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Biopsychosocial factors associated with depression and anxiety in older adults with intellectual disability: results of the wave 3 Intellectual Disability Supplement to The Irish Longitudinal Study on Ageing

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Abstract

Background Depression and anxiety are amongst the most prevalent mental health disorders in the older population with intellectual disability (ID). There is a paucity of research that pertains to associative biopsychosocial factors for depression and anxiety in this population. The aim of this study is to determine the biopsychosocial factors associated with depression and anxiety in a population of older adults with ID in Ireland.

Methods The study was part of 'The Intellectual Disability Supplement to The Irish Longitudinal Study on Ageing'. Depressive symptoms were assessed using the Glasgow Depression Scale for people with a Learning Disability. Anxiety symptoms were measured using the Glasgow Anxiety Scale for people with a Learning Disability. The cross-sectional associations of depression and anxiety with biopsychosocial parameters were measured using a variety of self-report and proxy-completed questionnaires.

Results For the study population, 9.97% met the criteria for depression, and 15.12% met the criteria for an anxiety disorder. Participants meeting criteria for depression were more likely to be taking regular mood stabiliser medications and to exhibit aggressive challenging behaviour. Participants meeting criteria for anxiety were more likely to have sleep difficulties and report loneliness. Participants meeting criteria for either/both depression and anxiety were more likely to report loneliness.

Conclusions This study identified both treatable and modifiable, as well as unmodifiable, biopsychosocial factors associated with depression and/or anxiety in older adults with ID. A longitudinal study follow-up will further develop our knowledge on the causality and direction of associated biopsychosocial factors with depression and anxiety in older adults with ID and better inform management strategies, prevention policies and funding of services.

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Introduction

The number of older adults with intellectual disability (ID) is increasing because of increased life expectancy, mainly as a result of advances and improvements in medical and social care (Sinai *et al.* 2012). As a result, this population may be exposed to more age-related physical and mental health difficulties (Perkins and Moran 2010).

Depression and anxiety are amongst the most prevalent mental health disorders in the older population with ID. Prevalence rates of 4.8–7.6% have been reported for depression and 2.7–5.7% for anxiety disorders (Patel *et al.*, 1993; Hermans *et al.* 2013; Reid *et al.* 2011) depending on the characteristics of the study populations and which diagnostic instruments were utilised.

Depression and anxiety are more prevalent in older adults with ID compared with younger adults with ID (Cooper 1997). The prevalence of major depressive disorder in older adults with ID is higher than in older adults without ID (Hermans *et al.* 2013; Axmon *et al.* 2018). In addition, older adults with ID report more symptoms of anxiety compared with other older adults (Axmon *et al.* 2018) in particular symptoms of 'tense or worrying feelings' and 'worrying thoughts' (Hermans *et al.* 2014).

Higher rates of depression and anxiety in older adults with ID may be a result of their longstanding disability, associated impairments and comorbid physical health problems (Pope and Tarlov 1991).

Hermans & Evenhuis (2013) Factors associated with depression and anxiety in older adults with ID may also differ from those of the general population due to different living conditions/situations, physical comorbidities, functional impairments, greater dependency on others and less autonomy. Physical health conditions including heart failure, stroke, chronic obstructive pulmonary disease, coronary artery disease, diabetes mellitus and malignancy are associated with increased depressive and anxiety symptoms (Hermans *et al.* 2013; de Winter *et al.* 2015) in people with ID.

Multiple psychosocial factors are associated with increased depression and anxiety symptoms in adults with ID including lack of day-time employment (Reid *et al.* 2011), social isolation (Hermans *et al.* 2013) and life events such as the death of a relative or friend, a change in the frequency of visits from family or friends and a change in the staff in the home or day service (Bond *et al.* 2019). Further research into physical and psychosocial factors that may cause or exacerbate depression and anxiety in older adults with ID is important for the development of prevention and treatment guidelines.

We studied the physical and psychosocial factors associated with depression and anxiety in a representative population of older adults with ID in Ireland. The aims of this study were to (1) determine what proportion of this population suffer from depression and/or anxiety and to (2) identify associated biopsychosocial factors.

Method

Settings and study population

Data were drawn from the third wave (2016/2017) of "The Intellectual Disability Supplement to The Irish Longitudinal Study on Ageing" (IDS-TILDA). IDS-TILDA is a multiple wave, longitudinal study investigating ageing in Ireland amongst adults with ID. The principle aims of IDS-TILDA are to examine the ageing profile of this population and to explore their physical and mental health, health service requirements, social supports, living conditions and community involvement. The study has been described in more detail elsewhere (McCarron *et al.* 2013).

The study sample used in IDS-TILDA was randomly selected from Ireland's National Intellectual Disability Database (NIDD). The NIDD records details on those in receipt or eligible to receive specialist ID services and summarises health services required by adults with ID. The most recent 2017 data set provided information on 28 388 people with all levels of ID and living in a variety of residential settings (Hourigan *et al.* 2018). The initial overall sample in the first wave of IDS-TILDA was representative of the NIDD data set (McCarron *et al.* 2013).

The IDS-TILDA inclusion criteria were as follows: (1) age ≥ 40 years, reflecting the reduced longevity and premature ageing of the ID population, (2) registered with the NIDD and (3) provide written

consent for participation in the study or family/guardian written agreement where required (McCarron *et al.* 2013). The study was granted ethical approval by Trinity College Dublin Faculty of Health Sciences Research Ethics Committee and by all the 138 service providers participating in the study.

Measures and procedures

Pre-interview questionnaires were referred to each participant at least 7 days prior to the main questionnaire, which was conducted as a face-to-face interview. This was to give respondents time to obtain the requested information, thereby improving the reliability of data. Topics in the pre-interview questionnaire included gender, age, level of ID, residential setting, health status/diagnoses, healthcare utilisation, dietary information, challenging behaviour and medications (McCarron *et al.* 2013).

The main face-to-face interview utilised a computer-assisted personal interviewing programme. This questionnaire comprised 17 sections including demographics and residential setting, social participation, physical and mental health, medications, sleep and socialisation. Interviews were a mix of self-report and proxy interviews completed by family and/or staff members and were administered by a trained interviewer in a location of the participant's choice, usually their home or day service centre (Bond *et al.* 2019).

Measures of depression and anxiety

Depressive symptoms were assessed using the Glasgow Depression Scale for people with a Learning Disability (GDS-LD). The GDS-LD was developed by Cuthill *et al.* (2003) and is a 20-item, self-rated scale for participants capable of self-report. The scale takes 10–15 min to administer, depending on the ability and cooperation of the respondent (Cuthill *et al.* 2003). The scores range from 0 to 40; a cut-off of ≥13 was selected based on published results which yields 96% sensitivity and 90% specificity for determining depression/no depression (Cuthill *et al.* 2003). The GDS-LD significantly differentiates between depressive and nondepressive ID groups and shows excellent criterion validity ($r = 0.94$), high test–retest reliability ($r = 0.97$) and high satisfactory internal consistency (Cronbach's $\alpha = 0.90$).

Anxiety symptoms were measured using the Glasgow Anxiety Scale for people with a Learning Disability (GAS-LD). The GAS-LD was developed by Mindham and Espie (2003) and is a 27-item self-report scale to assess anxiety symptoms in individuals with ID. The scale takes 5–10 min to administer, depending on the ability and cooperation of the respondent. The scale has good psychometric properties and significantly differentiates between anxious and nonanxious ID groups. The scale has high test–retest reliability ($r = 0.95$), high satisfactory internal consistency (Cronbach's $\alpha = 0.96$) and sufficient validity, with a sensitivity of 84% and specificity of 52% (Mindham and Espie 2003). The scores range from 0 to 54, and a cut-off of ≥17 for anxiety was used in keeping with published data (Hermans *et al.* 2013).

Associated physical and psychosocial factors

Potential associated physical and psychosocial factors were chosen based on associations found in previous published studies in older adults with ID and the general older population.

Physical health factors

Physical health was assessed using a self-report questionnaire where participants were asked to rate their own perception of their physical health on a five-point Likert scale ranging from excellent to poor. In addition, participants and/or their proxies were asked in their pre-interview questionnaires to state the presence of any chronic health condition (high blood pressure, angina, congestive heart failure, diabetes mellitus, hypercholesterolaemia, heart murmur, atrial fibrillation, myocardial infarction, stroke, transient ischaemia attack, dementia, Parkinson's disease, epilepsy and cancer). Participants and/or their proxies were also asked to state their physical exercise levels with an inactive lifestyle being defined as the absence of mild, moderate or vigorous exercise in the last 7 days and their body mass index (BMI) with obesity being defined as a BMI ≥30 (based upon reported height and weight).

Mental health factors

The use of psychotropic medications was assessed by asking participants and/or their proxies in the

pre-interview questionnaire to state their regular medication, that is, medication taken every day or every week including prescribed medications, over the counter medications, alternative medications and dietary/nutritional supplements (McCarron *et al.* 2011). Medications were recorded by both their brand and generic names as well as the corresponding dose and frequency. Information regarding a participant's medications were confirmed at the face-to-face interviews (O'Dwyer *et al.* 2016).

Medications were recorded using the World Health Organization Anatomical Therapeutic Chemical classification codes (WHO Collaborating Centre for Drug Statistics Methodology 2017). Psychotropic medications were divided into five categories:

- Antidepressants (N06A)
- Antipsychotics (N05A) excluding lithium (included instead in the mood stabiliser category) and Prochlorperazine as the doses in the study population fell within the dosage range used for treatment of Meniere's syndrome and nausea and vomiting (10–40 mg daily) as opposed to psychotic disorders (≥75 mg daily) (O'Dwyer *et al.* 2016; Health Products Regulatory Authority 2018; O'Connell *et al.* 2018
- Anti-epileptics (N03A) that for this study we labelled as mood stabilisers and added lithium (N05A). It was not possible to definitively conclude that anti-epileptic medication was indicated for mood stabilisation as opposed to seizure control in participants with a diagnosis of epilepsy (Bond *et al.* 2019). We therefore excluded these participants (n = 31) from the analyses.
- Anxiolytics (N05B) excluding rectal diazepam and Clobazam as they are used primarily for epilepsy as opposed to anxiety disorders
- Sedatives and hypnotics (N05C) excluding midazolam as its primary use is for acute seizure control as oppose to mental health conditions

Sleep

Sleep was assessed using three items from the Pittsburgh Sleep Quality Index. The Pittsburgh Sleep Quality Index is a self-rated questionnaire developed by Buysse *et al.* (1989) to assess sleep quality and disturbances over the past month. The questionnaire comprised 19 items combined into seven components that are then summarised into a global score. Studies have questioned the appropriateness of only using the global score (Rener-Sitar *et al.* 2014). Four items were included in this study to ascertain information regarding the participants' sleep latency, sleep disturbances, and use of sleeping medications and daytime dysfunction (Buysse *et al.* 1989).

Psychosocial factors

Behaviours that challenge were assessed using the Behaviour Problems Inventory for Individuals with Intellectual Disabilities-Short Form (Mascitelli *et al.* 2015). The Behaviour Problems Inventory for Individuals with Intellectual Disabilities-Short Form is a condensed version of the Behaviour Problems Inventory-01 (Rojahn *et al.* 2001). It is a 30-item standardised scale, which assesses the occurrence, frequency and severity of challenging behaviour in people with ID in the previous 2 months. The instrument includes three of the most common challenging behaviours including self-injurious behaviour (8 items), aggressive and destructive behaviour (12 items) and stereotyped behaviour (10 items).

The instrument has acceptable validity to assess challenging behaviour in individuals with ID, with adequate to good internal consistency, inter-rater agreement and test–retest reliability (Mascitelli *et al.* 2015). The tool has strong evidence for confirmatory and discriminant validity (Rojahn *et al.* 2012), and confirmatory factor analysis has validated the three Behaviour Problems Inventory-Short Form sub-scales (Mascitelli *et al.* 2015).

Functional limitations with activities of daily living (ADLs) and instrumental activities of daily living (IADLs) were assessed using a four-point Likert scale ranging from no difficulty to cannot do at all. ADLs were categorised as fundamental skills typically needed to manage basic physical needs and include bathing and showering, personal hygiene and grooming, dressing, toileting, functional mobility, that is, transferring and ambulating and self-feeding (Mlinac and Feng 2016). IADLs refer to tasks that allow an individual to live independently in a community and include cleaning and maintaining a home, managing finances, moving within a

community, food preparation, shopping, taking prescribed medications and using the telephone (Lawton and Brody 1969).

Contact with family and friends was assessed using a three-point Likert scale ranging from weekly, monthly and yearly or less. A lack of contact with family/friends was defined as contact yearly or less.

Statistical analysis

Statistical analysis was carried out using Statistical Package for the Social Sciences (SPSS) Version 24.0. Non-response analysis was carried out using chi-square test for age, gender, residential setting and level of ID. Associations between depression and/or anxiety, as determined by the GDS-LD and GAS-LD cut-offs, with demographic factors, physical and mental health factors, sleep factors and social and personal factors were analysed using Pearson's chi-squared test. Variables were chosen from those that were theoretically associated with the dependent variable as shown in the existing literature. Fisher's exact test statistic was used when expected frequencies were observed to be less than 5.

The relationship of depression, anxiety and either/both depression and anxiety with the bivariately significant variables was explored using logistical regression analysis. The bivariate approach permits making decisions about not including variables in the regression that initially seemed possible associates but absence of bivariate significance ($P > 0.05$) permits their removal from the regression ensuring only the relevant variables are then included in the regression. All odds ratios are adjusted for age and gender.

Results

The study population consisted of 291 participants (121 male participants and 170 female participants) who could complete the GDS-LD and GAS-LD self-report questionnaires. Most participants were in the 50–65 age range (64.26%) and had a moderate ID (53.08%). Most participants lived in a community group home (48.45%), and just under half were in employment (44.95%). Twenty-nine participants (9.97%) met the criteria for depression scoring above the cut-off on the GDS-LD and 44 participants (15.12%) met the criteria for an anxiety disorder scoring above the cut-off on the GAS-LD. Fifty-three (18.21%) met the criteria for either/both depression and anxiety (Table 1).

Patient demographics

Age, gender, level of ID and residential setting were not significantly associated with depressive and anxiety symptoms in the study population. Participants with Down syndrome were more likely to meet criteria for anxiety ($P = 0.05$) and either/both depression and anxiety ($P = 0.05$) compared with those whose ID was due to causes other than Down syndrome ($P = 0.05$).

Physical health factors

Twenty-two participants (7.56%) self-reported poor physical health. Participants who self-reported poor physical health were significantly more likely to meet

Table 1 Characteristics of the study population ($n = 291$)

Characteristic	*n*	%
Age		
<50	32	11.00
50–64	187	64.26
65+	72	24.7
Gender		
Male	121	41.58
Female	170	58.42
Level of ID[†]		
Mild	111	42.69
Moderate	138	53.08
Severe/profound	11	4.23
Residential setting		
Independent/family	78	26.80
Community group home	141	48.45
Residential care	72	24.74
Cause of ID		
Down syndrome	41	14.09
Other	250	85.91
Employment[‡]		
Employed	129	44.95
Unemployed/retired	158	55.05
Depression (score above cut-off on GDS)	29	9.97
Anxiety (score above cut-off on GAS)	44	15.12
Either or both depression or anxiety (score above cut-off on GDS and/or GAS)	53	18.21

[†]31 missing.
[‡]Four missing.
GAS, Glasgow Anxiety Scale; GDS, Glasgow Depression Scale; ID, intellectual disability.

criteria for anxiety ($P = 0.03$) or either/both depression and anxiety ($P = 0.04$). Two hundred and seventeen participants (74.57%) had at least one chronic physical health condition. Participants with any chronic physical health condition were significantly more likely to meet criteria for anxiety ($P = 0.008$) and either or both depression and anxiety ($P = 0.01$) (Table 2) compared to those without.

Most participants (79.73%) reported an inactive lifestyle and for a third of participant's BMI was found to be in the obese range (30.58%). Inactive lifestyle and obesity were not, however, significantly associated with depressive and/or anxiety symptoms (Table 2).

Mental health factors

One-third of participants reported taking regular antidepressants (29.90%) and antipsychotic medication (30.93%). Participants taking antidepressants were significantly more likely to meet criteria for anxiety ($P = 0.04$) and either/both depression and anxiety ($P = 0.04$). Regular antipsychotic medication was not significantly associated with depressive or anxiety symptoms. Thirty-three participants (11.34%) reported taking mood stabilisers. Participants on mood stabilisers were significantly more likely to meet criteria for depression ($P = 0.001$) and either/both depression and anxiety ($P = 0.02$). Thirty-five participants (12.03%) were on regular anxiolytic medication. Participants on anxiolytic medications were significantly more likely to meet criteria for depression ($P < 0.001$), anxiety ($P = 0.04$) and either/both depression and anxiety ($P = 0.001$). Finally, 17 participants (5.84%) took regular hypnotic/sedative medications. Participants taking regular hypnotics/sedatives were significantly more likely to meet criteria for depression ($P = 0.009$) (Table 2).

Participants with a doctor's diagnosis of depression were significantly more likely to be on regular antidepressants ($P < 0.001$), antipsychotics ($P < 0.001$), mood stabilisers ($P < 0.001$), anxiolytics ($P = 0.04$) and hypnotics/sedatives ($P = 0.005$). Participants with a doctor's diagnosis of anxiety were significantly more likely to be on regular antidepressants ($P < 0.001$), antipsychotics ($P < 0.001$), mood stabilisers ($P = 0.002$), anxiolytics ($P < 0.001$) and hypnotics/sedatives ($P < 0.001$).

Sleep factors

Trouble with sleeping was widely reported by participants. The most common reasons for this were due to using the bathroom (46.74%), waking in the night or early morning (20.96%) and being unable to get to sleep within 30 min (14.78%) (Table 3).

Participants were significantly more likely to meet criteria for depression if they had trouble sleeping due

Table 2 Potential physical and mental health factors associated with depression and/or anxiety symptoms in older adults with ID

Factor	*n* (%)	Depression (cut-off >13 on GDS-LD)	Anxiety (cut-off >13 on GAS-LD)	Either or both depression and anxiety
Poorer self-rated physical health	22 (7.56)	1.79	5.17*	5.26*
Any chronic physical health condition	217 (74.57)	0.88	7.12**	6.25*
Inactive lifestyle	232 (79.73)	1.01	1.30	0.26
Obesity (BMI ≥30)	89 (30.58)	3.13	1.46	0.80
Currently on antidepressants	87 (29.90)	2.52	4.19*	4.13*
Currently on antipsychotics	90 (30.93)	3.47	0.65	0.70
Currently on mood stabilisers	33 (11.34)	11.76**	3.25	4.97*
Currently on anxiolytics	35 (12.03)	13.64***	4.41*	10.97***
Currently on hypnotic/sedatives	17 (5.84)	6.73*	0.69	2.94

*$P < 0.05$,
**$P < 0.01$,
***$P < 0.001$.

BMI, body mass index; GAS, Glasgow Anxiety Scale; GDS, Glasgow Depression Scale; ID, intellectual disability.

Table 3 Potential sleep factors associated with depression and/or anxiety in older adults with ID

Factor	*n* (%)	Depression (cut-off >13 on GDS-LD)	Anxiety (cut-off >17 on GAS-LD)	Either/both depression and anxiety
Trouble sleeping as cannot get to sleep within 30 min	43 (14.78)	16.93***	9.61**	8.24**
Trouble sleeping over the past month due to waking in the night or early morning	61 (20.96)	19.11***	11.13***	13.70***
Trouble sleeping over the past month due to using the bathroom	136 (46.74)	4.30*	1.57	1.49
Trouble sleeping over the past month due to cannot breathe comfortably	7 (2.41)	0.22	4.46*	3.27
Trouble sleeping over the past month due to coughing or snoring	18 (6.19)	13.43**	13.95***	10.31***
Trouble sleeping over the past month due to feeling too cold	7 (2.41)	34.49***	18.52***	14.90***
Trouble sleeping over the past month due to feeling too hot	16 (5.49)	24.05***	16.40***	12.50***
Trouble sleeping over the past month due to a bad dream	9 (3.09)	13.44**	11.80***	15.33***
Trouble sleeping over the past month due to pain	13 (4.47)	7.61**	2.74	4.26*
Taking medication for sleep ≥1 per week	23 (7.90)	0.81	3.00	1.77
Trouble staying awake while driving, eating meals or engaging in social activities	19 (6.53)	12.24***	4.52*	5.43*

*$P < 0.05$,
**$P < 0.01$,
***$P < 0.001$.
BMI, body mass index; GAS, Glasgow Anxiety Scale; GDS, Glasgow Depression Scale; ID, intellectual disability.

to being unable to get to sleep in 30 min ($P < 0.001$), waking in the night or early morning ($P < 0.001$), coughing or snoring ($P < 0.001$), feeling too cold ($P < 0.001$), feeling too hot ($P < 0.001$) and having a bad dream ($P < 0.001$). Participants were also more likely to meet criteria for depression if they had trouble staying awake at least once per week while driving, eating meals or engaging in social activities ($P < 0.001$) (Table 3). Participants were more likely to meet criteria for depression if they had trouble sleeping due to using the bathroom ($P = 0.04$) and pain ($P = 0.006$).

Participants were significantly more likely to meet criteria for anxiety if they had trouble sleeping due to waking in the night or early morning ($P = 0.001$), coughing or snoring ($P < 0.001$), feeling too cold ($P < 0.001$), feeling too hot ($P < 0.001$) and having a bad dream ($P = 0.001$). Participants were also more likely to meet criteria for anxiety if they had difficulty sleeping due to being unable to get to sleep in 30 min ($P = 0.002$), being unable to breathe comfortably ($P = 0.04$) and trouble staying awake at least once per week while driving, eating meals, or engaging in social activities ($P = 0.03$) (Table 3).

Participants were significantly more likely to meet criteria for either/both depression and anxiety if they had trouble sleeping due to waking in the night or early morning ($P < 0.001$), coughing or snoring ($P = 0.001$), feeling too cold ($P < 0.001$), feeling too hot ($P < 0.001$) and having a bad dream ($P < 0.001$). Participants were also more likely to meet criteria for either/both depression and anxiety if they had difficulty sleeping due to being unable to get to sleep in 30 min ($P = 0.004$), pain ($P = 0.04$) and trouble staying awake at least once per week while driving, eating meals or engaging in social activities ($P = 0.02$) (Table 3).

Psychosocial factors

Fifty participants (17.18%) reported difficulties in carrying out ADLs. Participants who reported difficulties in carrying out activities of daily living were significantly more likely to meet criteria for depression ($P = 0.04$), anxiety ($P = 0.05$) and either/both depression and anxiety ($P = 0.02$). Most participants (82.82%) reported difficulties in carrying out IADLs; however, this was not significantly associated with depressive or anxiety symptoms (Table 4).

Just over half of participants (55.67%) reported a lack of involvement with a club or society. A minority of participants (6.19%) reported difficulties in keeping up enthusiasm to get things done in the last month. These participants were significantly more likely to meet criteria for depression ($P < 0.001$), anxiety ($P < 0.001$) and either/both depression and anxiety ($P < 0.001$). Seventy-six participants (26.12%) reported a lack of contact with family, and 24 (8.25%) reported a lack of contact with friends. One hundred and fourteen participants (39.18%) reported feeling lonely. These participants were significantly more likely to meet criteria for depression ($P = 0.02$), anxiety ($P < 0.001$) and either/both depression and anxiety ($P < 0.001$) (Table 4).

More than a third of participants (35.74%) reported challenging behaviour in the previous 2 months. Participants with any type of challenging behaviour were significantly more likely to meet criteria for

Table 4 Potential social and personal factors associated with depression and anxiety in older adults with ID

Factor	*n* (%)	Depression (cut-off >13 on GDS-LD)	Anxiety (cut-off >17 on GAS-LD)	Either/both depression and anxiety
Unemployment	158 (54.30)	0.64	0.84	1.37
Difficulty with activities of daily living	50 (17.18)	4.30*	3.66*	5.56*
Difficulty with instrumental activities of daily living	241 (82.82)	1.20	0.47	1.52
Lack of involvement with club/society	162 (55.67)	0.06	0.51	0.41
Difficulty keeping up enthusiasm to get things done in the last month	18 (6.19)	57.98***	12.40***	30.92***
Lack of contact with family	76 (26.12)	0.48	1.40	0.95
Lack of contact with friends	24 (8.25)	1.54	0.8	0.57
Loneliness	114 (39.18)	5.42*	19.11***	14.55***
Communication difficulties	148 (50.86)	1.24	0.39	2.11
Challenging behaviour – self-injury	38 (13.06)	0.58	0.06	0.03
Challenging behaviour – aggression	71 (24.40)	11.13***	1.25	5.91*
Challenging behaviour – stereotyped behaviour	67 (23.02)	0.47	0.63	1.54
Any challenging behaviour	104 (35.74)	4.63*	1.27	4.21*

*$P < 0.05$,
**$P < 0.01$,
***$P < 0.001$.
GAS, Glasgow Anxiety Scale; GDS, Glasgow Depression Scale; ID, intellectual disability.

depression ($P = 0.03$) and either/both depression and anxiety ($P = 0.04$). The most common type of challenging behaviour reported was aggression (24.40%). Participants who reported aggression in the previous 2 months were significantly more likely to meet criteria for depression ($P = 0.001$) (Table 4).

Variables found to have significant associations in bivariate comparisons were entered in logistic regression analyses (Table 5). The regression analyses showed that depressive symptoms remained significantly associated with taking regular mood stabilisers ($P = 0.02$) and aggressive challenging behaviour ($P = 0.04$). Anxiety symptoms remained significantly associated with trouble sleeping over the past month due to waking in the night or early morning ($P = 0.05$) and loneliness ($P = 0.005$). Finally, either/both depressive and anxiety symptoms remained significantly associated with loneliness ($P = 0.02$).

Discussion

This study was part of the large-scale IDS-TILDA, a multi-wave longitudinal study researching ageing in Ireland amongst adults with ID. The study shows that in an Irish sample of 291 older adults with ID, using formal ID services, 9.97% met the criteria for depression, 15.12% met the criteria for an anxiety disorder and 18.21% met the criteria for either/both depression and anxiety. Herman *et al.*, (2013)

Table 5 Associations of depression, anxiety and either/both depression and anxiety with biopsychosocial factors expressed in odds ratio (95% CI)

Independent variable	OR (95% CI)	*P* value
Depression		
Age	0.39 (0.05–2.95)	0.36
Gender	0.48 (0.05–4.66)	0.91
Mood stabilisers	6.11 (1.39–26.77)	0.02
Anxiolytics	0.67 (0.13–3.58)	0.64
Trouble sleeping as cannot get to sleep within 30 min	3.28 (0.74–14.53)	0.12
Trouble sleeping over the past month due to waking in the night or early morning	1.90 (0.38–9.39)	0.43
Trouble sleeping over the past month due to feeling too cold	4.12 (0.40–42.35)	0.23
Trouble sleeping over the past month due to feeling too hot	5.14 (0.56–47.09)	0.15
Trouble staying awake while driving, eating meals or engaging in social activities	0.80 (0.12–5.32)	0.82
Difficulty keeping up enthusiasm to get things done in the last month	2.96 (0.51–17.26)	0.23
Challenging behaviour – aggression	4.35 (1.05–18.1)	0.04
Anxiety		
Age	2.49 (0.43–14.24)	0.31
Gender	1.14 (0.50–2.59)	0.76
Trouble sleeping over the past month due to coughing or snoring	2.36 (0.57–9.71)	0.24
Trouble sleeping over the past month due to waking in the night or early morning	2.59 (1.01–6.66)	0.05
Trouble sleeping over the past month due to feeling too cold	2.78 (0.36–21.45)	0.33
Trouble sleeping over the past month due to feeling too hot	3.58 (0.94–13.65)	0.06
Difficulty keeping up enthusiasm to get things done in the last month	0.80 (0.18–3.65)	0.78
Loneliness	3.37 (1.44–7.90)	0.01
Either/both depression and anxiety		
Age	1.55 (0.34–7.09)	0.57
Gender	1.00 (0.45–2.22)	1.00
Anxiolytics	1.41 (0.49–4.08)	0.53
Trouble sleeping over the past month due to waking in the night or early morning	2.27 (0.93–5.54)	0.07
Trouble sleeping over the past month due to coughing or snoring	1.62 (0.37–7.13)	0.53
Trouble sleeping over the past month due to feeling too cold	2.45 (0.31–19.60)	0.40
Trouble sleeping over the past month due to feeling too hot	2.56 (0.66–10.04)	0.18
Difficulty keeping up enthusiasm to get things done in the last month	2.62 (0.61–11.14)	0.19
Loneliness	2.56 (1.15–5.72)	0.02

CI, confidence interval; OR, odds ratio.

reported similar rates with 16.8% of older adults with ID having increased depressive symptoms and 16.2% having increased anxiety symptoms.

There is a sparsity of data examining the biopsychosocial factors associated with mental illness in older adults with ID. Our study therefore provides much needed data examining the biopsychosocial factors that are implicated in mental ill health in older adults with ID. Our study included factors such as sleep, challenging behaviour and regular psychotropic medication that had not been included in existing studies.

Older adults with ID who met the cut-off for depression on the GDS-LD were more likely to be taking regular mood stabilisers and have aggressive challenging behaviour. Older adults with ID who met the criteria for anxiety on the GAS-LD were more likely to have difficulty sleeping due to waking in the middle of the night or early morning and reported feeling lonely. Finally, those meeting criteria for either/both depression and anxiety on the GDS-LD and LAS-LD reported feeling lonely. These are therefore the most critical factors in understanding associations with depressive and anxiety symptoms, but other variables identified in the bivariate analyses, may also deserve attention in intervention planning. Additional studies with other populations of people with ID are needed to confirm these findings and perhaps will offer additional insights into initially significant variables.

Additional biopsychosocial factors significantly associated with increased depressive symptoms have been reported elsewhere, including lack of daytime employment (Reid *et al.* 2011), difficulty with instrumental activities of daily living and lack of social contacts (Hermans *et al.* 2013). Increased anxiety symptoms have been found to be significantly associated with borderline or mild ID and lack of social contacts (Hermans *et al.* 2013). Our study did not report significant associations of these factors. Differences in associated biopsychosocial factors with depression and anxiety in various studies may be due to differences in study designs, study populations and statistical analysis (Hermans *et al.* 2013).

Almost three-quarters of participants reported having at least one chronic physical health condition. Any chronic physical health condition and self-reported poorer physical health were associated with increased anxiety symptoms. A study published by de Winter *et al.* (2015) reported a significant association between increased anxiety symptoms and diabetes, which appeared to be bidirectional and a significant association between chronic diseases and depression has also been reported (Hermans *et al.* 2013); however, this was not replicated in our study. Studies should further explore the complex relationship between mental and physical ill health in older adults with ID and explore possible mechanisms related to potential shared underlying pathophysiology.

Depressive symptoms were significantly associated with the regular use of mood stabilisers. To determine if participants had a formal diagnosis to justify the use of psychotropic medication, the study examined the relationship between the use of psychotropic medications with having formal diagnoses of depression and/or anxiety. A formal diagnosis of depression and/or anxiety was significantly associated with the regular use of all classes of psychotropic medications. Differences may be explained by the fact that the GDS-LD is a 'present state' tool that evaluates symptoms level across a 1-week period (Cuthill *et al.* 2003), and therefore, individuals who meet the criteria for depression may have not been identified yet by psychiatric services. On the other hand, it is unclear whether the diagnoses of depression and/or anxiety in our study population were recent or historical and whether these participants are currently unwell, in remission or recovered. It is widely reported that most older adults with ID are chronically medicated and polypharmacy remains a significant issue in this population (O'Dwyer *et al.* 2016). It is vital that older adults with ID can readily access psychiatric services for regular mental states and medication reviews with the use of rating scales to determine symptom level and aid in treatment decisions. Future studies should also seek to differentiate between historic and current diagnoses.

There are limited studies exploring sleep disturbances in older adults with ID. Available data have reported 72% of older adults with ID have at least one sleep problem and longer time in bed is associated with depressive symptoms (van de Wouw *et al.* 2013). Our study confirmed associations between a variety of sleep problems with depressive and anxiety symptoms. Further research should focus on determining the causality of the relationships

found in this study. Providers of ID services must recognise that service users with sleep problems are at increased risk of mental ill health and ensure that they are assessed and monitored without delay to ensure optimal management.

Participants with aggressive challenging behaviour were more likely to meet criteria for depression. Psychiatric comorbidity is frequent in older adults with ID and correlates with age (McCarron *et al.* 2013; Hermans and Evenhuis 2014). A study by Cooper and van der Speck (2009) reported that challenging behaviour was the most frequent psychiatric comorbidity. A strong association between depressive and anxiety symptoms in older adults with ID has also been reported by Hermans *et al.* (2013); however, this was not replicated in our study. Psychiatric comorbidity increases demand on ID service use and cost of care. It also increases the risk of polypharmacy in a population particularly at high risk of adverse drug effects (Bratek *et al.* 2017). Further research to gain a deeper understanding of the complexities of psychiatric comorbidities in older adults with ID is warranted so that clear and effective treatment guidelines may be developed to manage comorbid mental illness, reduce the risk of polypharmacy and prevent additional disability in adults with ID as they age.

There are several limitations to the study. Firstly, as the study is cross-sectional in nature it limits our ability to draw conclusions regarding the causality and direction of the associated biopsychosocial factors and mental ill health. The associated biopsychosocial factors identified in the study may be a result of mental ill health, that is, depressive and anxiety symptoms can lead to poor sleep, difficulties with activities of daily living and enthusiasm to get things done. On the other hand, difficulties with these parameters can lead to and/or augment depressive and anxiety symptoms. Future waves of IDS-TILDA will enable a more longitudinal perspective to be taken. The report here offers an important and needed baseline picture to support this future work.

As is common to longitudinal studies, much of the data stems from self-questionnaires and proxy-questionnaires, which are not verified by assessments. This may have led to an underestimation of physical and mental health problems, which could have impaired our ability to draw associative conclusions. Another limitation is that the study utilised self-reported data in the form of the GDS-LD and GAS-LD rather than a diagnostic clinical interview. Participants who met the cut-off scores were not followed-up by diagnostic interview limiting our ability to infer which participants truly suffered from depression and anxiety. As the study relied on self-report in an older population with ID, there may be difficulties with cognitive processing abilities that may limit this population in the recognition and communication of complex emotions. The GDS-LD and GAS-LD, nevertheless, are designed specifically for people with ID/LD, have been utilised widely in the literature and have demonstrated good psychometric properties for their use in research.

This study has identified a significant number of biopsychosocial factors associated with depression and anxiety in older adults with ID. Strengths of the study included a relatively large sample size and the use of a well characterised population sample. The study emphasises the importance of screening for associated biopsychosocial factors in addition to symptoms of mental ill health in older adults with ID. Longitudinal studies should be implemented to provide additional and reliable knowledge on the causality and direction of associative biopsychosocial factors and mental ill health for the older ID population to better inform management strategies, prevention policies and funding of services.

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