results from this test rests, at least in part, on the appropriateness of the instrument. While inspection of the NZGSS data does not reveal an appropriate instrument for physical health, there is a useful instrument for mental health, via the variable denoted *Calm* in Table 1. The instrument corresponds to whether the respondent felt relatively calm during the last four weeks. The absolute values of the correlations between *Calm* and mental health variables range between 0.37 and 0.41 (see Table 3) but the correlation between *Calm* and *Employment* is only 0.07. Further justification of this instrument 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 calmness may be related to the industry in which (s)he self-selects and becomes employed, to the authors' knowledge, being calm is not necessarily related to the selection into or out of employment *per se*.

The subsequent regressions require the instrument to be appropriate for *all* mental health variables. Accordingly a variable is constructed, *Mental Health*, which is equal to 1 if the individual states that (s)he has any of the three mental health issues and 0 otherwise. This variable is then instrumented by *Calm*. Application of the instrumental variable probit regressions to the full sample, and for males and females separately, are presented in Table 7. The corresponding Wald test statistics 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% level, indicating that we cannot reject this null hypothesis. The results in Table 7 are not directly comparable with the marginal effects in Table 5. Nonetheless, it is interesting to note that 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. Given important gender-ethnicity issues, we re-estimated the full instrumental variable models for each sub-group and present these Wald test statistics in Table 8. It is reassuring to note that the cautious conclusion of exogeneity of mental health related issues from employment propensity is sustained across all sub-groups; the only exception being Pacific Islander males at the 5% level, suggesting that for this ethnic group a low employment propensity may cause mental health-related issues (a necessary caveat of this outcome is that it is based on small sample size,  $N = 169$ ). Thus, the majority of our evidence corroborates the findings of Cai (2009) and Schmitz (2011).

< Table 7 >

< Table 8 >

## Conclusions

This paper investigated the impacts of mental and physical health issues on employment propensity. This is the first paper to explore the effects on employment of both health issues simultaneously, and includes an interacted variable to capture the multiplicative impact of these issues. We provide evidence which shows that the health-employment relationship is a multidimensional and complex issue, and understanding this relationship is vital in order to inform appropriate strategies to tackle social exclusion.

Labour-market participation is a key predictor of economic participation and consequently poverty. The evidence presented here demonstrates that both physical and mental health impact upon an individual's likelihood of being in employment. The results were consistent across different model specifications. The significance of physical health issues diminished when mental health covariates were added to the specification and individual health effects were further subsumed when the interacted health variable was added. This reflects the complex and circular nature of the relationship between the two health domains, and consequently the impacts on employment propensity.

The results presented have important policy implications: policy drawn from empirical studies of whole populations will not identify the nuances that are present between sub-groups of the population. 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 sub-groups. However, the

majority of extant policy responses have tended to use broad homogenous definitions of disability that fail to recognise the complexity of ill-health.

The results emphasise three important themes. First, there is a substantial impact of physical health-limiting variable on employment for males. Future research should focus on what specific type of physical health problems this variable encompasses and their severity. It would be useful to know whether this variable signifies more short- or long-term physical ailments and 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. Here the direction for future work should be to investigate the mechanisms through 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 particularly important in our sample for Pacific Island males. Future work should investigate the mechanisms by which Pacific Island males' labour-market activities are more modified by mental health problems in comparison to other ethnicities.

While our results suggest that health influences employment status, there was the theoretical possibility of reverse causality. Instrumental variable tests for endogeneity indicated that the direction of causality, at least for mental health status, was from health to employment.

Targeted policy could be developed and adopted for the differing effects of ill-health by gender and ethnicity in order to attain higher employment rates. Greater awareness of the role of mental health in terms of attachment to the labour market is key, and our findings indicate a clear bias in estimations when mental health covariates were omitted from empirical analyses.

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**Table 1: Descriptive statistics**

Variable	Definition	Mean (Standard deviation)		
		All	Males	Females
Employed	1 = 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: 1 = none of the time; 2 = little of the time; 3 = some of the time; 4 = most of the time; 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: 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: 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: 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: 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: 1 = none of the time; ...; 5 = all of the time.	1.541 (0.887)	1.490 (0.860)	1.585 (0.906)
Health interacted	Average physical health (mean of Health-limiting; Pain; and Energy) interacted with average mental health (mean of Depressed; Health-social; and Health-accomplishing)	3.248 (2.879)	3.036 (2.717)	3.433 (3.002)
Maori	1 = Maori; 0 otherwise	0.131 (0.337)	0.121 (0.326)	0.139 (0.346)
Pacific Islanders	1 = Pacific Islander; 0 otherwise	0.053 (0.224)	0.055 (0.228)	0.051 (0.219)
NZ European	1 = NZ European; 0 otherwise	0.812 (0.391)	0.818 (0.386)	0.806 (0.396)
Other ethnicities	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	1 = Male; 0 otherwise	0.464 (0.499)	-	-
Children	1 = children in household; 0 otherwise	0.433 (0.496)	0.406 (0.491)	0.457 (0.498)
Older children	1 = adult children in household; 0 otherwise	0.076 (0.265)	0.078 (0.268)	0.075 (0.263)
Partnered	1 = non-partnered; 0 otherwise	0.586 (0.493)	0.617 (0.486)	0.559 (0.497)
Qual Cert	1 = highest educational qualification is school certificate; 0 otherwise	0.458 (0.498)	0.490 (0.500)	0.429 (0.495)
Qual Diploma	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	1 = highest educational qualification is a degree; 0 otherwise	0.082 (0.274)	0.077 (0.267)	0.085 (0.279)
Calm	1 = Felt calm/peaceful in 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>

Notes: Excluded 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.

**Table 2: Health variables by employment and occupation**

	Employed	Not employed	Professionals	Skilled	Less skilled	Manual
Health-limiting	1.416 (0.852)	1.881 (1.217)	1.362 (0.802)**	1.433 (0.867)	1.444 (0.859)	1.422 (0.862)
Pain	1.661 (1.073)	1.963 (1.296)	1.609 (1.057)**	1.697 (1.072)	1.653 (1.054)*	1.743 (1.111)
Energy	2.350 (0.860)	2.634 (1.041)	2.319 (0.806)	2.335 (0.866)**	2.408 (0.881)**	2.301 (0.935)
Depression	1.609 (0.853)	1.923 (1.013)	1.549 (0.780)	1.596 (0.859)**	1.674 (0.894)	1.645 (0.933)
Health-social	1.401 (0.817)	1.782 (1.146)	1.361 (0.786)**	1.426 (0.839)	1.415 (0.820)	1.410 (0.822)
Health-accomplishing	1.455 (0.799)	1.835 (1.088)	1.412 (0.764)	1.429 (0.790)**	1.507 (0.827)	1.480 (0.804)
Percent of employed sample	100%	-	39.5%	21.9%	27.7%	10.9%
Percent of sample	77.5%	22.5%				

Notes: Standard deviations provided in parentheses. The occupational categories correspond to the ISCO-08 classifications (see ILO (2010)).

\*\* and \* reflect significance of the differences between current occupational column with the column to its right, at the 5% and 10% level respectively.

**Table 3: Correlations**

	Health-limiting	Pain	Energy	Depression	Health-social	Health-accomplishing	Employed
Health-limiting	1						
Pain	0.463	1					
Energy	0.396	0.272	1				
Depression	0.269	0.189	0.344	1			
Health-social	0.481	0.332	0.403	0.496	1		
Health-accomplishing	0.351	0.204	0.350	0.600	0.534	1	
Employed	-0.202	-0.112	-0.128	-0.144	-0.172	-0.177	1
Calm	-0.188	-0.148	-0.383	-0.409	-0.324	-0.373	0.070

**Table 4: 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 5: Probit regression - marginal effects**

	(1)	(2)	(3)	Males (3)	Females (3)
Health-limiting	-0.061*** (0.006)	-0.050*** (0.006)	-0.034*** (0.008)	-0.039*** (0.008)	-0.023* (0.012)
Pain	-0.008 (0.005)	-0.006 (0.005)	0.009 (0.006)	0.015** (0.007)	0.001 (0.010)
Energy	-0.019*** (0.006)	-0.005 (0.006)	0.008 (0.007)	0.004 (0.008)	0.013 (0.011)
Depressed	-	-0.014** (0.007)	0.002 (0.008)	0.0004 (0.010)	0.005 (0.013)
Health-social	-	-0.013* (0.007)	0.010 (0.009)	0.003 (0.011)	0.016 (0.014)
Health-accomplishing	-	-0.026*** (0.007)	-0.007 (0.009)	0.002 (0.010)	-0.015 (0.014)
Health interacted	-	-	-0.024*** (0.007)	-0.016** (0.007)	-0.029*** (0.010)
Male	0.112*** (0.010)	0.112*** (0.010)	0.113*** (0.010)		
Age: 15-19 years	-0.185*** (0.032)	-0.196*** (0.032)	-0.192*** (0.032)		
20-24 years	-0.024 (0.026)	-0.029 (0.026)	-0.028 (0.026)		
25-29 years	-0.015 (0.023)	-0.014 (0.023)	-0.013 (0.023)		
30 – 34 years			<i>Control variable</i>		
35-39 years	0.067*** (0.017)	0.069*** (0.017)	0.072*** (0.017)		
40-44 years	0.083*** (0.017)	0.082*** (0.017)	0.084*** (0.016)		
45-49 years	0.077*** (0.017)	0.077*** (0.017)	0.079*** (0.017)		
50-54 years	0.037* (0.020)	0.034 (0.021)	0.038* (0.020)		
55-59 years	-0.026 (0.025)	-0.029 (0.025)	-0.025 (0.025)		
60-64 years	-0.147*** (0.029)	-0.157*** (0.029)	-0.153*** (0.029)		
Children	-0.133*** (0.013)	-0.133*** (0.013)	-0.134*** (0.013)		
Older children	-0.004 (0.020)	-0.007 (0.020)	-0.008 (0.020)		
Partnered	0.099*** (0.012)	0.086*** (0.012)	0.086*** (0.012)		
Smoker	-0.028** (0.013)	-0.020* (0.012)	-0.021* (0.013)		
NZ European			<i>Control variable</i>		
Maori	-0.063*** (0.016)	-0.061*** (0.016)	-0.061*** (0.016)		
Pacific Islanders	-0.086*** (0.025)	-0.080*** (0.025)	-0.082*** (0.025)		
Unknown Ethnicity	-0.069 (0.146)	-0.066 (0.143)	-0.071 (0.145)		
No school qualifications			<i>Control variable</i>		
Qual Cert	0.058 (0.011)	0.056 (0.011)	0.057 (0.011)		
Qual Diploma	0.093 (0.013)	0.091 (0.013)	0.091 (0.013)		
Qual Degree	0.098 (0.015)	0.095 (0.015)	0.096 (0.015)		
Sample size	6753	6737	6737	3130	3607
Pseudo R <sup>2</sup>	0.152	0.159	0.160	0.232	0.122
Log likelihood	-3044.404	-3010.129	-3003.471	-1051.040	-1875.416

Notes: Standard errors in parentheses. \*, \*\* and \*\*\* signify statistical significance at the 10%, 5% and 1% levels respectively. The covariates used in the full sample are also employed in the gender subsamples, but not reported for brevity.

**Table 6: Probit regressions by gender and ethnicity – marginal effects**

	Maori		Pacific Islander		NZ European	
	Male	Female	Male	Female	Male	Female
Health-limiting	-0.100** (0.035)	-0.026 (0.037)	-0.104* (0.052)	-0.027 (0.061)	-0.030** (0.008)	-0.030** (0.012)
Pain	0.044 (0.029)	0.005 (0.033)	0.016 (0.037)	0.081 (0.062)	0.010 (0.007)	0.001 (0.010)
Energy	0.019 (0.035)	-0.025 (0.035)	-0.036 (0.047)	0.029 (0.061)	0.008 (0.008)	0.006 (0.012)
Depressed	0.012 (0.039)	-0.003 (0.039)	-0.104* (0.044)	-0.009 (0.069)	0.002 (0.010)	0.002 (0.013)
Health-social	0.013 (0.042)	0.011 (0.041)	-0.020 (0.056)	-0.163* (0.085)	0.003 (0.011)	0.010 (0.015)
Health-accomplishing	-0.026 (0.036)	-0.090** (0.042)	-0.069 (0.056)	-0.059 (0.074)	0.008 (0.011)	-0.014 (0.015)
Health interacted	-0.003 (0.029)	-0.012 (0.031)	0.029 (0.039)	-0.007 (0.057)	-0.019** (0.008)	-0.023** (0.011)
Sample size	376	485	169	180	2565	2907
Pseudo R <sup>2</sup>	0.245	0.195	0.418	0.169	0.237	0.116
Log likelihood	-165.242	-263.065	-56.438	-102.540	-791.235	-1437.945

Notes: 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 5 were also included in these regressions, but not reported for brevity.

**Table 7: Instrumental variable probit regressions**

	All	Males	Females
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)
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. All other non-health related covariates included in the regressions presented in Table 5 were also included in these regressions but not reported for brevity.

**Table 8: Wald 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.

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