Gender differences in the association between common mental disorders and regional deprivation in Ireland

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Abstract

This paper aims to add a gender and place perspective to our understanding of depression and anxiety (common mental disorders, CMD) through the use of multilevel models. To date, regional variations in the prevalence of CMD in Ireland have not been explained adequately. Using data from the 2007 Quarterly National Household Survey special module on health and health service utilization, this paper examines whether regional differences in CMD persist after accounting for both individual and regional characteristics. The null model indicated that 2% of the variance in CMDs occurred at the regional level. Including contextual interaction variables the level of variance at the regional level increased to 3.3%. Of specific interest to this paper was the association between place based deprivation and gender on CMD at the regional level. This paper found that whilst regional deprivation alone did not have a significant impact on CMD, the interaction between female and regional relative deprivation was significant. Specifically, this means that women living in more deprived regions tend to have a greater number of CMD.

Keywords: Depression; Gender; Ireland; Multi level Modelling; Regions

1. Introduction

In Ireland, research by the Health Research Board (HRB) found that 14% of respondents to the National Psychological Distress Survey had experienced some form of mental, nervous or emotional difficulty in the previous year (Tedstone-Doherty et al., 2008). Individual socio-economic risk factors for depression and/or anxiety, or as they are often referred to in the Irish and British literature when examined together, common mental disorders (CMD) (Fone et al., 2007; Fone et al., 2013; Polling et al., 2014) are well established at the national level and include low socioeconomic status, and unemployment (Fone et al., 2007; Payayo et al., 2014). With regard to demographic risk factors, research on gender and CMD has consistently found that rates of CMD for women are typically higher than those of men (Bassett and Moore, 2013). Research has found that the explanations of gender differences in CMD outcomes reflect sex-related biological, social and environmental aspects and the interplay between these forces (Bassett and Moore, 2013; Uddin et al., 2010; Matheson et al., 2006). Gender is recognized as a status position that frames access to personal and social resources (Matteson et al., 2006). Within this context, social explanations of gender differences in health posit that women report higher levels of CMD and other health problems

because of reduced access to material and social conditions that foster health (Bassett and Moore, 2013; Matheson et al., 2006). In comparison to men, women are less likely to be employed, more likely to work in lower status positions when employed, to have lower incomes and be single parents (Matheson et al., 2006). Specifically, research has found that women demonstrate a greater association between financial strain, level of debt and changes in levels of poverty and rates of CMDs compared to men (Reading and Reynolds, 2001; Muntaner et al., 2004; Lorant et al., 2007).

Examining studies on the role between geography and CMD, Fone et al., (2013) suggest that it is income inequality relative to wider society rather than neighborhood inequality that is associated with poorer mental health outcomes. That is, deprived areas have poorer health, not because of inequalities within them, but because they are poor relative to the wider society (Pickett & Wilkinson, 2010; Fone et al., 2013). Linking this to gender outcomes for CMD, research to date has indicated that the association between the environment and mental health outcomes also differ between men and women (Pabayo et al., 2014; Bassett and Moore, 2013; Stafford et al., 2005; Belle and Doucet, 2003). Explanations of why residential environments may have different health effects on women and men include: (1) women and men perceive their environments differently; (2) women and men are exposed within their environments to different stressors and at varying degrees; and (3) women may be more vulnerable than men to certain aspects of the environment due to differences in social roles (Bassett and Moore, 2013; Stafford et al., 2005; Kahn et al., 2000). Indeed, recent quantitative research examining the association between gender, place based disadvantage and depression (excluding anxiety) (Bassett and Moore, 2013; Payabo et al., 2013) found that living in a county or state with higher income inequality increases the risk of developing depression among women. These finding support those by Pickett & Wilkinson (2010) and Fone et al., (2013) who noted that it is the degree of social stratification across wider society, rather than social stratification within neighborhoods that are associated with higher levels of CMD for women.

However, whilst research has indicated that the role of place based deprivation should be examined across wider society, for example at the county, state or regional level, such an analysis is only of interest if socio-economic disparities actually exist at these levels. Although a small country, regional issues have historically attracted considerable attention in Ireland (Moylan, 2011). This interest has focused on the size of the Dublin and Mid-East

regions and their perceived dominant share of the national economy Moylan, 2011). Indeed, there is a perception that any economic success prior to the 2007 recession was centred within the Greater Dublin Area (GDA) and served to increase rather than addressed regional disparities (Moylan, 2011). Thus, to examine whether regional disparities exist and if an analysis of deprivation and CMD outcomes is of interest within the Irish context, Table 1 presents the population size, relative income position, relative deprivation score and employment rates for the eight NUTSIII regions. Placing each of the regions in context of population size, 11% of the Irish population reside in Border region, 28% in the Dublin region, 11.4% in the Mid East, 6% in the Midlands, 8.4% in the Mid-West, 11% in the South-East, 14.5% in the South-West and 9.6% in the West. Examining the regional distribution of employment, Table 1 indicates that the majority of the employed population are situated in the Dublin region. Indeed, one third of the Irish population is employed in Dublin. Indeed, the second highest employment region; the South West employs only half (14.4%) of the population compared to Dublin. Examining the relative income position of the regions using an index of per capita disposable income, one can see that the gap between the richest, Dublin (111.7) and poorest, Midlands (91.2) region is considerable. Dublin residents earn 20 index points more relative to residents in the midlands region. Using the New Measures of Deprivation for the Republic of Ireland for 2006 (Haase and Pratschke, 2008) as a measure of regional relative deprivation, one finds that there is a large gap between the richest regions (Dublin and the South West) and the poorest regions (Midlands, Border, and West) in 2007. Thus, Table 1 indicates that there are large regional disparities in terms of personal income, employment opportunities and deprivation scores between the eight regions.

Table 1 Key characteristics of the NUTS 3 regions in terms of socio-economic profile

Regional Context

Given that research has found that the relationship between the environment and mental health outcomes differ between men and women at wider societal levels (Pabayo et al., 2014; Bassett and Moore, 2013; Stafford et al., 2005; Belle and Doucet, 2003) and the regional economic disparities in Ireland (Moylan, 2011), this paper uses multilevel models (MLM) to explore the role of relative deprivation at the regional level and CMD for women.

In an effort to explore this association, this paper uses regional levels of deprivation for Ireland (Haase and Pratschke, 2008), and three additional contextual variables; regional rates

of disability, lone parents and self reported health status. The inclusion of the variable regional rates of disability was based on previous research that found that using disability as a proxy for economic inactivity, found that individual mental health status was significantly associated with place based economic inactivity, after adjusting for individual-level variables (Fone et al., 2007; Weich et al., 2003). The rational for including regional rates of lone parents within the MLM was based on research that found that being a lone parent has (a) been shown to be positively associated with rates of mental illness and (b) being a lone parent is positively associated with high rates of deprivation (Matheson et al., 2006). Furthermore, within an Irish context, the majority of lone parents are single mothers. Thus, the inclusion of regional rates of lone parent's acts as an additional proxy for gendered deprivation. Finally, with regard to self reported physical health outcomes, studies have found that physical health outcomes are closely related to mental health outcomes (Stafford et al., 2005), particularly among women (Kahn et al., 2000). Regional rates of very good self-reported health status were included in the model to control for regional rates of health outcomes.

This paper continues as follows; Section 2 provides an outline of the data used and why it was included within this study. Section 3 introduces the multi-level modelling framework and the rationale for its use within this paper. Section 4 presents the results of the analysis. Section 5 discusses the results presented in section 4 within the context of previous international research. Finally, section 6 offers concluding remarks.

2. **Data**

Data Sources

The Quarterly National Household Survey (QNHS) is a representative micro-level dataset for the whole of Ireland, the main purpose of which is the provision of timely estimates of short-term labour market trends. Whilst the main purpose of the QNHS is the production of quarterly labour force estimates, there is also a provision for the collection of data on social topics through the inclusion of special survey modules. In 2007, Quarter 3, a special module on health and health service utilization was collected. This module was commissioned by a specially created health liaison group, which comprised experts in several fields of medical research and officials in the Department of Health. The data are linked to the core data collected as part of the QNHS and therefore demographic, socio-economic and spatial variables are included in the dataset. The health module collected in Quarter 3, 2007 forms

the basis of this paper. The 2007 QNHS health survey contained 21,253 individuals. The variables included a variety of medical health status, health conditions and health utilization data, as well as demographic and socio-economic. Of interest to this paper is that the survey contained a specific question on CMD; had the individual ever been diagnosed by a doctor with depression and/or anxiety. The QNHS contains two spatial variables, NUTS3 region and whether the individual lived in an urban or rural area.

To help prevent collinerity between the individual and regional level covariates, the contextual variables were obtained from data outside the QNHS and were derived from multiple sources. The variable on regional deprivation, already presented in the Introduction section, was taken from the New Measures of Deprivation for the Republic of Ireland (Haase and Pratschke, 2008). This measure used a range of socio-economic data from the Census of Population 1991, 1996, 2002 and 2006 to calculate a composite index of both absolute and relative deprivation at the regional and small area level in Ireland (Haase and Pratschke, 2008). This paper utilizes the relative deprivation index calculated for the eight NUTS3 regions in Ireland, the Border, Dublin, Mid-East, Midlands, Mid-West, South-East, South West and West. The relative deprivation index has a mean of 0 and a standard deviation of 10. Positive score indicate increasing affluence, negative scores indicate increasing disadvantage (Haase and Pratschke, 2008). As noted in the Introduction, large disparities exist between each of the regions, with the Border region being the most deprived region (-4.5) in Ireland and the Mid East region (consisting of the counties around Dublin) the least deprived (+6.6) in 2006 (Haase and Pratschke, 2008). The other three regional contextual variables, regional rates of single parents, self-reported very good health status and disability were obtained from the weighted QNHS. These regional variables were then used to create regional interaction variables. Table 2 includes a description of the regional interaction variables included in the final model.

Dependent Variable

Data collected for the purpose of epidemiological research on mental health is usually based on clinical scales. However, due to the lack of publically available data using a clinical scale for CMD this paper uses a self-reported variable; had the individual ever been doctor diagnosed with a CMD, as the dependent variable. It is important to note that there may be limitations on using a dependent variable that is self-reported. The use of a self reported variable may compound several sources of invalidity and unreliability: for example the

potential unreliability of a clinical diagnoses, particularly with regard to mental health and the respondent's memory. There may also be a urban bias as individuals in rural areas may have limited access to health services. However, recent research (Sanchez-Villegas et al., 2008; Vellakkal et al., 2013) has argued that the use of self-reported medical diagnosis of CMD can be an appropriate approach in epidemiology studies. For example, Vellakkal et al., (2013) note that poorer levels of health literacy may bias prevalence rates based on clinical scales among the elderly, the lower educated and individuals in lower socioeconomic groups who may have lower health literacy skills. Thus, as the self reported variable, have you ever been diagnosed with CMD is imperfect, recent studies by Sanchez-Villegas et al., (2008) and Vellakkal et al., (2013) have shown that self-reported medical diagnoses can be a valid method of capturing health outcomes, in lieu of clinical scales, in the general population.

Regional Level Contextual Variables

As noted above, the main explanatory of interest within this analysis was regional level deprivation, whilst the selection of the three further contextual variables included in this analysis, regional rates of disability, lone parents and self reported health status, was guided by previous research and theory linking place based stressors to poor mental health (Matheson et al., 2006). This paper utilises the relative deprivation index calculated for the eight NUTS3 regions in Ireland, the Border, Dublin, Mid-East, Midlands, Mid-West, South-East, South West and West (Haase and Pratschke, 2008). The relative deprivation index has a mean of 0 and a standard deviation of 10. Positive score indicate increasing affluence and negative scores indicate increasing disadvantage (Haase and Pratschke, 2008). The data used for the three further contextual variables, regional rates of disability, lone parents and self reported health status were all obtained from the Census of Population, 2006 (CSO, 2006).

Individual Variables

Individual-level variables that reflect the socio-demographic characteristics related to CMD were included to adjust for their potential impact on individual-level CMD when the four cross level regional stressors are included in the model. The variables used from the QNHS included gender, age, marital status, education level, employment status, disability status, whether the individual had visited a GP in the previous 12 months and whether the individual was entitled to free medical care (had a medical card). Medical card ownership has been used as a proxy for individual level income within socio-economic and health research in Ireland

(Tay et al., 2004; Morrissey et al., 2008).

Table 2 Summary Statistics of the Compositional and Contextual Variables included in the MLM

3. Methodology

The present study aims to add a gender and regional perspective to our understanding of CMD, using the QNHS dataset. Conceptualising and designing research on the association between health outcomes and relative deprivation is best carried out using ecological studies at higher levels of geography, where differences in socio-economic circumstances are more pronounced (Pickett & Williamson, 2010; Fone et al., 2013). Within this context, research to date on the individual and contextual predicators of CMD has focused on the use of multilevel models. Multilevel models allow quantitative analyses to operationalise environmental context in a manner that accounts for both average outcomes as well as deviations about average outcomes of spatial events (Zolnik, 2009). Thus, allowing research to appropriately attribute variations in the outcomes of spatial events to differences between places and differences between people within places. MLM first determines how much of the variance in the outcome measure of CMD can be attributed to the regional level (null model). This is followed with a series of models first introducing individual-level variables then regional including the individual and regional level variables together in a final model (Matheson et al., 2006). A second spatial variable, urban/rural residency is introduced in both Model 2 (individual level model) and Model 3 (individual and contextual model) as a random coefficient in the random component of the model to allow the magnitude of the urban-rural differential to vary across regions. Model estimation uses iterative Monte Carlo Markov Chain (MCMC) sampling methods (Leckie and Charlton, 2013), as provided by the runmlwin program in Stata (Leckie and Charlton, 2013). Goodness of fit is assessed by a measure of fit that penalises model complexity, known as the Deviance Information Criterion or DIC (Spiegelhalter et al., 2002).

4. Results

Using the QNHS, it was found that in 2007, 3.8% (809 individuals) of the Irish population reported having being diagnosed with a CMD.

Null Model

Of the 809 individuals that reported suffering from CMD in the QNHS, 2007, 13% resided in the Border region, 28% in the Dublin region, 10% in the Mid East, 7% in the Midlands, 10% in the Mid-West, 9% in the South-East, 15% in the South-West and 8% in the West. Table 2 presents the results of the MLM. In the null (logistic) model, the constant value of –3.26 is interpreted as the log-odds of having been diagnosed with a CMD in the average region. Formulating the model in terms of a continuous latent response variable, the degree of clustering in the data, the variance partition coefficient (VPC) is 0.02. This indicates that 2% of the variation in an individual's propensity to have been diagnosed with a CMD lies between regions. In interpreting the value of the VPC, it is important to keep the following points in mind: while most of the variability in CMD is at the individual level, the magnitude of the VPC is within the typical range since VPCs rarely exceed 0.20 (Snijders & Bosker, 1999; Matheson et al., 2006); the size of the ICC does not rule out relatively large effects of neighborhood level measures (Duncan & Raudenbush, 1999; Matheson et al., 2006); and, to the extent that the final model includes significant cross-level interactions, VPCs will vary across level two units. Thus, not in spite of but because of the reported VPC being small, a MLM framework remains relevant to this analysis. The reported DIC for the null model was 6842.40.

Model 2 – Compositional Effects

Model 2 includes individual level covariates in the fixed component of the model and an urban/rural coefficient in the random component of the model. Table 1 contains a description of the individual predictors included in the model. Table 2, presents the coefficients and significance levels of the variables included in the model. From Table 2, one can see that a younger age profile, being married, being widowed, a GP visit, disability profile and urban residency have a significant impact on having been diagnosed with CMD. Examining model 2, the variance estimate at the regional level remains similar to the null model at 2.6% and the DIC experiences a large decrease from 6842.40 to 5738.61. Introducing the urban/rural coefficient in the random component of the model, allows the magnitude of the urban-rural differentials to vary across regions. The residual variance between regions for individuals living in urban areas is 8.4% and 6.6% for individuals living in rural areas. These results show that there is greater regional-level variation in the probability of doctor diagnosed rates of CMDs in urban areas than in rural areas. The confidence intervals reported in Table 3 also indicate that this observed variance is statistically significant. The negative intercept for rural

covariance (-0.068) implies that regions with above average rates of diagnosed CMD tend to have below average rural effects.

With regard to the individual determinants included in the model 2, all levels of age relative to the base category 75 years old plus, were found to have a significant effect on having a CMD. Individuals aged 35 to 44 (2.08) and 45 to 54 (1.88) years old had the greatest effect on having a CMD relative to the base category. The model found that being married (-0.61) relative to being single, living in rural areas (-0.66) and being employed (-0.54) had a negative effect on whether an individual reported having been diagnosed with a CMD. The compositional model also found that being entitled to free health care (medical card ownership, 0.63), having visited a GP in the previous 12 months (1.10) and having a disability (1.68) had a positive effect on whether an individual reported having been diagnosed with a CMD.

Model 3 – Compositional and Contextual Effects

Model 3 includes both individual level and contextual predictors in the fixed component of the model and again an urban/rural coefficient in the random component of the model. Correlation tests were undertaken for each of the four contextual predictors to examine collinearity. None of the variables reported a correlation greater than -0.08. Table 2 contains a description of the 4 regional interaction terms. With the addition of the regional interaction terms, the variance estimate at the regional level increases marginally to 3.3% (Table 3) and there is an improvement in model fit (reduced DIC from 5738.61 to 5651.68). The addition of regional interaction predictors also has an effect on the random part of the model, whereby the residual variance between regions for individuals living in urban areas increases to 11%. The residual variance between regions for individuals living in rural areas also increases to 7.6%. Again, the confidence intervals reported in Table 3 also indicate that this observed variance is statistically significant. These results indicate that a higher percentage of regional level variation in urban areas is explained by the addition of the four contextual predicators than rural areas. The intercept for rural covariance increases marginally to (-0.087) this implies that regions with above average rates of doctor diagnosed CMD tend to have below average rural effects.

Table 4 presents the coefficients and significance levels of the individual and regional interaction variables. From Table 4, one can see that the same individual level variables

remain significant; all levels of age relative to the base category 75 years old plus, were found to have a significant effect on having a CMD. Again individuals aged 35 to 44 (2.08) and 45 to 54 (1.88) years old had the greatest effect on having a CMD within the model. The model found that being married (-0.65) relative to being single, living in rural areas (-0.68) and being employed (-0.48) had a negative effect on whether an individual reported having been diagnosed with a CMD. The compositional model also found that being entitled to free health care (medical card ownership, 0.62); having visited a GP in the previous 12 months (0.92) had a positive effect on whether an individual reported having been diagnosed with a CMD. Interesting on inclusion of the contextual variables, the disability variable becomes negative and the coefficient decreases in size (0.001). These would seem to indicate that the inclusion of the interaction term individual disability has a greater impact on CMDs than individual level disability alone. One can see that all four contextual interaction predicators have a significant impact on whether an individual has been diagnosed with a CMD (lone parent by regional rates of lone parents -0.008, individual level very good health status by regional rates of very good health status, -0.022, individual level disability by regional rates of disability, -.084 and female by regional relative deprivation, 0.021). The significance of these interaction terms indicates that controlling for individual level variables, lone parents living in regions with higher percentage of lone parents, individuals with disabilities living in regions with higher percentage of individuals with disabilities and individuals with good health living in regions with higher percentage of individuals reporting good health are less likely to report CMDs. Thus, each of these three regional interaction terms has a significant negative association with the CMDs. In contrast, the interaction term for females and regional deprivation is positive, therefore indicating that women living in more deprived regions tend to have a greater number of CMD in Ireland. However, the magnitudes of the reported coefficients are very small, particularly in comparison to the individual level predictors.

Table 3 Variance and percentage of total unexplained variance at the individual and urban/rural level in the prevalence of CMDs in Ireland

Table 4 Effect of individual and urban/rural residency on levels of CMDs in 2007

5. Discussion

In spite of emerging evidence that the places where people live influence health status (Fone et al., 2007; Stafford et al., 2005; Pickett & Pearl, 2001), there are few previous studies

investigating the effect of regional variation in relative deprivation on mental health from a gendered perspective. Recent research examining the association between gender, place based disadvantage and inequality and CMD (Bassett and Moore, 2013; Payabo et al., 2013) found that living in a county or state with higher income inequality increases the risk of developing depression (anxiety was not modeled) among women. Within this context, this paper examined the association between regional deprivation, gender and CMD outcomes. Compared to previous studies of this nature (Peterson et al., 2009; Peen et al., 2010; Skapinakis et al., 2005), this study found that contextual predictors explained a higher proportion of regional variance (3.3%) in CMD in Ireland

Exploring this variation further, it was found that whilst regional deprivation alone did not have a significant impact on CMDs, the interaction between female and regional relative deprivation was significant. Thus, similar to previous research (Kahn et al., 1995; Pabayo et al., 2013; Bassett and Moore, 2013), this paper found that women living in more deprived regions tend to have a greater number of CMD in Ireland. These results potentially reflect the sensitivity of women to deprivation in terms of wider social relations and to the impact of income inequality in society. The selection of the three further contextual variables included in this analysis, regional rates of disability, lone parents and self reported health status, was guided by previous research linking contextual effects to poor mental health. With regard to regional rates of disability, research in the UK by Fone et al., (2007) and Weich et al., (2003) using disability as a proxy for economic inactivity, found that individual mental health status was significantly associated with place based economic inactivity, after adjusting for individual-level variables. In contrast, this research found that interacting individual level disability by regional rates of disability has a small negative, but significant association on CMD outcomes. This is an interesting result and may be related to the regional rather than small area level focus used by Weich et al., (2003) and Fone et al., (2007) of this paper. That is, whilst levels of disability may be important at lower geographical scales, for example within neighbourhoods, the impact of having a disability and being economically inactive, in a region with high disability rates lessens the relationship between disability, economic inactivity and CMD.

This paper hypothesised, given the relationship between lone parents, female gender and deprivation that lone parents by regional rates of lone parents may be a proxy for gendered

poverty and therefore have a positive relationship with CMD outcomes. However, as with the disability interaction variable, the lone parents by regional rates of lone parents interaction had a negative association on CMD outcomes. Again this may be because the impact of being a lone parent, in a region with high lone parent rates lessens the relationship between lone parents and CMD. Instead, the association between lone parenthood and disability on CMD is normalised at the regional scale in Ireland. Finally, as expected individual self reported good health by regional rates of reported good health status is negatively associated with CMD. As noted above, research has found that physical health outcomes are closely related to mental health outcomes (Pickett and Wilkinson, 2010), particularly among women (Kahn et al., 2000).

The results of this paper therefore have important implications for research and policy on CMD. In light of previous research on the role of area based deprivation and it's differing impacts on men and women, the significant relationship between regional rates of deprivation once interacted with female individuals is an interesting result both in the Irish context and internationally. Whilst, the significance and higher proportion of variance (3.3%) predicted by the contextual variables demonstrates that levels of disadvantage within regions, where more variance in personal and area based characteristics are observed, are a more important predictor of CMD for women. Finally, including an urban/rural predictor in the random component of the model 2 and model 3 allowed the magnitude of the urban-rural differentials to vary across regions. It was found that on controlling for individual and contextual predictors, there is greater regional-level variation in the probability of CMDs in urban areas compared to rural areas. Although not a central focus of this paper, the finding that urban areas, based on both compositional and contextual factors have a greater association with CMD is interesting. In terms of health care planning across Ireland, this result indicates that a "one shoe fits all" approach to health service delivery is not appropriate. As noted by Peterson et al., (2005) working in the USA, the nature and strength of contextual associations with mental health status differs between rural and urban settings. Thus, in delivering effective services, health policy and planning needs to acknowledge the importance of contextual characteristics that distinguish rural and urban areas in Ireland.

However, certain limitations should be considered when interpreting the results presented in this paper. This study used large European defined administrative areas as the higher level of aggregation, and the analysis included only two levels, the individual and regional. Whilst

household level has been shown to be an important source of variation in previous research (Weich et al., 2005), the high proportion of one-person households in the QNHS limits the use of a household level. Under these circumstances, the addition of a household level would make it very difficult to separate out between- and within-household variation because of confounding across level-1 and -2 (Twigg et al., 2000). Additionally there are also substantive reasons for not including the household level: in a correct model, the overall effect of including the level of household would be to reduce variation at the regional level. As the objective of the paper is to predict variation at the regional level, it is appropriate to allow these higher-level differences to exist even if some of their variation can be explained by household differences. Thus, the multilevel structures adopted model CMDs at the individual across two levels: the individual and the regional level. Finally, the CMD variable within the QNHS is assessed in a crude way, using a simple self-reported question on whether an individual had been ever diagnosed by a doctor with either or both depression and anxiety. Thus, a degree of random misclassification will be inevitable and may have biased the results in either direction. However, it is important to note that recent studies by Sanchez-Villegas et al., (2008) and Vellakkal et al., (2013) each advocate the use of self-reported medical diagnosis as a valid method of capturing health outcomes in the general population.

6. Conclusions

Given the increasing prevalence of CMD (Weich et al., 2005), this study is of interest to both policymakers in Ireland and internationally in beginning to understand the relationship between regional characteristics and mental health outcomes so that scarce health service resources may be targeted more effectively. Studies that simultaneously investigate contextual and individual factors are needed to advance our understanding of the determinants of health (Diez Roux, 1998) and to provide a basis for planning improvements in public health (Macintyre et al., 1993). This study, therefore, adds insight to the relationship between place based deprivation, gender and CMD and confirms that health policies that are based on a "one size fits all'' in terms of either place or gender are not sufficient. Indeed, the results presented within this paper indicate the sensitivity of women to deprivation and wider income inequality in society. Thus, this study hopes to prompt those responsible for developing, implementing, and evaluating mental health policies to acknowledge the important differences in the effects place based deprivation has on men and women.

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Table 1 Key characteristics of the NUTS 3 regions in terms of socio-economic profile

	Population ('000) 2007*	**Persons at Work % 2007***	**Indices of Income per capita 2007****	**Relative Deprivation Score 2006*****
Border	481	10.5%	**92.3**	-4.5
Midlands	260	5.8%	91.2	-.3
West	419	9.4%	93.6	.8
Dublin	1,210	29.3%	111.7	4.3
Mid-East	497	11.9%	103.7	6.6
Mid-West	365	8.2%	97.6	2.1
South-East	474	10.5%	**93.4**	-.4
South-West	632	14.4%	95.7	3.4
State	**4,338**	**100%**	100	2.1

* Source: QNHS, 2007, ** Source: National Accounts, 2007, CSO, Source *** New Measures of Deprivation for the Republic of Ireland for 2006 (Haase and Pratschke, 2008)

Table 2 Summary Statistics of the Compositional Variables included in the MLM

Gender: Male	28%
Age 18-24	3%
Age 25-34	12%
Age 35-44	24%
Age 45-54	23%
Age55-64	17%
Age 65-74	12%
Age 75 Plus	7%
Marital Status: Single	35%
Marital Status: Married	40%
Marital Status: Divorced/Separated	14%
Marital Status: Widowed	10%
Education: Primary Only	34%
Education: Lower Secondary	19%
Education: Upper Secondary	17%
Education: Post Leaving Cert	9%
Education: Third Non degree Level	9%
Education: Third degree Level	11%
Employed: No	69%
Employed: Yes	31%

Medical Card: No	61%
Medical Card: Yes	39%
Used GP Services: No	7%
Used GP Services: Yes	93%
Disability: No	61%
Disability: Yes	39%

Table 3 Variance and percentage of total unexplained variance at the individual and urban/rural level in the prevalence of depression in Ireland

	Variance and Confidence Intervals			% unexplained variance in the prevalence of depression	DIC
Model 1 - Null Model					
Individual	3.29			98%	6842.40
Region		0.064	CI: 0.015-0.195	2%	
Model 2 – Random Slope Included (Rural)					
Individual	3.29			97.4%	5738.61
Region (Rural)	Var(cons)	0.088;	CI: 0.024-0.25	2.6%	
	Cov(cons, rural)	-0.068;	CI: -0.244-0.01		
	Var(rural)	0.114;	CI: 0.016-0.45		
Model 3 – Random Effects + Contextual Characteristics Included					
Individual	3.29			96.7%	5651.68
Region (Rural)	Var(cons)	0.112;	CI: 0.03 -0.32	3.3%	
	Cov(cons, rural)	-0.087;	CI: -0.31 - 0.005		
	Var(rural)	0.139;	CI: 0.02 -0.53		

Table 4 Effect of individual and urban rural on levels of depression (self-reported) in 2007

Independent Variables	Mean	95% CI		Mean	95% CI	
Sex: Female - 1						
Sex	0.15*	-0.01	0.32	0.12*	-0.06	0.3
Age: Reference Age 75 plus						
Age 15-24	1.02***	0.49	1.57	1.2***	0.66	1.75
Age 25-34	1.52***	1.11	1.93	1.64***	1.23	2.06
Age 35-44	2.09***	1.71	2.45	2.16***	1.79	2.54
Age 45-54	1.89***	1.53	2.25	1.9***	1.53	2.27
Age 55-64	1.46***	1.11	1.81	1.42***	1.06	1.78
Age 65-74	0.74***	0.41	1.09	0.74***	0.41	1.1
Marital Status: Reference Single						
Married	-0.61***	-0.8	-0.42	-0.66***	-0.85	-0.46
Divorced/Separated	0.03	-0.24	0.28	0.07	-0.19	0.33
Widowed	-0.32	-0.64	0.02	-0.3*	-0.61	0.01
Employed: 1- Yes						
Employed	-0.54***	-0.74	-0.35	-0.47***	-0.67	-0.28
Medical Card: 1 - Yes						
Medical Card	0.64***	0.44	0.83	0.62***	0.42	0.82
GP Visit: 1 - Yes						
GP Visit	1.11***	0.83	1.41	0.93***	0.65	1.23
Disability: 1 - Yes						
Disability	1.69***	1.53	1.84	0	-1.41	1.39
Education: Reference University-degree						
Lower Primary	-0.03	-0.3	0.25	-0.1	-0.38	0.19
Lower Secondary	0.01	-0.27	0.31	-0.02	-0.31	0.27
Leaving Certificate	-0.06	-0.34	0.22	-0.1	-0.38	0.17
Post Leaving Certificate non-degree	0.16	-0.16	0.51	0.14	-0.18	0.45
University – non-degree	0.23	-0.07	0.55	0.21	-0.12	0.54
Rural (No, 0; Yes, 1)	-0.66***	-1.11	-0.32	-0.69	-1.07	-0.36
Interaction: Female* Regional Deprivation				0.02**	0	0.04
Interaction: Lone Parent* Regional Rates of Lone Parents				-0.01***	-0.01	0
Interaction: Very Good Health Status* Regional Rates of Self Reported Very Good Health Status				-0.02***	-0.03	-0.02
Interaction: Disability *Regional Rates of Economic Inactivity due to Disability				-0.08***	0.01	0.16
Constant	-6.17***	-6.79	-5.59	-5.69***	-6.29	-5.1

* = $p<0.05$, ** = $p<0.01$,*** = $p<0.001$