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Physical activity and core depressive symptoms in the older Irish adult population.

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Physical activity and core depressive symptoms in the older Irish adult population

A project funded by the Centre for Ageing Research and Development in Ireland (CARDI)¹

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Executive Summary

Research indicates that the prevalence of depression is increasing and that by 2020 depression will become the second leading cause of disease worldwide, as measured by disability adjusted life years. Interventions which involve physical activity have shown that becoming active, even at a moderate level; can be effective in treating depression. In addition, physically active individuals are less likely to develop depressive symptoms than those who are not active, making physical activity an important strategy in the prevention of ill health.

The aim of this study was to investigate the associations between physical activity levels and core depressive symptoms in Irish adults aged 50 years or more. The study used data from the Survey of Lifestyle, Attitudes and Nutrition (SLÁN) 2007, a national survey of individuals living in the Republic of Ireland (n=4,255 adults aged 50 years or older) and The Northern Ireland Health and Social Wellbeing Survey (NIHSWS), 2005-2006, a survey of individuals living in Northern Ireland (n=1,904 adults aged 50 years or older).

Measures of depressed mood and anhedonia (two core depressive symptoms according to diagnostic criteria (DSM IV)) were derived using items from the surveys. Physical activity patterns were categorised using the International Physical Activity Questionnaire (IPAQ) Short Form (Craig et al. 2003). Demographic factors (age, gender and social class), smoking status and health service use were also considered.

Just over 5% (5.4%) of SLÁN 2007 participants and 11.1% of NIHSWS 2005-2006 participants had experienced both depressed mood and anhedonia in the recent past. In the overall sample this was 7.2% of participants. Overall 45% of participants reported being moderately physically active but 36.6% of participants reported activity at low levels (SLÁN 2007: 35.6%; NIHSWS 2005-2006: 38.8%). For the overall sample, depressive symptoms were negatively associated with being male, being older and high levels of physical activity. Depressive symptoms were significantly and positively associated with being separated/divorced or widowed, and social classes 3-6. Overall, people over 50 years who were engaged in moderate to high levels of physical activity had a 50-56% reduction in the odds of having elevated depressive symptoms.

Consistent with other research findings, this study suggests that physical activity levels are strongly associated with depressive symptoms. Increasing levels of physical activity among adults over 50 years has the potential to improve mental health.

1. Introduction

1.1 Definition and prevalence of depression

Depression refers to the presence of depressive syndromes defined in the American Psychiatric Association's Diagnostic and Statistical Manual (Craig et al. 2003) and in the International Classification of Diseases (World Health Organization)). For a diagnosis of major depression to be made, DSM-IV and ICD-10 both state that either depressed mood or anhedonia (loss of interest or pleasure) must be present, while ICD-10 additionally indicates that fatigue should also be present.

In 2008, Chapman and Perry highlighted the fact that rates of major depression have risen markedly in recent years and that by 2020, depression is set to become the second leading cause of disease worldwide, as measured by disability adjusted life years (Chapman and Perry 2008).

Depression in older age is reported to be relatively frequent in the literature, with major depression rates ranging from 0.9% to 9.4% for individuals living in private households and from 14% to 42% for individuals living in institutions (Djernes 2006), (Teresi 2001); (Evers 2002). When both groups are included, rates range from 1% to 16% (Djernes 2006). The European Collaborative Group on Depression (EURODEP) reported a combined prevalence of 12.3% (14.1% in women and 8.6% in men) for adults living in the community across Europe (Copeland et al. 1999). A slightly lower prevalence rate of 8.7%, increasing to 9.7% if concurrent dementia was reported, was found in a 2007 British cohort study (McDougall et al. 2007). In the United States, large-scale epidemiological investigations have estimated the prevalence of major depressive disorder in community dwelling adults aged 65 or older to be between 1% and 5%, while the prevalence of clinically significant depressive symptoms is estimated to be approximately 15% (Blazer 2003).

In general, rates of depression appear to be higher in older women when compared with older men, although the gap narrows with age (Djernes 2006). The Cross-national Longitudinal European Study on Ageing (CLESA), found that prevalence of depressive symptoms was higher in women than in men in four of five countries studied including Spain, Italy, the Netherlands and Finland (Zunzunegui et al. 2007). The exception was Sweden. Findings indicated that the excess representation of female depressive symptoms remained after taking into account higher prevalence of social and health related risk factors, suggesting the existence of additional pathways linked to gender and/or biological sex.

Few studies have reported differences in depression prevalence by race or ethnicity, although depressive symptoms may be more common among Hispanic older women than non-Hispanic white participants (Swenson et al. 2000). Social class differences have been more widely studied in cross-sectional and longitudinal studies. Low socio-economic status (SES) has been found to be related to a higher prevalence and incidence of depression (Everson et al. 2002). Research has provided evidence that low SES is related to low perceived control over behaviour, negative approaches to coping with perceived stressful situations and challenges, poor social support, and more stressful life events. Consequently, it has been found that people with lower SES often have less psychosocial resources than people with higher SES (Glass, Kasl, and Berkman 1997). The association between psychosocial factors and depression has been studied extensively, with several studies finding positive effects of social support on mental health. Stressful life events, often associated with low SES (e.g. income loss and ill health) have a strongly negative impact on depressive symptoms (McLeod 1990). In a study by Koster and colleagues, low SES predicted the incidence of depression in a large sample of older adults, with psychosocial factors explaining on average 16% of the differences in incident depression (Koster et al. 2005). Lorant et al. (Lorant et al. 2007) in a prospective cohort study also observed a clear relationship between depression and worsening socio-economic circumstances.

1.2 Depression - findings from Ireland

In Ireland, SLÁN (Doyle 2010) 2007 reported that overall, 6% of respondents had experienced major depression within the previous year. In the 45-64 year age group the proportion was 7% and in the older age group (65 years or more) it was 3% (Morgan et al. 2008). Reflecting trends in other countries men (5%) were less likely to experience depression than women (8%). SLÁN 2007 also included a standard 5-item measure of psychological distress – the Mental Health Index (MHI-5) from the SF-36 (Ward et al. 2009). Findings suggested relatively low levels of psychological distress in the population. Men had statistically significantly higher average scores than women, indicating less psychological distress (mean scores of 83 compared to 81; $p < 0.001$), with no clear pattern across age groups. However, respondents in higher social classes (SC) reported less psychological distress than those in lower social classes (SC 1-2: 83; SC 3-4: 82; SC 5-6: 80).

In Northern Ireland, the Northern Ireland Health and Social Wellbeing Study (NIHSWS) 2005-06 used the short version of the General Health Questionnaire (GHQ-12) (Goldberg 1992) to measure psychological distress in the population. Overall, 19% of all respondents in Northern Ireland were categorised as showing a probable mental health problem. As in SLÁN 2007, women were more likely to report problems than men (22% compared to 16%; $p < 0.001$). Twenty-two percent of those aged 45-64 years and 16% of those aged 65 years or older reported a probable mental health problem. While there was no significant difference found

regarding mental health difficulties in terms of social class in Northern Ireland (SC 1-2: 15%; SC 3-4: 19%; SC 5-6: 22%), the pattern was similar to that of SLÁN, with a greater prevalence of psychological distress found in lower social classes.

1.3 Increasing focus on depression in older adults

Studies of depression tend to focus on younger adults as the prevalence of major depressive disorder is higher in younger compared to older adults. However, recent research has called for reconsideration of this approach, as rates of major depression, and subsequent incidence of suicide, increase with age (Chapman and Perry 2008). In older age, depressive syndromes often affect people with chronic medical illnesses, cognitive impairment or disability (Alexopoulos et al. 2002). Depression in older adults is not only associated with increased risk of morbidity but also increases the risk of suicide and self-neglect, while it decreases physical, cognitive and social functioning. These factors may contribute to an overall increased mortality rate for older adults that experience depression (Blazer 2003). Diagnosing depression in older adults may be more difficult than with younger adults as symptoms may be masked by physical conditions or mistaken for symptoms of an illness. Chapman and Perry (Chapman and Perry 2008) also suggest that perhaps less consideration is given to the cost of depression and the efficacy of treatment because many older people are retired from work. So, while some improvements have been made in identifying and treating depression in older adults, the importance of screening and aggressive treatment for depression in older people continues to be highlighted (O'Connell et al. 2004).

1.4 Physical activity

There are many ways to reduce depression but perhaps one of the most underused ways is through physical activity. A 2008 review identified observational and intervention studies showing inverse associations between physical activity and the likelihood of depression in adults (Teychenne, Ball, and Salmon 2008). Physical activity has been found to have protective effects on depression even at relatively low levels (Strawbridge et al. 2002). Win and colleagues found that high depression scores and low physical activity rates were strongly associated and that participants with the lowest physical activity levels were more than three times as likely to have a high depression score as those in the most active group (Win et al. 2011). As an intervention with older adults, exercise training has proved to be highly successful, with no significant difference between the impact of psychopharmacological treatment and exercise training on symptoms of depression (Blumenthal et al. 2007); (Blumenthal et al. 1999). In a review of the literature, Barbour and Blumenthal (Barbour and Blumenthal 2005) found that exercise leads to a reduction in depressive symptoms for participants placed on a waiting list for further intervention and for participants given weekly

social contact sessions. In some instances it was found that exercise also led to a reduction in depressive symptoms when compared to those on antidepressant medication.

Studies have also reported that the interventions bring about changes in behaviour that persist long after intervention. Singh and colleagues, for example found that exercise training with older patients was still effective in treating depression 20 weeks after intervention (Singh, Clements, and Singh 2001). Similarly, Babyak found that 10 months after an exercise-based depression treatment intervention for older adults, the participants assigned to an exercise group had significantly lower relapse rates than participants assigned to a psychopharmacological therapy group (Babyak et al. 2000). Exercising individually following both of these interventions was associated with a reduced probability of depression diagnosis, indicating the potency and practicality of exercise for older adults experiencing depression.

1.5 Physical activity - findings from Ireland

Whilst recent research indicates the usefulness of exercise in reducing depression rates, levels of physical activity still remain low for older Irish adults. In the Republic of Ireland, the Department of Health and Children and the Health Service Executive published national guidelines on physical activity (The Department of Health and Children and The Health Service Executive 2009). These state that 'every adult should be active. Some physical activity is better than none, more is better than some, and any amount of physical activity you do gains some health benefits' (p.13).

A majority of SLÁN 2007 participants (51%) in the 45-64 age group reported moderate activity levels, with a further 28% reporting low and 21% reporting high levels of physical activity. Those aged 65 years or older reported lower activity levels, with 44% of participants reporting low activity, 46% moderate and the remaining 10% reporting high activity levels.

In the NIHSWS 2005-2006 study, there were similar findings. Almost half of respondents aged 45-64 years engaged in an intermediate level of physical activity (45%) while 29% engaged in above recommended activity and a further 26% of participants were described as sedentary. Those aged over 65 years were primarily sedentary (52%) while 30% engaged in intermediate levels of activity. The remaining 18% were described as engaging in above average levels of physical activity. When both groups were compared it was found that the oldest age group in both the Republic of Ireland and Northern Ireland had the highest percentage of physically inactive respondents. As noted by Ward and colleagues there was little social class variation for those reporting high or above recommended levels of physical activity (Ward et al. 2009).

2. The current study

The overall aim of this study is to investigate the associations between physical activity levels and core depressive symptoms in Irish adults aged 50 years or more. The current study will analyse the latest national level data available (SLÁN 2007 and NIHSWS 2005-2006) at an item level focusing on physical activity and the two core depressive symptoms according to DSM IV diagnostic criteria– depressed mood and anhedonia. The study will provide baseline data on core depressive symptoms in the community in Ireland (North and South), as well as an internationally comparable profile of physical activity patterns in this group. Understanding the associations between these key variables will give important insights into how the physical and mental health of respondents may be improved, and will inform public health and policy approaches (e.g. public transport to increase physical activity).

The study objectives are:

- 1) To profile the physical activity levels of older adults in Ireland (North and South) and compare these with international studies.
- 2) To derive measures of core depressive symptoms (depressed mood and anhedonia) from the different measures used in the SLÁN and NIHSW surveys.
- 3) To examine the prevalence of depressive symptoms specifically depressed mood and anhedonia in older adults.
- 4) To assess the association between depressed mood, anhedonia and levels of physical activity in older adults.

Age, gender and social class effects will be considered, as well as other significant identified covariates.

3. Methodology

3.1 Design

This was a retrospective quantitative study involving secondary analysis of existing national datasets.

3.2 Materials

The datasets used in this study were those from the Northern Ireland Health and Social Wellbeing Survey (NIHSWS) 2005-2006 and the Survey of Lifestyle Attitudes and Nutrition (SLÁN) 2007. The NIHSWS 2005-2006 data was obtained from the UK data archive (<http://www.data-archive.ac.uk/>) and the SLÁN 2007 from the Irish Social Science Data Archive (<http://www.ucd.ie/issda/>). These surveys are the latest available sources of nationally representative data on health and lifestyle in the Ireland.

3.2.1 SLÁN 2007 sampling and weighting

In the Republic of Ireland, the SLÁN survey has been conducted on three occasions to date – in 1998, 2002 and 2007. The survey includes all adults' aged 18 years and older living in private households. The sampling frame for SLÁN 2007 was the GeoDirectory, which is a listing of all addresses in Ireland compiled by An Post. The sample used was probabilistic and was selected using the ESRI's RANSAM program, which results in probability samples where each dwelling has a known probability of selection. Four hundred primary sampling units were systematically selected and addresses identified. Respondent selection within a household was by the 'next birthday' rule. No substitution of respondents within households was allowed and only one person per household was interviewed. The sampling and weighing methods are described more fully in the SLÁN 2007 Main Report (Morgan et al. 2008). There was an overall response rate of 62%. For the purposes of this study, all participants aged 49 years or younger were excluded from the analysis.

3.2.2 NIHSWS 2005 sampling and weighting

In Northern Ireland, the Northern Ireland Health and Social Well-being Survey (NIHSWS) has been conducted on three occasions to date – 1997, 2001 and 2005-6. The survey includes adults' aged 16 years and older living in private households. The sample for NIHSWS 2005-2006 was based on a systematic random sample of 5,000 addresses drawn from the property database of the Land and Property Services Agency (LPSA). The LPSA addresses were sorted by district council and ward, so the sample was effectively stratified geographically. Interviews were sought of all adult members (those aged 16 and

older) of eligible addresses to yield a representative sample across Northern Ireland. The overall response rate was 66%. As with the SLÁN 2007 data, for the purposes of this study, all participants aged 49 years or younger were excluded from the analysis.

3.2.3 Mental health and well-being measures

To directly compare the presence of core depressive symptoms across the island of Ireland, questions that examined the presence of anhedonia and depressed mood had to be identified in both questionnaires. The items outlined in Table 1 were selected as the best items to assess the presence of depressed mood and anhedonia. The items as they appear in the individual surveys are included in Appendix A.

Table 1. Items chosen to indicate presence of anhedonia and depressed mood

	SLÁN 2007	NIHSWS 2005-2006
Depressed mood item	Occurrence of feelings of being sad, blue or depressed that lasted for two weeks or more in a row within the last 12 months	Have you recently been feeling unhappy and depressed?
Anhedonia item	Occurrence of a two week + period when the respondent lost all interest in things that usually give them pleasure during the last 12 months	Have you recently been able to enjoy your normal day-to-day activities?

The two items chosen from the SLÁN 2007 questionnaire were originally drawn from CIDI-SF V1.1 health interview survey, a short form of the World Health Organization's Composite International Diagnostic Interview Short Form (WHO-CIDI-SF). This interview, fully administered, provides a probable diagnosis of major depressive disorder (Kessler et al. 1998), indicating that the respondent fulfils the criteria of probable major depressive disorder through experiencing an episode of depression for at least two weeks during the past 12 months. The two items chosen from the NIHSWS 2005-2006 questionnaire were originally drawn from the GHQ-12 (Goldberg 1992), a screening instrument used to detect the presence of non-psychotic psychiatric morbidity in community settings. The GHQ-12 was originally designed for use in general practice settings as a screening tool and cannot be used to diagnose specific psychiatric problems.

3.2.4 Health behaviour variables

Physical activity levels, smoking status and attendance at a General Practitioner at least once in the previous year were assessed using items from the surveys. All items from the surveys referred to in this section are presented in Appendix A. It should be noted that in some cases there are differences in how questions are phrased in SLÁN 2007 and NIHSWS 2005-2006. These differences have been previously noted and discussed in the SLÁN 2007 'One Island – One Lifestyle?' report (Ward et al. 2009). The combining of various scales measuring the same core depressive symptoms is a method successfully employed previously in research examining anhedonia. One such study showed that symptoms of anhedonia, as measured by two different scales, scaled together without any other symptoms, forming a 'pure' scale (Doyle 2010). Although the questions drawn from the SLÁN questionnaire are more specific in nature, both questions from each questionnaire assess the same core symptoms, making direct Northern Ireland - Republic of Ireland comparisons possible. Future surveys will aim to have even greater comparability, with initiatives such as the European Health Survey System (EHSS), involving Core Health Interview Surveys and Health Examination Surveys, aiming to promote such compatibility across future European population surveys.

1. Smoking

In both survey's respondents were categorised as being non-smokers, current smokers or former smokers/ex-smokers. In SLÁN this was done using two questions centred around the WHO definition of 'never smoked' (World Health Organization 1998). Firstly, each participant was asked if they had smoked at least 100 cigarettes in their entire lives and secondly, if so, did the participant smoke every day, some days or not at all. In NIHSWS 2005-2006 respondents self-categorised themselves as current, ex or non-smoker.

2. Physical activity

SLÁN 2007 assessed physical activity using the International Physical Activity Questionnaire (IPAQ)² Short Form (Craig et al. 2003). An adapted version of the measure was used in the NIHSWS 2005-2006. The IPAQ includes a series of questions related to time spent being physically active at different levels, including walking. Results allow levels of activity to be categorised as low (little or no physical activity, less than 5,000 steps a day), moderate (approximately 5,000-10,000 steps a day) or high (over 10,000 steps a day).

² See www.ipaq.ki.se

3. Health service use

Both surveys included an item related to attending a General Practitioner in the previous 12 months. These items were used as a marker of health service use.

3.2.5 Demographic variables

1. Age

Respondents in both surveys were categorised by age. Six categories were used: 50-54, 55-59, 60-64, 65-69, 70-74 and 75 or older.

2. Social class

NIHSWS 2005-2006 used individual socio-economic group, derived from the SOC2000 classifications of occupations, as the social class indicator. SLÁN 2007 used the CSO96 social class classification. To facilitate comparison, the NIHSWS data was transformed from SOC2000 to CSO96 using a conversion program provided by the University of Essex. The CSO96 classification uses six categories:

- professional workers (social class 1);
- managerial and technical (social class 2);
- non-manual (social class 3);
- skilled manual (social class 4);
- semi-skilled (social class 5);
- unskilled (social class 6).

For the purpose of this analysis, these six categories were re-grouped into three social classes: SC 1-2, SC 3-4 and SC 5-6. In cases where there was not enough information available to assign a social class classification to a participant, he or she was assigned to an 'unclassified' group.

3.3 Procedure

Data was analysed using descriptive and inferential statistics for each dataset individually and combined. Univariate analysis (chi-square, logistic regression) assessed the association between the variables. Multivariate logistic regression assessed the associations between depressive symptoms and demographic and behavioural variables. This analysis also controlled for all available demographic and behavioural variables. The overall level of missing data was low (less than 2% for all variables). All tables presented in the results section include the overall numbers for clarity.

4. Results

4.1 Introduction

The results of this study are presented in a number of sections starting with a description of the participants. Associations between variables are presented and the relationship between depressive symptoms and physical activity is analysed using logistic regression.

4.2 Participants

The total number of respondents included in the analysis was 6,159. This comprised 4,255 SLÁN 2007 participants and 1,904 NIHSWS 2005-2006 participants (see Table 2). SLÁN 2007 participants were mostly female (52.1%) and married (55.8%). The largest number of respondents (37.1%) was drawn from social classes 3-4 (SC1-2: 28.6%; SC 5-6: 20.4%; unclassified: 14.0%). A similar demographic pattern was also observed in the Northern Ireland survey where participants were mostly female (57%), married (62%) and categorised as being in social classes 3-4 (SC1-2: 26.1%; SC 3-4: 38.4%; SC 5-6: 22.8%; unclassified: 12.6%).

Table 2. Sample demographics

		SLÁN 2007	NIHSWS 2005-2006	Total
		(N= 4255) %	(N= 1904) %	(N=6159) %
Gender	Male	43.2	43.0	43.1
	Female	56.8	57.0	56.9
Marital Status	Single (never married)	15.5	8.7	22.8
	Married or co-habiting	57.0	62.0	57.7
	Separated or divorced	7.0	8.0	6.8
	Widowed	20.2	21.3	12.7
Age	50 - 54 years	19.4	17.9	18.9
	55 - 59 years	17.4	16.7	17.2
	60 - 64 years	17.0	15.4	16.5
	65 - 69 years	14.8	15.8	15.1
	70 - 74 years	12.3	13.1	12.5
	75+ years	19.2	21.2	19.8
Social class	SC 1-2	28.6	20.7	26.1
	SC 3-4	37.1	41.4	38.4
	SC 5-6	20.4	28.3	22.8
	Unclassified	14.0	9.6	12.6

4.3 Health behaviours and health service use

4.3.1 Physical activity

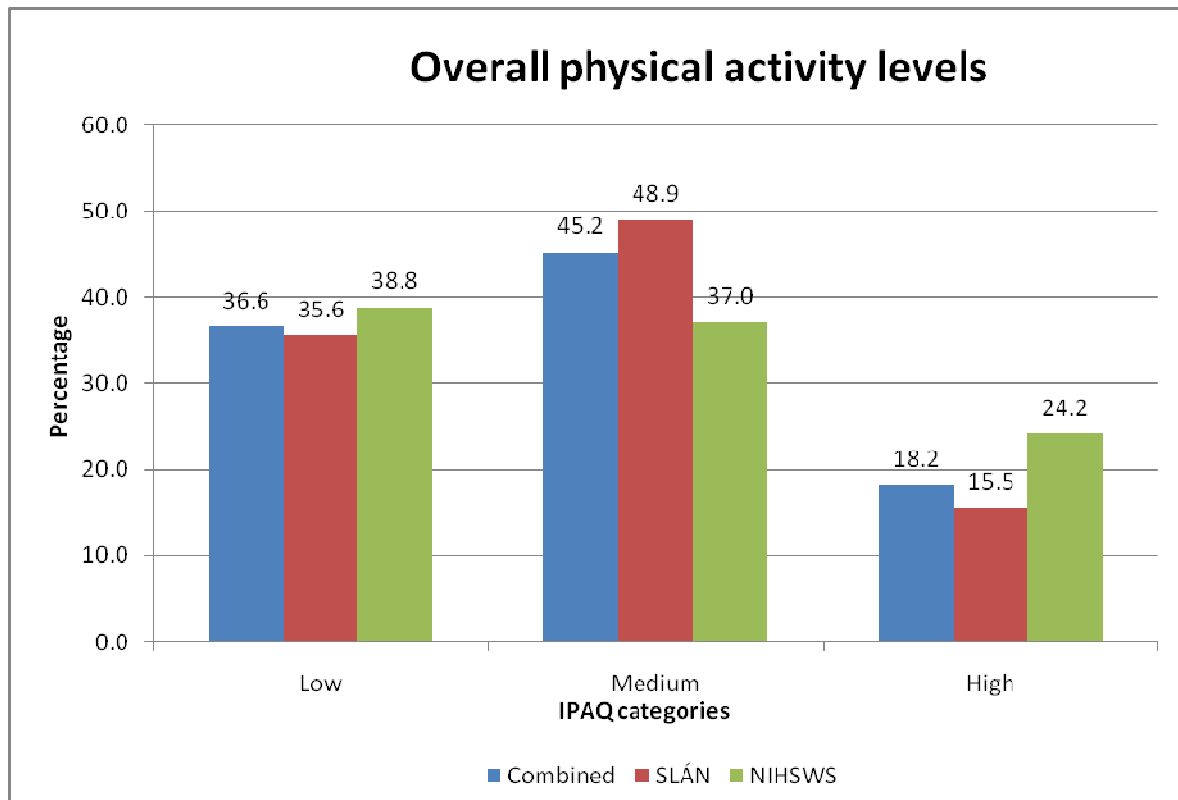


Figure 1. Physical activity levels for SLÁN 2007, NIHSWS 2005-2006 and the total sample

Levels of physical activity are outlined in Figure 1. Overall 45% of participants reported being moderately physically active. An additional 36.6% reported low levels of physical activity with the results being similar for both surveys.

4.3.2 Smoking

Overall almost one in four respondents were smokers (24.4%) and almost a half were former smokers (48.6%). The overall rate of smoking was higher in the Republic of Ireland (27% compared with 18%).

4.3.3 Health service use

Overall over 85.6% of participants had visited a GP in the previous 12 months (NI: 83.6%; RoI: 86.5%). Overall, those that undertook low levels of physical activity were most likely to visit their GP in the past 12 months (89.9%), while fewer participants who engaged in intermediate (85.1%) or high levels of activity (79%) visited their GP in the same 12 month period. In Northern Ireland participants reporting the lowest levels of physical activity were more likely to have visited a GP (low: 42.9%; moderate: 35.4%; high 21.7%). There was no clear pattern in Republic of Ireland.

4.4 Core depressive symptoms

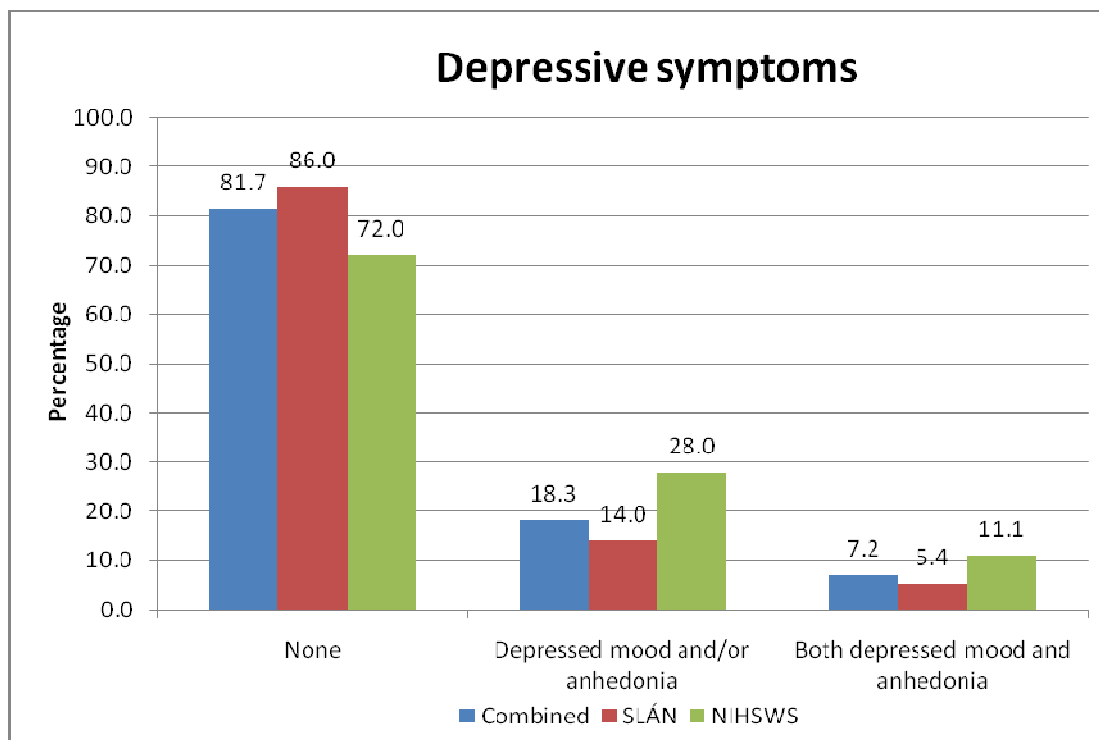


Figure 2. Depressive symptoms reported in SLÁN 2007, NIHSWS 2005-2006 and in the total sample

The proportion of participants with depressive symptoms from each survey and in the overall sample is presented in Figure 2. In summary, 28% of participants in the Northern Ireland survey had experienced depressed mood and/or anhedonia in the recent past, the most closely comparable figure for the Republic of Ireland was 14%, giving an overall figure of 18.3%. The following sections consider the individual symptoms in more detail.

4.4.1 Depressed mood

In SLÁN 2007, 10.3% (434/4229) of participants aged 50 years or more reported feelings of being sad, blue or depressed that lasted for two weeks or more in a row within the last 12 months. In the NIHSWS 2005-2006 study 17.8% (338/1904) of participants reported symptoms of depressed mood - 13.5% felt more unhappy and depressed than usual, with a further 4.3% reporting mood to be much lower than usual. Overall, 12.6% (772/6133) of the combined participants surveyed reported experiencing depressed mood in the recent past.

4.4.2 Anhedonia

In SLÁN 2007, 9.2% (386/4219) of participants reported a period of time greater than two weeks when they lost all interest in things that usually give them pleasure during the last 12 months. In the NIHSWS 2005-2006 study it was found that participants' ability to enjoy normal day-to-day activities was diminished in 21.3% (406/1903) of cases, with 317 (16.6%) participants reporting their ability to be less so than usual and a further 89 (4.7%) reporting that it was much less than usual. Overall, 12.9% (792/6122) of participants reported experiencing anhedonia in the recent past.

4.4.3 Depressed mood and co-morbid anhedonia

It was found in the SLÁN 2007 study that depressed mood and co-morbid anhedonia occurred among 5.4% (228/4207) of all participants over 50 years of age. The prevalence was found to be even higher in the NIHSWS 2005-2006 study, with 11.1% (212/1903) of participants over 50 years of age reporting both depressed mood and anhedonia. Overall, 7.2% (440/6110) of all participants experienced both depression and anhedonia in the recent past (see Figure 2).

4.5 Demographic factors, physical activity and depressive symptoms

The associations between demographic variables, physical activity and depressive symptoms were considered using univariate analyses. In SLÁN 2007 (Table 4), those with some elevated depressive symptoms were more likely to be female, younger and to have low levels of physical activity. A similar picture emerged for the NIHSWS 2005-2006 survey (Table 5) - those with elevated depressive symptoms were more likely to be female, younger, separated/divorced and have low levels of physical activity. In the combined data, depressive symptoms were associated with all assessed variables in univariate analyses.

Table 3. SLÁN 2007 chi-squares, participant demographics and health behaviours according to depressive symptomatology

SLÁN 2007	Total (N=4255) %	No depressed mood or anhedonia (N=3634) % (n)	Depressed mood and/or anhedonia (N=592) % (n)	Chi square value	P value
Gender					
Male	43.2	87.4 (1606)	12 (221)	9.77	.002
Female	56.8	83.9 (2028)	15.3 (371)		
Marital Status					
Single (never married)	29.0	85.9 (1054)	14.1 (173)	1.53	.675
Married or co-habiting	55.8	86.3 (2034)	13.7 (322)		
Separated or divorced	6.2	85.7 (222)	14.3 (37)		
Widowed	8.9	84.0 (314)	16.0 (60)	17.32	<.001
Age					
50 - 54 years	19.4	81.5 (667)	18.5 (151)		
55 - 59 years	17.4	84.4 (620)	15.6 (115)		
60 - 64 years	17.0	86.4 (621)	13.6 (98)		
65 - 69 years	14.8	87.2 (546)	12.8 (80)		
70 - 74 years	12.3	87.0 (450)	13.0 (67)		
75+ years	19.2	90.0 (730)	10.0 (81)		
Social class					
SC 1-2	28.6	87.9 (1067)	12.1 (147)	6.98	0.73
SC 3-4	37.1	86.0 (1350)	14.0 (219)		
SC 5-6	20.4	84.5 (732)	15.5 (134)		
Unclassified	14.0	84.1 (485)	15.9 (92)		
Physical activity					
Low	35.6	84.2 (1252)	15.8 (235)	6.52	.038
Medium	48.9	87.0 (1783)	13.0 (267)		
High	15.5	87.3 (569)	12.7 (83)		

Table 4. NIHSWS 2005-2006 chi-squares, participant demographics and health behaviours according to depressive symptomatology

NIHSWS 2005-2006		Total	No depressed mood or anhedonia (N=1371) % (n)	Depressed mood and/or anhedonia (N=532) % (n)	Chi square value	P value
Gender	Male	43.0	73.6 (602)	26.4 (216)	1.71	<.001
	Female	57.0	70.9 (769)	29.1 (316)		
Marital Status	Single (never married)	8.7	72.9 (121)	27.1 (45)	28.36	<.001
	Married or co-habiting	62.0	75.6 (892)	24.4 (288)		
	Separated or divorced	8.0	57.9 (88)	42.1 (64)		
	Widowed	21.3	66.7 (270)	33.3 (135)		
Age	50 - 54 years	17.9	69.8 (238)	30.2 (103)	13.38	0.02
	55 - 59 years	16.7	65.1 (207)	34.9 (111)		
	60 - 64 years	15.4	74.3 (217)	25.7 (75)		
	65 - 69 years	15.8	72.7 (218)	27.3 (82)		
	70 - 74 years	13.1	77.1 (192)	22.9 (57)		
	75+ years	21.2	74.2 (299)	25.8 (104)		
Social class	SC 1-2	20.7	75.6 (298)	24.4 (96)	6.11	.106
	SC 3-4	41.4	72.5 (572)	27.5 (217)		
	SC 5-6	28.3	68.5 (369)	31.5 (170)		
	Unclassified	9.6	72.9 (132)	27.1 (49)		
Physical activity	Low	38.8	57.4 (424)	42.6 (315)	130.78	<.001
	Medium	37.0	80.0 (563)	20.0 (141)		
	High	24.2	83.5 (384)	16.5 (76)		

Table 5. Overall chi-squares, participant demographics and health behaviours according to depressive symptomatology

Overall	Total	No depressed mood or anhedonia	Depressed mood or anhedonia	Chi square value	P value
	%	% (n)	% (n)	% (n)	% (n)
Gender					
Male	43.1	83.5 (2208)	16.5 (437)	10.26	.001
Female	56.9	80.3 (2797)	19.7 (687)		
Marital Status					
Single (never married)	22.8	84.3 (1175)	15.7 (218)	43.44	<.001
Married or co-habiting	57.7	82.8 (2926)	17.2 (610)		
Separated or divorced	6.8	75.4 (310)	24.6 (101)		
Widowed	12.7	75.0 (584)	25.0 (195)		
Age					
50 - 54 years	18.9	78.1 (905)	21.9 (254)	28.37	<.001
55 - 59 years	17.2	78.5 (827)	21.5 (226)		
60 - 64 years	16.5	82.9 (838)	17.1 (173)		
65 - 69 years	15.1	82.5 (764)	17.5 (162)		
70 - 74 years	12.5	83.8 (642)	16.2 (124)		
75+ years	19.8	84.8 (1029)	15.2 (185)		
Social class					
SC 1-2	26.1	84.9 (1365)	15.1 (243)	21.46	<.001
SC 3-4	38.4	81.6 (1922)	18.4 (436)		
SC 5-6	22.8	78.4 (1101)	21.6 (304)		
Unclassified	12.6	81.4 (617)	18.6 (141)		
Physical activity					
Low	36.6	75.3 (1676)	24.7 (550)	9.27	<.001
Medium	45.2	85.0 (2346)	14.8 (408)		
High	18.2	85.7 (953)	14.3 (159)		

4.6 Impact of depression on levels of physical activity

The association between depressed mood or anhedonia and physical activity level was analysed. In the multivariate analysis for SLÁN 2007 (Table 7), depressive symptoms were negatively associated with male gender, older age groups, being a former smoker, and moderate to high levels of physical activity, while depressive symptoms were positively associated with social class 5-6, and being a current smoker.

Table 6. Logistic regression completed using SLÁN 2007 variables regressed on to presence of depression

		Odds ratio	CI 95		P < z
			Lower	Upper	
Gender	Male or female	0.74	0.61	0.89	0.002
Marital status	Married or co-habiting*				
	Single (never married)	0.98	0.798	1.20	0.843
	Separated or divorced	1.05	0.706	1.55	0.818
	Widowed	1.15	0.828	1.60	0.405
Age	50 - 54 years*				
	55 - 59 years	0.82	0.63	1.08	0.153
	60 - 64 years	0.72	0.54	0.95	0.021
	65 - 69 years	0.62	0.46	0.85	0.002
	70 - 74 years	0.66	0.48	0.91	0.010
	75+ years	0.44	0.32	0.60	0.000
Social class	SC 1-2*				
	SC 3-4	1.20	0.95	1.51	0.118
	SC 5-6	1.43	1.10	1.86	0.007
	Unclassified	1.41	1.05	1.90	0.022
Smoking status	Never smoked*				
	Former smoker	0.66	0.53	0.82	0.000
	Current smoker	1.23	0.97	1.57	0.094
Physical activity	Low*				
	Moderate	0.77	0.63	0.94	0.009
	High	0.71	0.53	0.94	0.016

* reference category

In multivariate analysis of NIHSWS 2005-2006 (Table 8), depression was negatively associated with older age categories, being a former or current smoker, and higher levels of physical activity. Being widowed was positively associated with elevated depressive symptoms.

Table 7. Logistic regression completed using NIHSWS 2005-2006 variables regressed on to presence of depression

		Odds ratio	CI 95		P < z
			Lower	Upper	
Gender	Male or female	0.89	0.70	1.12	0.301
Marital status	Married or co-habiting*				
	Single (never married)	0.97	0.653	1.44	0.872
	Separated or divorced	1.47	0.885	2.45	0.136
	Widowed	1.58	1.016	2.45	0.042
Age in years	50 - 54 years*				
	55 - 59 years	1.14	0.81	1.61	0.457
	60 - 64 years	0.67	0.46	0.98	0.040
	65 - 69 years	0.66	0.45	0.95	0.026
	70 - 74 years	0.43	0.28	0.65	0.000
	75+ years	0.42	0.29	0.61	0.000
Social class	SC 1-2*				
	SC 3-4	0.99	0.74	1.33	0.940
	SC 5-6	1.02	0.74	1.40	0.903
	Unclassified	0.86	0.56	1.34	0.518
Smoking status	Never smoked*				
	Former smoker	0.73	0.54	0.99	0.040
	Current smoker	0.62	0.46	0.84	0.002
Physical activity	Low*				
	Moderate	0.29	0.22	0.37	0.000
	High	0.23	0.17	0.31	0.000

* reference category

The findings in relation to smoking are surprising and require careful consideration. The different definitions of former smoker used in both surveys are likely to have impacted these findings. Other important factors include weighting – in the original analyses of the overall datasets complex weighting variables were developed and applied. These weights were not applied in the current analyses as only a subset of each of the original datasets was used, and these weightings may have been contradictory in the different datasets. In SLÁN 2007, for example, when levels of physical activity and smoking are considered in the overall dataset (n = 10,176) the pattern is different than in the present subsample of those aged 50 and over. The total dataset results show higher rates of physical activity being observed in non-smokers, demonstrating the potential importance of the loss of these weightings. It is also possible that depressed smokers have died. Given the cross-sectional nature of the survey data and the fact that only limited number of questions on smoking were asked it is not possible to probe this finding further in the current study.

In the combined multivariate logistic analysis (Table 9), depressive symptoms were significantly negatively associated with male gender, older age categories, being a former smoker and increasing levels of physical activity. Depressive symptoms were significantly and positively associated with being separated/divorced or widowed, and social classes 3-6. Overall, people over 50 years who were engaged in

moderate to high levels of physical activity had a 50-56% reduction in the odds of having elevated depressive symptoms. This association is independent of the other factors listed in the tables.

Table 8. Logistic regression completed using NIHSWS 2005-2006 and SLÁN 2007 variables regressed on to presence of depression

		Odds ratio	CI 95		P < z
			Lower	Upper	
Gender	Male or female	0.83	0.73	0.96	0.011
Marital status	Married or co-habiting*				
	Single (never married)	1.15	0.96	1.37	0.119
	Separated or divorced	1.61	1.22	2.12	0.001
	Widowed	1.82	1.45	2.28	0.000
Age in years	50 - 54 years*				
	55 - 59 years	0.96	0.78	1.18	0.688
	60 - 64 years	0.71	0.57	0.88	0.002
	65 - 69 years	0.66	0.53	0.83	0.000
	70 - 74 years	0.57	0.45	0.73	0.000
	75+ years	0.46	0.36	0.57	0.000
Social class	SC 1-2*				
	SC 3-4	1.23	1.03	1.47	0.020
	SC 5-6	1.51	1.24	1.83	0.000
	Unclassified	1.20	0.94	1.53	0.137
Smoking status	Never smoked*				
	Former smoker	0.70	0.59	0.82	0.000
	Current smoker	1.03	0.86	1.23	0.753
Physical activity	Low*				
	Moderate	0.50	0.43	0.58	0.000
	High	0.44	0.36	0.54	0.000

* reference category

5. Limitations

The authors acknowledge that this study has a number of limitations. Firstly, as outlined in the methods section, there are differences between the survey instruments and some questions on the same topic were not asked in the same form. One important example relates to smoking. SLÁN used the WHO definition of former smoker (ever having smoked 100 cigarettes in one's lifetime), whereas the NIHSWS asked respondents to self-categorise. It is likely that the use of the definition in the Republic of Ireland partly, at least, explains the large difference in the number of former smokers between the two surveys.

Additionally, for the NIHSWS 2005-2006 survey the mental health questions were presented to the participants on screen using computer-assisted personal interviewing (CAPI) so their answers were recorded privately. In SLÁN 2007, the questions were asked by an interviewer. Although participants in the Republic of Ireland did not express any difficulties in answering questions it is important to be mindful of the different methodologies used. Another consideration is that the items used in the NIHSWS 2005-2006 are not those typically used in diagnostic interviews, as was the case with SLÁN 2007, and as such may not be precise markers of a diagnosis of major depressive disorder. However, these items do focus on the diagnostic criteria for depression, and as such add some credence to the importance of depression in the findings presented here.

In relation to the assessment of physical activity, the IPAQ measure has been established as a valid and reliable method of monitoring levels of physical activity globally for populations of 18-65 years of age (Craig et al. 2003). Unfortunately because many studies exclude older groups, less is known about how the measure applies to findings for older adults. A recent cross sectional survey involving a community sample with a mean age of 77.4 years administered IPAQ and found it to be able to distinguish differences in physical activity levels between groups differentiated by age (Delbaere, Hauer, and Lord 2009). However other studies have suggested that there is a tendency towards both over-reporting and under-reporting of physical activity within the older population (Heesch et al. 2010). Further validation studies are needed.

More generally, while the IPAQ is recognised as a useful and valid measure and for these reasons has been included in many national surveys across the world, there are many challenges to assessing physical activity in surveys. Measures require respondents to think about different levels of activity such as low, moderate and high/vigorous but ensuring that these terms are understood in the same way by all respondents is extremely difficult. Differing national guidelines also complicate cross country comparisons. In 2008, a report by the European Heart Network could identify only three multinational studies looking at levels of physical activity in Europe (European Heart Network 2008). Establishing comparisons with other countries is therefore very difficult.

This study uses cross-sectional survey data, so it is important to remember that while associations can be discussed, causality may not exist. Indeed some large epidemiologic studies suggest that the relationship between depression and physical activity is bidirectional. Over time, physically active individuals are less like to develop depression than those that are not active (Teychenne et al. 2008) and conversely depression is a significant risk factor for sedentary behaviour (Roshanaei-Moghaddam 2009). Therefore being physically active is important, regardless of causality.

6. Discussion

The aim of this study was to investigate the associations between physical activity levels and core depressive symptoms in Irish adults aged 50 years or more. The study used data from SLÁN 2007 and NIHSWS 2005-2006 surveys. Measures of depressed mood and anhedonia (two core depressive symptoms according to diagnostic criteria (DSM IV)) were derived using items from the surveys. The main findings in relation to depression were:

- Just over 5% (5.4%) of SLÁN 2007 participants and 11.1% of NIHSWS 2005-2006 participants had experienced both depressed mood and anhedonia in the recent past. In the overall sample this is 7.2% of participants.
- Considering the symptoms separately, overall 12.6% of all participants reported experiencing depressed mood (SLÁN 2007: 10.3%; NIHSWS 2005-2006: 17.8%) while similar proportions (12.9%) reported experiencing anhedonia (SLÁN 2007: 9.2%; NIHSWS 2005-2006: 21.3%) in the recent past.

The difference in reported symptoms by survey is notable and consistent with other research which has documented higher levels of psychological distress in Northern Ireland compared to the Republic of Ireland (Tedstone Doherty, Moran, and Kartalova-O'Doherty 2009); (Tedstone Doherty, Moran, and Walsh 2007).

Patterns of physical activity were also considered and participants from both surveys were categorised as being active at a low, moderate or high level. Overall 45% of participants reported being moderately physically active but 36.6% reported activity at low levels (SLÁN 2007: 35.6%; NIHSWS 2005-2006: 38.8%). These findings are consistent with a previous Eurobarometer study carried out in 2005, which found that over 40% of adults in the EU-15³ countries do no moderate-intensity activity in a typical week. In this study Ireland and the UK were ranked second and third most inactive. Given that moderate physical activity has been shown to give many health benefits, a focus should be on helping older adults move from the low to the moderate category of physical activity. A continuous positive relationship between the amount of physical activity carried out by an individual and the health benefits

³ Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and United Kingdom.

directly related to this has previously been cited as an excellent rationale for focusing on reducing sedentary behaviour (Nelson et al. 2007).

Consistent with other studies, in both SLÁN 2007 and NIHSWS 2005-2006, depressive symptoms were more likely to be reported by females, participants who were separated or divorced and participants in the lower SES groups. An association with age was also observed such that more depressive symptoms are reported by the 'younger older age groups' when compared to the 'older old'. This is consistent with other studies that report a decrease in the prevalence of depression over the course of the lifespan.

For the overall sample, multivariate analysis revealed that depressive symptoms were more often reported by females (when compared with males), younger 'old' when compared with older 'old' and those who were less physically active. Depressive symptoms were significantly and positively associated with being separated/divorced or widowed, and social classes 3-6. Overall, people over 50 years who were engaged in moderate to high levels of physical activity had a 50-56% reduction in the odds of having elevated depressive symptoms.

This finding has important implications for public health policy. It is consistent with a growing body of research that supports physical activity as a behaviour which underpins both physical and mental health. In a recent review and meta-analysis published in 2010, Windle and colleagues demonstrated that exercise was effective in promoting wellbeing in old age (Windle 2010). The British Heart Foundation has specific guidelines for the promotion of physical activity with older people (British Heart Foundation 2008). The national guidelines published for the Republic of Ireland, also include guidelines for adults aged 65 years or more (The Department of Health and Children and The Health Service Executive 2009). Both sets of guidelines recommended 30 minutes of moderate intensity physical activity at least five times per week but additionally they highlight the importance of being generally active.

SLÁN 2007 highlighted that as well as providing data relating to general wellbeing, it is extremely important from a public health and policy point of view to consider the prevalence and impact of depressive symptoms in the community. This study represents an important step in providing baseline data on depressive symptoms in the older adult community in Ireland. Common measures used in future surveys would facilitate more detailed analysis and perhaps allow more insight into the varying levels of symptoms reported between the two surveys.

Future Irish research should include consideration of collaboration on data collection to facilitate further and more detailed research on the prevalence of depressive symptoms in the community. One of the main advantages of national surveys is they are very inclusive, and do not exclude groups (including older people) who are often excluded from other forms of research. More generally, the 2010 review paper by Windle and colleagues and the 2008 review by Teychenne et al have called for more detailed considerations of questions such as: what is the optimal level of physical activity? and what are the optimal domains or settings? The 2010 paper also stressed the importance of evaluating interventions from an economic point of view.

This analysis, although limited in some respects, highlights an important relationship between physical activity and depressive symptoms in Ireland. An increase in physical activity levels has the potential to provide many health benefits, and for individuals who are experiencing depressive symptoms, interventions to improve activity levels should help improve mood.

References

- Alexopoulos, G. S., K. Buckwalter, J. Olin, R. Martinez, C. Wainscott, and K. R. Krishnan. 2002. "Comorbidity of late-life depression: an opportunity for research in mechanisms and treatment." *Biological Psychiatry* 52: 543–58.
- Babyak, M., J. A. Blumenthal, S. Herman, P. Khatri, M. Doraiswamy, K. Moore, W. E. Craighead, T. T. Baldewicz, and K. A. Krishnan. 2000. "Exercise Treatment for Major Depression: Maintenance of Therapeutic Benefit at 10 Months." *Psychosomatic Medicine* 62: 633-38.
- Barbour, K. and J. Blumenthal. 2005. "Exercise training and depression in older adults." *Neurobiology of Aging* 26(1): 119-23.
- Blazer, D. 2003. "Depression in late life: review and commentary." *Journal of Gerontological Medical Science*; 56A: 249–65.
- Blumenthal, J., M. Babyak, P. Doraiswamy, L. Watkins, B. Hoffman, K. Barbour, S. Herman, W. Craighead, A. Brosse, R. Waugh, A. Hinderliter, and A. Sherwood. 2007. "Exercise and Pharmacotherapy in the Treatment of Major Depressive Disorder." *Psychosomatic Medicine* 69: 587-96.
- Blumenthal, J. A., M. A. Babyak, K. A. Moore, W. E. Craighead, S. Herman, P. Khatri, R. Waugh, M. A. Napolitano, L. M. Forman, M. Appelbaum, P. Murali, Doraiswamy, and K. A. Krishnan. 1999. "Effects of exercise training on older patients with major depression." *Archives of internal medicine* 159: 2349-56.
- British Heart Foundation. 2008. "Guidelines for the promotion of physical activity with older people." UK.
- Chapman, D. and G. Perry. 2008. "Depression as a major component of public health for older adults." *Preventing chronic disease* 5: 1-9.
- Copeland, J. R., A. T. Beekman, M. E. Dewey, C. Hooijer, A. Jordan, B. A. Lawlor, A. Lobo, H. Magnusson, A. H. Mann, I. Meller, M. J. Prince, F. Reischies, C. Turrina, M. W. DeVries, and K. C. Wilson. 1999. "Depression in Europe. Geographical distribution among older people." *The British Journal of Psychiatry* 174: 312-21.
- Craig, C., A. Marshall, M. Sjostrom, A. Bauman, M. Booth, B. Ainsworth, M. Pratt, U. Ekelund, A. Ynvge, J. Sallis, and P. Oja. 2003. "International Physical Activity Questionnaire: 12-Country Reliability and Validity." *Med Sci Sports Exerc* 35: 1381-95.
- Delbaere, K., K. Hauer, and S. R. Lord. 2009. "Evaluation Of The Incidental And Planned Activity Questionnaire (IPAQ) For Older People." *Br J Sports Med, bjsm*.
- Djernes, J. 2006. "Prevalence and predictors of depression in populations of elderly: A review." *Acta Psychiatrica Scandinavia* 113: 372–87.
- Doyle, F., Conroy, R., McGee, H. and Delaney, M. 2010. "Depressive symptoms in persons with acute coronary syndrome: specific symptom scales and prognosis." *Journal of Psychosomatic Research* 68: 121-30.

European Heart Network. 2008. "European Cardiovascular Disease Statistics" [accessed on 20th April 2008]. Available at: <http://www.heartstats.org.uk/datapage.asp?id=7683>.

Evers, M. M., SC Samuels, M. Lantz, K. Khan, AM Brickman, D.B. Marin. 2002. "The prevalence, diagnosis and treatment of depression in dementia patients in chronic care facilities in the last six months of life.." *International Journal of Geriatric Psychiatry* 17: 464–72.

Everson, S. A., S. C. Maty, J. Lynch, and G. Kaplan. 2002. "Epidemiologic evidence for the relation between socioeconomic status and depression, obesity, and diabetes." *Journal of Psychosomatic Research* 53: 891–5.

Glass, T., S. Kasl, and L. Berkman. 1997. "Stressful life events and depressive symptoms among the elderly Evidence from a prospective community study." *J Aging Health* 9: 70–89.

Goldberg, D. 1992. "General Health Questionnaire (GHQ-12)." Windsor, UK: NFER-Nelson.

Heesch, K. C., J. G. van Uffelen, R. L. Hill, and W. J. Brown. 2010. "What do IPAQ questions mean to older adults? Lessons from cognitive interviews." *Int J Behav Nutr Phys Act* 7: 35.

Kessler, R. C., G. Andrews, D. Mroczek, B. Ustun, and H. U. Wittchen. 1998. "The World Health Organization Composite International Diagnostic Interview Short-Form (CIDI-SF)." *International Journal of Methods in Psychiatric Research* 7: 171-85.

Koster, A., B. Bosma, G. I. J. M. Kempen, B. W. J. H. Penninx, A. T. F. Beekman, D. J. H. Deeg, and T. J. H. Van Eijk. 2005. "Socioeconomic differences in incident depression in older adults: The role of psychosocial factors, physical health status, and behavioral factors " *Journal of Psychosomatic Research* 61: 5619-627.

Lorant, V., C. Croux, S. Weich, D. Deliege, J. M. Delie, and M. Anseau. 2007. "Depression and socio-economic risk factors: 7-year longitudinal population study." *British Journal of Psychiatry* 190: 293 - 98.

McDougall, F. A., K. Kvaal, F. E. Matthews, E. Paykel, P. B. Jones, M. E. Dewey, and C. Brayne. 2007. "Prevalence of depression in older people in England and Wales: the MRC CFA Study." *Psychological Medicine* 37: 1787-95.

McLeod, J. D. a. R. C. K. 1990. "Socioeconomic status differences in vulnerability to undesirable life events. ." *Journal of Health and Social Behavior* 31: 162-72.

Morgan, K., H. McGee, D. Watson, I. Perry, M. Barry, E. Shelley, J. Harrington, M. Molcho, R. Layte, N. Tully, E. van Lente, M. Ward, J. Lutomski, R. Conroy, and R. Brugha. 2008. "SLÁN 2007: Survey of Lifestyle, Attitudes & Nutrition in Ireland. Main Report." Health Promotion Unit Department of Health and Children. Dublin.

Nelson, M. E., W. J. Rejeski, S. N. Blair, P. W. Duncan, J. O. Judge, A. C. King, C. A. Macera, and C. Castaneda-Sceppa. 2007. "Physical activity and public health in older adults: recommendation from the American College of Sports Medicine and the American Heart Association." *Med Sci Sports Exerc* 39(8): 1435-45.

O' Connell, H., A. Chin, C. Cunningham, and B. Lawlor. 2004. "Recent developments: Suicide in older people." *British Medical Journal* 329: 895-99.

Roshanaei-Moghaddam, B., W. Katon, and J. Russo. 2009. "The longitudinal effects of depression on physical activity." *General Hospital Psychiatry* 31(4): 306-15.

- Singh, N. A., K. A. Clements, and M. A. Singh. 2001. "The efficacy of exercise as a long-term antidepressant in elderly subjects, a randomized, controlled trial." *The Journals of Gerontology* 56A: M497-M504.
- Strawbridge, W. J., S. Deleger, R. E. Roberts, and G. A. Kaplan. 2002. "Physical Activity Reduces the Risk of Subsequent Depression for Older Adults." *American Journal of Epidemiology* 156: 328-34.
- Swenson, C. J., J. Baxter, S. M. Shetterly, S. L. Scarbro, and R. F. Hamman. 2000. "Depressive symptoms in Hispanic and non-Hispanic White rural elderly. The San Luis Valley Health and Aging Study." *American Journal of Epidemiology* 152: 1048-55.
- Tedstone Doherty, D., R. Moran, and Y. Kartalova-O'Doherty. 2009. "Psychological distress, mental health problems and use of health services in Ireland." *HRB Research Series 5*. Dublin Health Research Board.
- Tedstone Doherty, D., R. Moran, and D. Walsh. 2007. "Psychological health of the Irish population: Some results from the HRB National Psychological Well-being and Distress Survey." *HRB Research Series 5*. Dublin Health Research Board.
- Teresi, J., R. Abrams, D. Holmes, M. Ramirez, J. Eimicke. 2001. "Prevalence of depression and depression recognition in nursing homes." *Social Psychiatry and Psychiatric Epidemiology* 36: 613-20.
- Teychenne, M., K. Ball, and J. Salmon. 2008. "Physical activity and likelihood of depression in adults: a review." *Preventative Medicine* 46: 397-411.
- The Department of Health and Children and The Health Service Executive. 2009. "The National Guidelines on Physical Activity for Ireland."
- Ward, M., H. McGee, K. Morgan, E. Van Lente, R. Layte, M. Barry, D. Watson, E. Shelley, and I. Perry. 2009. "SLÁN 2007: Survey of Lifestyle, Attitudes and Nutrition in Ireland. 'One Island – One Lifestyle?' Health and lifestyles in the Republic of Ireland and Northern Ireland: Comparing the population surveys SLÁN 2007 and NIHSWS 2005." Dublin: The Stationery Office.
- Win, S., K. Parakh, C. M. Eze-Nliam, J. S. Gottdiener, W. J. Kop, and R. Ziegelstein. 2011. "Depressive symptoms, physical inactivity and risk of cardiovascular mortality in older adults: the Cardiovascular Health Study." *Heart* 97(6): 500-05.
- Windle, G., Hughes, D., Linck, P., Russell, I. and Woods, B. 2010. "Is exercise effective in promoting mental well-being in older age? A systematic review." *Aging & Mental Health* 14(6): 652-69.
- World Health Organization. 1993. "The ICD-10 Classification of Mental and Behavioural Disorders: Diagnostic Criteria for Research." Geneva.
- World Health Organization. 1998. "Tobacco or health: A global status report." Geneva: WHO.
- Zunzunegui, M., N. Minicuci, T. Blumstein, M. Noale, D. Deeg, M. Jylhä, and N. Pedersen. 2007. "Gender differences in depressive symptoms among older adults: a cross-national comparison: The CLESA project." *Social Psychiatry and Psychiatric Epidemiology* 42: 198-207.

Appendix A: Items from the SLÁN 2007 and NISHWS 2005-2006 used in the current study

Notes:

1. The number/letter before each question indicates where the item can be found in the original surveys.
2. SLÁN 2007 was completed by interviewers using paper and pen. The NISHWS 2005-2006 was completed using Computer-assisted personal interviewing (CAPI), therefore the format of the items below is different by survey.

Demographic Items: SLÁN 2007

- A1 *[INT: IS THE RESPONDENT]* Male ... Female ...
- A2 What age are you? _____ Years
- H2 What is your current marital status? *[TICK ONE ONLY]*
- Single (never married)
 - Cohabiting
 - Married
 - Separated
 - Divorced
 - Widowed

Demographic Items: NISHWS 2005-2006

2. Sex
3. Age
4. Marital status:
 - Married (spouse in household)
 - Married (spouse not in household)
 - Cohabiting
 - Single (never married)
 - Separated
 - Divorced

Health service use item: SLÁN 2007

- A10. When was the last time you consulted a GP or family doctor for your own health or health related needs?
- In the last 4 weeks
 - Between 1 and 12 mths ago
 - 1-2 years ago

More than 2 years ago
Never

Health service use item: NIHSWS 2005-2006

11. Apart from any visit to hospital, when was the last time you talked to a doctor on your own behalf?

- "2 weeks ago but less than a month ago",
- "1 month ago but less than 3 months ago",
- "3 months ago but less than 6 months ago"
- "6 months ago but less than a year ago",
- "A year or more ago",
- "Never consulted a doctor"

Depression items: SLÁN 2007

A27 During the past 12 months, was there ever a time when you felt sad, blue, or depressed for two weeks or more in a row?

[INT: IF THE RESPONDENT VOLUNTEERS THAT THEY ARE ON ANTIDEPRESSANTS THEY SHOULD STILL ANSWER YES ON NO TO THE QUESTION]

Yes ₁ No ₂ → Go to A44

A28 During that time did the feelings of being sad, blue, or depressed usually last all day long, most of the day, about half the day or less than half the day?

All day long ... ₁ Most of the day ... ₂ About half ... ₃ Less than Half ... ₄
→ Go to A29 → Go to A29 → Go to A44 → Go to A44

A44 During the past 12 months was there ever a time lasting two weeks or more when you lost interest in most things like hobbies, work or activities that usually give you pleasure?

[INT: IF THE RESPONDENT VOLUNTEERS THAT THEY ARE ON ANTIDEPRESSANTS THEY SHOULD STILL ANSWER YES OR NO TO THE QUESTION]

Yes ₁ No ₂ → Go to A60

A46 During those two weeks, did you feel this way every day, almost every day or less often?

Every day ... ₁ Almost every day ... ₂ Less often ...
₃ → Go to A60

Depression items: NIHSWS 2005-2006

Q17. Have you recently been able to enjoy your normal day-to-day activities?

- More than
- Same as usual
- Less so
- Much less

Q19. Have you recently been feeling unhappy and depressed?

- Not at all
- No more "any more than usual"
- More "Rather more than usual"
- Much more "Much more than usual"

Physical activity items: SLÁN 2007

Think about all the vigorous activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

B3 During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?

_____ days None _0 → Go to B5

B4 How much time did you usually spend doing vigorous physical activities on one of those days?

_____/_____ hours and minutes per day Not sure/don't know _9999

B5 Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? [Do not include walking].

_____ days None _0 → Go to B7

B6 How much time did you usually spend doing moderate physical activities on one of those days?

_____/_____ hours and minutes per day Not sure/don't know _9999

[INT: AN AVERAGE TIME FOR ONE OF THE DAYS ON WHICH YOU DO MODERATE ACTIVITY IS BEING SOUGHT. IF THE RESPONDENT CAN'T ANSWER BECAUSE THE PATTERN OF TIME SPENT VARIES WIDELY FROM DAY TO DAY, ASK: "HOW MUCH TIME IN TOTAL DID YOU SPEND OVER THE LAST 7 DAYS DOING MODERATE PHYSICAL ACTIVITIES?"

___ / ___ HOURS/MINS TOTAL]

B7a Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

During the last 7 days, on how many days did you walk at for at least 10 minutes at a time?

___ days per week None ₀ → Go to B9

B8 How much time did you usually spend walking on one of those days?

___ / ___ hours and minutes per day Not sure/don't know

9999

[INT: AN AVERAGE TIME FOR ONE OF THE DAYS ON WHICH YOU WALK IS BEING SOUGHT. IF THE RESPONDENT CAN'T ANSWER BECAUSE THE PATTERN OF TIME SPENT VARIES WIDELY FROM DAY TO DAY, ASK: "WHAT IS THE TOTAL AMOUNT OF TIME YOU SPENT WALKING OVER THE LAST 7 DAYS?" ___ ___ ___ / ___ HOURS/MIN]

Physical activity items: NIHSWS 2005-2006

Q1 During the last 7 days, on how many days did you do activities which took vigorous or hard effort, for at least 10 minutes at a time, like running, aerobics, heavy gardening or anything else that caused large increases in breathing or heart rate?

0..7;

Q2 On each day you did vigorous activity for at least 10 minutes, how much time on average (in minutes) did you spend doing it?

INTERVIEWER - PLEASE RECORD TIME IN MINUTES

10..999;

Q3 During the last 7 days, on how many days did you do activities which took moderate effort, for at least 10 minutes at a time, like cycling, vacuuming, gardening or anything else that caused some increase in breathing or heart rate?

Please do not include walking in your answer

0..7;

- Q4 On each day you did moderate activity for at least 10 minutes, how much time on average (in minutes) did you spend doing it?

INTERVIEWER - PLEASE RECORD TIME IN MINUTES

10..999;

- Q5 During the last 7 days, on how many days did you walk at a brisk or fast pace, for at least 10 minutes at a time, to get from place to place, for recreation, pleasure or exercise?

0..7;

- Q6 On each day when you walked briskly for at least 10 minutes, how much time on average (in minutes) did you spend walking?

Smoking items: SLÁN 2007

- D2 Have you yourself smoked at least 100 cigarettes in your entire life? [5 PACKS = 100 CIGARETTES]

Yes ... ₁ No ... ₂ → Go to SECTION E

- D3 Do you now smoke every day, some days, or not at all?

Every day... ₁ Some days ... ₂ Not at all ... ₃ → Go to D5

Smoking items: NIHSWS 2005-2006

- Q6. "Have you ever smoked a cigarette, a cigar or a pipe?":
Yes/no

- Q7. "Do you smoke cigarettes at all nowadays?":
Yes/no

IF YES AT Q1 AND NO AT Q2

- Q8. "Have you ever smoked cigarettes regularly?":
Yes/no

Alcohol use items: SLÁN 2007

- E4. During the past 7 days how many standard drinks of any alcoholic beverage did you have each day?

[Int: Tick box if none]

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Alcohol use: NIHSWS 2005-2006

Q16. About how often have you had an alcoholic drink of any kind in the last 12 months?":

- "Almost every day",
- "5 or 6 days a week",
- "3 or 4 days a week",
- "Once or twice a week",
- "Once or twice a month",
- "Once every couple of months",
- "Once or twice a year",
- "Not at all in the last 12 months";

IF EvDay....OneYear AT Q16 AND Shandy AT Q17

Q18. How many pints of shandy do you drink in a typical week?
Please do not include any shandy that comes in bottles or cans.
RECORD TO THE NEAREST PINT "
: 0..999;

CONVERT1 "@OCONVERT TO UNITS@O":0.00..300.00;

IF OneMonth....OneYear AT Q16 AND Shandy AT Q17

Q19. How many pints of shandy do you drink in a typical month?
RECORD TO THE NEAREST PINT "
:0..999;

CONVERT2 "@OCONVERT TO UNITS@O":0.00..300.00;

IF EvDay....OneWeek AT Q16 AND Beer AT Q17

Q20. "How many pints of beer, lager, stout or cider do you drink
in a typical week?
RECORD TO THE NEAREST PINT "
:0..999;

CONVERT3 "@OCONVERT TO UNITS@O":0.00..300.00;

IF OneMonth....OneYear AT Q16 AND Beer AT Q17

Q21. "How many pints of beer, lager, stout or cider do you drink
in a typical month?
RECORD TO THE NEAREST PINT "

:0..999;

CONVERT4 "CONVERT TO UNITS//":0.00..300.00;

IF EvDay....OneWeek AT Q16 AND Spirit AT Q17

- Q22. "If you drink at home you may not pour out exactly the same amount but I'd like you to estimate how many single measures of spirits or liqueur you drink in a typical week?

RECORD TO NEAREST SINGLE MEASURE"

:0..999;

CONVERT5 "CONVERT TO UNITS":0.00..300.00;

IF OneMonth....OneYear AT Q16 AND Spirit AT Q17

- Q23. "If you drink at home you may not pour out exactly the same amount but I'd like you to estimate how many single measures of spirits or liqueur you drink in a typical month?

RECORD TO NEAREST SINGLE MEASURE"

:0..999;

CONVERT6 "CONVERT TO UNITS":0.00..300.00;

IF EvDay....OneWeek AT Q16 AND Sherry AT Q17

- Q24. "I'd like you to estimate how many glasses of sherry, port, martini or similar drinks you drink in a typical week?

RECORD TO NEAREST SMALL GLASS"

:0..999;

CONVERT7 "CONVERT TO UNITS":0.00..300.00;

IF OneMonth....OneYear AT Q16 AND Sherry AT Q17

- Q25. "I'd like you to estimate how many glasses of sherry, port, martini or similar drinks you drink in a typical month?

RECORD TO NEAREST SMALL GLASS"

:0..999;

CONVERT8 "CONVERT TO UNITS":0.00..300.00 ;

IF EvDay....OneWeek AT Q16 AND Wine AT Q17

- Q26. "I'd like you to estimate how many glasses of wine, champagne or babycham you drink in a typical week?

RECORD TO NEAREST STANDARD GLASS"

:0..999;

CONVERT9 "CONVERT TO UNITS":0.00..300.00 ;

IF OneMonth....OneYear AT Q16 AND Wine AT Q17

- Q27. "I'd like you to estimate how many glasses of wine, champagne or babycham you drink in a typical month?
RECORD TO NEAREST STANDARD GLASS"
:0..999;

CONVER10 "CONVERT TO UNITS":0.00..300.00;

IF EvDay....OneWeek AT Q16 AND ALCPOP AT Q17

- Q28. "I'd like you to estimate how many bottles of alcopops, eg hooch or bacardi breezer, you drink in a typical week?
RECORD TO NEAREST BOTTLE"
:0..999;

CONVER11 "CONVERT TO UNITS":0.00..300.00 ;

IF OneMonth....OneYear AT Q16 AND ALCPOP AT Q17

- Q29. "I'd like you to estimate how many bottles of alcopops, eg hooch or bacardi breezer, you drink in a typical month?
RECORD TO NEAREST BOTTLE"
:0..999;
- Q30. Could you tell me if you have had any other alcoholic drinks during the last 12 months?":

Yes/no;

- Q31. What other type(s) of drink have you had?
ENTER ONE TYPE OF DRINK ONLY":

- Q32. How many of this drink would you have in a typical week?"
:0..999;

- Q33. How many of this drink would you have in a typical month?"
:0..999;

- Q34. Could you tell me if you have had any other alcoholic drinks during the last 12 months?":
yesno;

- Q35. ENTER TYPE OF DRINK
ENTER ONE TYPE OF DRINK ONLY":

Q36. How many of this drink would you have in a typical week?"
:0..999;

Q37. How many of this drink would you have in a typical month?"
:0..999;