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Prevalence, patterns and factors associated with psychotropic use in older adults with intellectual disabilities in Ireland

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Abstract

Background People with intellectual disability (ID) are at increased risk of exposure to psychotropic drugs and psychotropic polypharmacy because of the higher prevalence of mental health conditions present and more controversially, the use of these agents to treat challenging behaviours. Despite the fact that many adults with ID are exposed to psychotropic polypharmacy, few studies to date have focused on the patterns of use of multiple psychotropics, or factors associated with psychotropic polypharmacy, particularly in the older population. This study aims to examine the prevalence, patterns and factors associated with psychotropic use in general and psychotropic polypharmacy in particular in a representative sample of ageing people with ID.
Methods This was an observational cross-sectional study from Wave 1 of Intellectual Disability Supplement to the Irish Longitudinal Study on Ageing; a nationally representative sample of 753 persons with ID aged between 41 and 90 years. Participants/proxy reported medicines (prescription and over the counter) taken on a regular basis; medication data were available for 736 participants (98%). Participants were divided into those with no psychotropic exposure, exposure to 1 psychotropic and psychotropic polypharmacy (2+ psychotropics). Patterns of psychotropic use were analysed. A multinomial logistic regression model identified factors associated with use of 1 psychotropic and psychotropic polypharmacy.
Results Overall, 59.1% (436) of the sample was exposed to any psychotropic; of these, 66.2% reported psychotropic polypharmacy. Antipsychotics were the most frequently reported psychotropic class by 43% of the sample. Living in a residential institution and having a history of reporting a mental health condition or sleep problems were associated with psychotropic polypharmacy after adjusting for confounders, while those with epilepsy were less likely to experience exposure to polypharmacy, but age, gender had no significant effect.
Conclusions Psychotropic use and polypharmacy were commonplace for older adults with ID. Psychotropic use, particularly the use of psychotropic combinations, needs to be regularly reviewed for safety, efficacy and adverse effects, and rationale for use of multiple agents needs to be clear and documented.

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Keywords intellectual disability, mental health, polypharmacy, psychiatric disorders, psychotropic medicines

Background

Mental health problems are common in people with intellectual disability (ID) and occur at a significantly higher prevalence than in the general population (Cooper *et al.* 2007), particularly self-injurious behaviour, attention deficit hyperactivity disorder, anxiety, psychosis and depression (Matson & Shoemaker 2011). Methodological differences have resulted in inconsistencies in reported rates of prevalence, but a seminal longitudinal cohort study by Cooper *et al.* (2007) reported that 40.9% of 1023 adults with ID presented with some form of mental disorder, but when the ICD-10 DCR criteria were applied, the rate dropped to 16.6% (Cooper *et al.* 2007), with affective disorders being predominant using record linkage across health jurisdictions in Western Australia; Morgan *et al.* (2008) identified that almost a third of individuals with ID had concurrent psychiatric morbidity, and nearly 2% of people with a mental illness also had ID.

Psychotropic agents are frequently employed to treat psychopathological conditions (Molyneux *et al.* 1999; Stolker *et al.* 2001; Stolker *et al.* 2002; Holden & Gitlesen 2004; Matson *et al.* 2010). Additionally, many people with ID receive these agents on a long-term basis to treat behavioural problems in the absence of a psychiatric diagnosis (Deb *et al.* 2014) for which these medications may or may not have been indicated (Stolker *et al.* 2002; Deb 2007; Deb & Unwin 2007). While some research has focused on the effectiveness of these agents in the suppression of symptoms or maladaptive behaviours, the potential for detrimental effects on positive social behaviours such as learning and social and adaptive behaviours (Bamburg *et al.* n.d.), especially in older people with a long history of exposure, has not been studied. Furthermore, the challenges presented by difficulties in communication, assessment and diagnosis, recognition of side effects, use of medications without explicit patient consent, coordination of social and behavioural interventions with pharmacotherapy (Einfeld 2001; King 2002; Matson & Mahan 2010; Matson *et al.* 2010; Deb *et al.* 2014) and the relative paucity of high-quality data to inform the use of medicines in this population (Reiss & Aman 1997; King 2002) illustrate the need for research.

Improvements in health and social care in developed countries for people with IDs have resulted in increases in life expectancy in this population, leading to a large and growing cohort of older adults with ID (Sinai *et al.* 2012). In Ireland, an increase in the proportion of those with ID aged 35 years and older has been observed in each iteration of the National Intellectual Disability Database (NIDD), from 37.9% in 1996 to 48.6% in 2009 (Kelly & Kelly 2010, McCarron *et al.* 2011). Despite increases in life expectancy, in Ireland, McCarron et al. (2015) found that mortality was four times higher for people with ID compared with the general population, and on average, people with ID died 19 years earlier. A recent study using national data about people with ID in England also found significantly higher mortality rates compared with the general population (Glover *et al.* 2017).

There is ongoing international concern about the levels of use of psychotropics in older people (Peterson *et al.* 2005; Mojtabai & Olfson 2010; Maust *et al.* 2014), particularly those who live in residential care (Ruths *et al.* 2001; Richter *et al.* 2012). There is accumulating evidence of adverse cognitive effects associated with psychotropic agents in the elderly (Weich *et al.* 2014). Prevalence of psychotropic use for people with ID has been reported to range from 40% to 44% for long-stay hospitals or institutional settings, up to 49% for primary care community-based residential care and 9–10% for those living in independent settings (Branford 1994; Kiernan *et al.* 1995; Molyneux *et al.* 1999; Robertson *et al.* 2000; Robertson *et al.* 2005; Sheehan *et al.* 2015). However, although psychotropic polypharmacy is common, the combinations of medications used have not been studied in detail. The study aim was to examine the prevalence, patterns and factors associated with psychotropic use in general and psychotropic polypharmacy in particular in a representative sample of ageing people with ID. The objectives were to:

1 determine the prevalence of psychotropic drug use and psychotropic polypharmacy;

2 describe the combinations of psychotropics being used;
3 determine the demographic and clinical factors associated with use of single psychotropic agents and psychotropic polypharmacy.

Methods

Study design

Medication data for this study were drawn from Wave 1 (2009/2010) of the Intellectual Disability Supplement to the Irish Longitudinal Study on Ageing (IDS-TILDA), including a nationally representative sample of 753 persons with an ID, aged over 40 years (Fig. 1) (McCarron, 2011). IDS-TILDA is a longitudinal study of older adults with ID and has been described in detail elsewhere. (McCarron, 2011, McCarron *et al.* 2013, O'Dwyer *et al.* 2016). Everyone included in the study was registered on the Irish National Intellectual Disability Database (NIDD) and therefore had an ID. The person's level of intellectual disabilities was checked and confirmed from case notes at the time of the face-to-face interview. Participants lived independently/with family, in community group homes or in residential settings. Residential settings were defined as living arrangements where 10 or more people share a single living unit or where the living arrangements are campus-based. Community group homes are in a community setting with staff support for small groups of people with IDs. The STROBE (The Strengthening the Reporting of Observational Studies in Epidemiology) reporting guidelines for cross-sectional studies was utilised (Vandenbroucke *et al.* 2014). Ethical approval for the study was received from the Faculty of Health Sciences Trinity College Dublin and 138 participating Intellectual Disability Service Providers, and all participants and/or proxies as appropriate provided informed consent to partake in the study.

Medication exposure measures

In a pre-interview survey participants/proxies were asked 'Can you tell me what medications (including prescribed and over the counter, herbal medicines) you take on a regular basis – like every day or every week?' (McCarron, 2011). Medication data were then confirmed by interviewers. Medicines were recorded by brand or generic name, including prescription and non-prescription and over the counter, and all data were anonymised. Medications were coded using the World Health Organization Anatomical Therapeutic Chemical (ATC) classification system (WHO n.d.).

Measuring exposure to pyschotropic medicines

The primary outcomes of interest (the dependent variables) for this study were whether a subject had any psychotropic use and whether a subject was exposed to use of multiple agents (psychotropic polypharmacy). Key definitions were:

- Psychotropic polypharmacy: concurrent use of two or more psychotropic agents in one individual (Mojtabai & Olfson 2010; Lake *et al.* 2012).
- Intraclass polypharmacy: use of two or more agents from within the same therapeutic class (Kalachnik *et al.* 2002; Mayville 2007; Ouellette-Kuntz *et al.* 2013). For the purpose of intraclass polypharmacy, anxiolytics and hypnotics were treated as one class (anxiolytics/hypnotics) comparable with other studies (Sheehan *et al.* 2015).
- Interclass polypharmacy: use of two or more medications from different therapeutic classes (McGillivray & McCabe 2004).

Two pharmacists (M. O.' D., J. P.) independently reviewed and confirmed medication entries with confirmation of psychotropic classifications by a psychiatrist specialising in the treatment of people with ID (N. M.). There were four major classes of psychotropic medicines:

1 antipsychotic agents (ATC N05A);
2 antidepressants (ATC NO6A);
3 anxiolytics (ATC N05B)/sedative/hypnotics (NO5C);
4 mood-stabilising agents (which included antiepileptics (N03A) for indications other than epilepsy and lithium (N05AN01)).

We counted the mood-stabilising antiepileptic medicines in our definition of a psychotropic when the patient did not report a doctor's diagnosis of epilepsy and received a drug with an indication of mood stabilisation, 80% of these had a doctor's diagnosis of emotional/nervous or psychiatric condition.

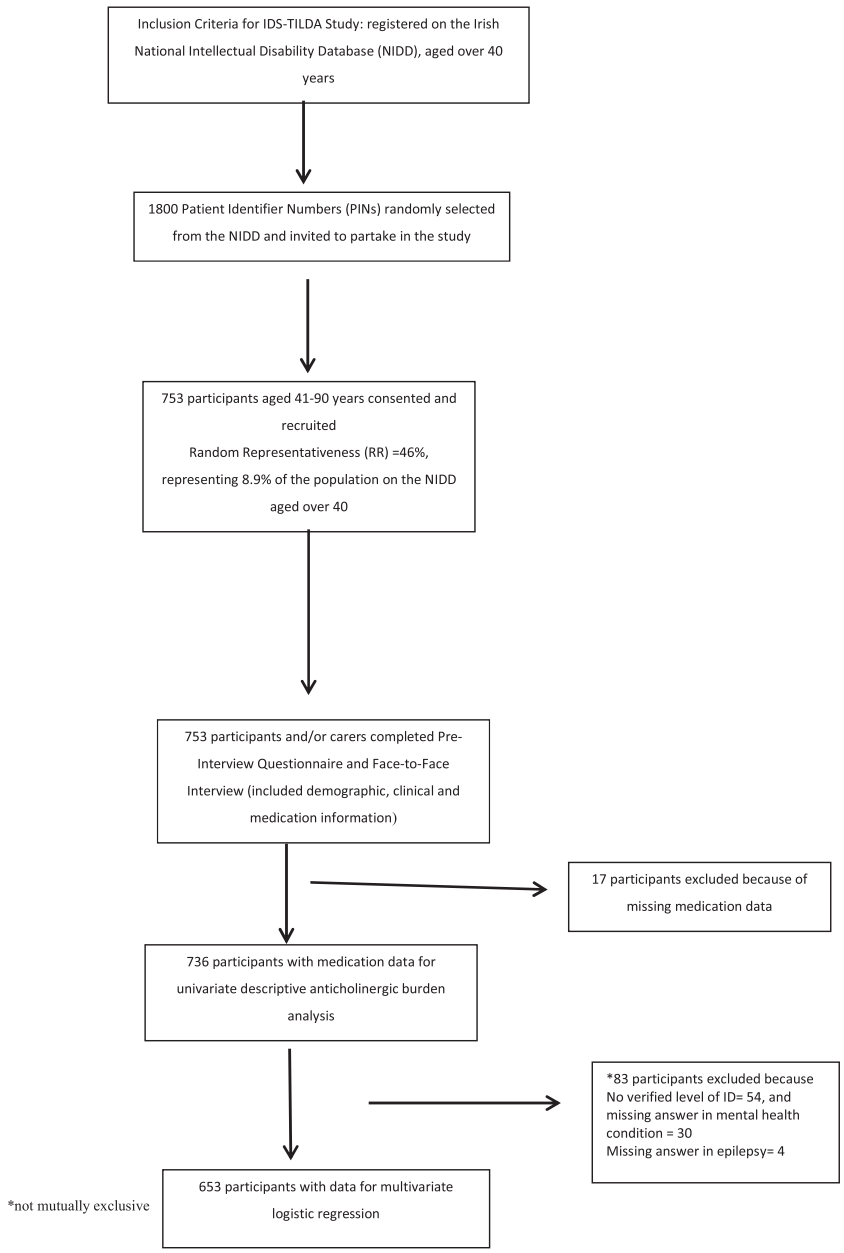

Figure 1 Flow chart for study. IDS-TILDA, Intellectual Disability Supplement to the Irish Longitudinal Study on Ageing.

The following variables were then created:

1 A binary variable reporting use of any psychotropics (1, 0).
2 A continuous variable capturing number of psychotropics reported by an individual (range 0–7)
3 A categorical variable capturing those reporting 0, 1 or 2 or more psychotropics (psychotropic polypharmacy) (0, 1, 2)
4 A binary variable for those reporting intraclass polypharmacy (1, 0)
5 A continuous variable for the number of interclass polypharmacy combinations (range 0–5).

Mental health conditions and variables

Mental health variables were based on the following questions:

1. 'Have you ever received a doctor's diagnosis of an emotional/nervous or psychiatric condition?'
2. 'What type(s) of conditions are these (hallucinations, manic depression, mood swings, depression, anxiety, psychosis, schizophrenia, don't know, none of these conditions)?' (Ageing 2002)

Those who reported hallucinations or psychosis or schizophrenia were grouped as a psychotic disorder. Sleep difficulties originally in four categories become a binary variable (any sleep problem) (Mulryan *et al.* 2014).

Explanatory variables

Potential predictors of the use of psychotropics and/or psychotropic polypharmacy included

1. Predisposing variables: age, gender, level of ID, living circumstances, co-morbid epilepsy, physical health conditions, sleep problems and health perception;
2. Enabling factors: institutional setting, healthcare access and functional abilities;
3. Need factors: reporting a mental health condition, a sleep problem and type of mental health condition.

Although suggested in the literature, we excluded the following variables from further analysis because of insufficient heterogeneity: marital status (almost all were unmarried), education (almost all had not received secondary education), socio-economic status (almost all had a medical card), healthcare insurance and utilisation.

Statistical analysis

Data analyses were performed using SPSS version 20. Descriptive statistics summarised the population reporting use of 1 psychotropic, 2 or more psychotropics (psychotropic polypharmacy) and those reporting no psychotropic exposure. The overall prevalence of psychotropic drug use was calculated as a proportion of the total eligible population (n = 736). Participants were further classified according to medication usage into no psychotropics, 1 psychotropic and ≥2 psychotropics by age, gender, level of ID, residential setting, body mass index, mental health conditions, epilepsy and health conditions.

Multinomial logistic regression was then used to identify factors associated with use of one psychotropic and with psychotropic polypharmacy using individuals who reported taking no psychotropic medications as the reference category.

Demographic variables were included in the model with those with unverified level of ID (n = 54) excluded. Those living independently and in community group homes were grouped together in a single variable because of insufficient numbers in the living independently variable. Variables with a P value < 0.10 in univariate analysis were then included in the multivariable model (Tabachnick & Fidell 2013). All variables were entered into the model simultaneously, with results presented as adjusted odds ratios (ORs) with corresponding 95% confidence intervals (CIs).

Sample size calculation for the logistic regression was based on the guideline of Peduzzi *et al.* (1996): $N = 10k/p$, where p is the smallest of the proportions of negative or positive cases in the population and k the number of covariates (independent variables). For the regression model, there were seven covariates, and the proportion of negative cases (1 psychotropic) was 0.214; therefore, a minimum sample size (N) of 327 was needed. There were 653 cases available for regression analyses, meaning sample size was sufficient.

Results

Study population

As may be seen in Table 1 (n = 736), almost half (48.2%) reported having ever being diagnosed with a doctor's diagnosis of an emotional/nervous or psychiatric condition. Further, of those reporting conditions, over half (54%) reported an anxiety condition, 40% mood swings, 39% depression, 27.8% emotional problems, 19.1% schizophrenia or psychosis or hallucinations (not mutually exclusive) and 7.9% manic depression. In the total sample, 5.7% reported cerebral palsy, and less than 1% reported a

Table 1 Characteristics of the study population (n = 736)

Characteristics	Total 736 *N* (%)	No psychotropic use 300 *N* (%)	1 psychotropic 148 *N* (%)	Psychotropic polypharmacy 288 *N* (%)	*P*-value
Gender					
Male	330	136 (41.2)	70 (21.2)	124 (37.6)	0.67
Female	406	165 (40.6)	77 (19.0)	164 (40.4)	
Age					
41–49 years	266	122 (45.9)	49 (18.4)	95 (35.7)	0.09
50–64 years	336	137 (40.8)	69 (20.5)	130 (38.7)	
65+ years	134	42 (31.3)	29 (21.6)	63 (47.0)	
Level of ID (n = 682)					
Mild	163	72 (44.2)	28 (17.2)	63 (38.7)	**<0.001**
Moderate	316	144 (45.6)	61 (19.3)	111 (35.1)	
Severe/profound	203	59 (29.1)	48 (23.6)	96 (47.3)	
Residence					
Independent	122	87 (71.3)	20 (16.4)	15 (12.3)	**<0.001**
Community group home	265	115 (43.4)	60 (22.6)	90 (34.0)	
Residential	349	99 (28.4)	67 (19.2)	183 (52.4)	
BMI category (n = 574)					
Underweight	12	4 (33.3)	2 (16.7)	6 (50.0)	
Normal weight	214	75 (35.0)	48 (22.4)	91 (42.5)	
Overweight	173	72 (41.6)	30 (17.3)	72 (41.6)	
Obese	175	73 (41.7)	34 (19.4)	68 (38.9)	
Emotional/nervous/psychiatric condition (n = 731)					
Yes	352	34 (9.7)	87 (22.7)	231 (65.6)	**<0.001**
No	352	255 (72.4)	47 (13.4)	50 (14.2)	
Do not know	27	10 (37.0)	11 (40.7)	6 (22.2)	
Any sleep difficulty	450	160 (35.6)	98 (21.8)	192 (42.7)	**0.001**
Has epilepsy (n = 732)	225	94 (41.8)	54 (23.6)	78 (34.7)	0.09
Any dementia (n = 727)	44	12 (27.3)	7 (15.9)	5 (56.8)	0.05
Self-rated health (n = 730)					
Excellent/good/very good	625	249 (39.8)	125 (20.0)	251 (40.2)	0.31
Fair/poor	105	48 (45.7)	23 (21.9)	34 (32.4)	

ID, intellectual disability; BMI, body mass index. *$P < 0.05$ in bold.

diagnosis of autism in addition to ID. Over 60% reported some difficulty with sleep, and 44 participants reported a doctor's diagnosis of any dementia. Eight in 10 of those who reported psychotropic use had at least one other chronic condition (they were multimorbid.).

Psychotropic medication use

In total, 436 participants (59.1%) reported use of psychotropics, with a mean (±SD) of 2.3 (±1.3) psychotropic medicines (maximum concurrent seven psychotropics). Just over two-thirds (66.2%, 288) reported concurrent use of two or more psychotropics, and over one-third (38.1%, 166) reported use of three or more psychotropics. The three most frequently reported psychotropic agents were the atypical antipsychotics risperidone, olanzapine and the anxiolytic diazepam; together, these three agents accounting for over one-quarter (29.4%) of all psychotropic medicines reported. Other drugs with central effects were less frequently used: stimulant use was less than 1% and medications for dementia <2%.

Profile of those reporting psychotropic use and psychotropic polypharmacy

Almost 40% of the eligible study population was exposed to psychotropic polypharmacy, one-fifth

reported use of one psychotropic and 40% had no psychotropic exposure. Almost half (47%) of those over 65 years reported psychotropic polypharmacy exposure, compared with 38.7% of those aged 50–64 years and 35.7% of those aged 40–49 years ($P = 0.09$). Almost half (47%) of those with severe/profound ID reported polypharmacy, in contrast to 35.1% of those with moderate ID and 38.7% of those with mild ID ($P < 0.001$). Over half (52.4%) of those living in residential settings reported psychotropic polypharmacy compared with 34% of those living in community group homes and 12.3% of those living 104 independently($P < 0.001$). Eight in 10 of those who reported psychotropic use had at least one other chronic condition. There was a significant association between psychotropic use and older age ($P < 0.05$), with 68.7% (92) of those aged over 65 years exposed, compared with 59.2% (199) of those aged 50–64 years and 54.1% (144) of those aged 40–49 years. A significant association between antidepressant use and age was observed ($P < 0.05$); approximately 32.8% (44) of those over 65 years had an antidepressant compared with 27.1% (91) of those aged 50–64 years and 21.8% (58) of those aged 40–49 years.

Intraclass polypharmacy

Antipsychotics were the most frequently prescribed class reported by 319; 73% of psychotropic users (Table 2). Overall, 30.5% (133) of those who reported psychotropic use were exposed to intraclass polypharmacy. The level of intraclass polypharmacy was greatest for antipsychotics, with just over one-quarter (25.6%; 82) of those who reported use of antipsychotics were exposed to concurrent use of two or more antipsychotic agents (maximum four) and lowest for antidepressants (4.7%). Use of more than one anxiolytics/hypnotics was also substantial (26.7%; 59) (Table 2). Eleven participants reported concurrent use of multiple agents in two different classes, for example, use of two antipsychotics and two antidepressants concurrently.

Interclass polypharmacy

Among those reporting psychotropic medication use (436), almost two-thirds (62%, 265) reported interclass polypharmacy, with the majority (60%, 161) reporting use of two psychotropic agents from different classes, one-third reported psychotropic agents from three different classes and 3.4% (15) reported concurrent use of agents from four or more different therapeutic classes (Fig. 2).

The most frequently reported interclass combinations were antipsychotics with anxiolytics/hypnotics, by one-third (34.9%) of those with psychotropic exposure, and antipsychotics with antidepressants reported by 29.8% (129). Approximately 11.9% was exposed to antipsychotics, anxiolytics/hypnotics and antidepressants concurrently, and one-quarter (113 participants) were exposed to both interclass and intraclass polypharmacy (e.g. two antipsychotics combined with an antidepressant).

Psychotropic use and mental health conditions

The highest proportion of participants reporting psychotropic polypharmacy, including three or more concurrent psychotropics (Table 3), also reported a history of either manic depression (57.1%) or a psychotic disorder (55.8%). The proportion of

Table 2 Intraclass and interclass polypharmacy among the therapeutic classes

Therapeutic class	Total (n = 736) N (%)	1 agent (n = 148) N (%)	2+ (intraclass polypharmacy %) (n = 133) N (%)	% of intraclass polypharmacy users with interclass polypharmacy N (%)
Antipsychotics	319 (43.1)	237 (74.3)	82 (25.6)	68 (82.9)
Antidepressants	193 (26.2)	184 (95.3)	9 (4.6)	8 (89.0)
Anxiolytics and hypnotics	221 (30.0)	162 (73.3)	59 (26.7)	53 (89.8)
Mood stabilisers	88 (12.0)	78 (88.6)	10 (11.4)	9 (90.0)

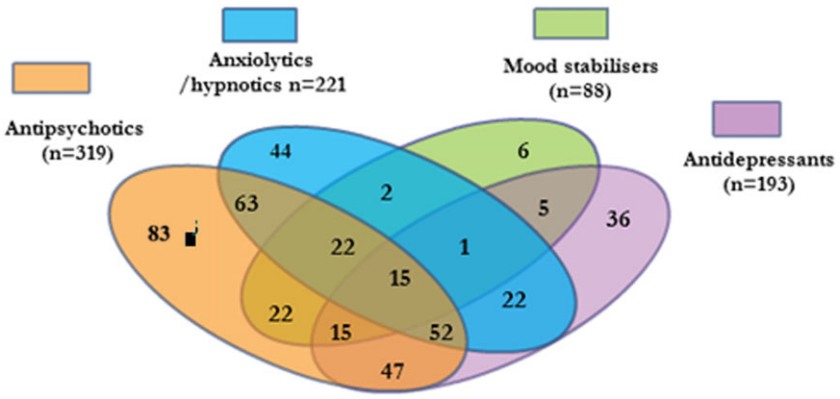

Figure 2 Interclass combinations. [Colour figure can be viewed at wileyonlinelibrary.com]

participants reporting psychotropic polypharmacy ranged from 68.9% of those who reported a history of anxiety to 82.1% of those who reported manic depression. Almost all of those who reported a history of a psychotic disorder also reported receiving an antipsychotic (94.2%) compared with 65.5% of those reporting both depression and use of an antidepressant. Those who reported a history of manic depression also frequently (53.6%) reported use of a mood stabiliser, the group that includes lithium. Use of anxiolytics varied least across the diagnostic groups (5%) compared with the greatest variation (40.5%), which was seen with antidepressants.

Factors associated with psychotropic use and psychotropic polypharmacy

The multinomial logistic regression showed (Table 4) that having ever reported having ever receiving a doctor's diagnosis of a mental health condition and were associated with both use of one psychotropic and psychotropic polypharmacy, controlling for all other factors in the model. Living in a residential setting was associated with an increased risk of exposure to psychotropic polypharmacy but not one psychotropic alone as was having a sleep difficulty. Those with epilepsy were significantly less likely (OR 0.53; 95% CI = 0.31–0.89) to report psychotropic polypharmacy, controlling for other factors in the model. Age and gender were not found to influence use of one psychotropic or psychotropic polypharmacy, while there was a significant association between severe/profound ID and use of 1 psychotropic but not psychotropic polypharmacy.

Discussion

Principal findings

Psychotropic use and psychotropic polypharmacy were commonplace in this representative sample of ageing people with ID. Almost two-thirds of those reporting psychotropic use were exposed to interclass polypharmacy, and three in 10 reported intraclass therapy. Antipsychotics represented the most frequently reported psychotropic (and non-psychotropic) class, by over 40% of the total sample and almost three-quarters of those who reported psychotropic use.

Our findings revealed almost half of the total population reported having a history of having at some time being diagnosed with a mental health condition and nearly three-quarters of those exposed to psychotropic agents reported having received a doctor's diagnosis of a mental health condition. Furthermore, eight in 10 of those with psychotropic use had at least one other chronic condition.

Our findings are similar to a recent large UK cohort study where 49% of 33 016 adults with ID from the primary care Health Improvement Network database had a history of prescription of psychotropic medicines (Sheehan *et al.* 2015). An Australian study of 114 older people with ID found 62.3% were prescribed a central nervous system (CNS) medicine and 47.4% more than one (this included antiepileptics used for epilepsy) (Chitty *et al.* 2015). Our findings of the prevalence of psychotropic use are also similar to a recent US study by Tsiouris *et al.* (2012) of 4069 adults with ID (including Autism Spectrum Disorder (ASD)), where 58% reported use

Table 3 Reported use of psychotropics and history of mental health

	Psychotropic use				Psychotropic classes				
History of mental health condition type (multiple selection possible) *n* (%)	**1 psychotropic *n* (%) 148**	**2 psychotropics *n* (%) 122**	**3+ psychotropics *n* (%) 166**	**Total *n* (%)**	**Antipsychotics *n* (%) 319 (43.1)**	**Antidepressant *n* (%) 193 (26.2)**	**Anxiolytics *n* (%) 173 (23.5)**	**Hypnotics *n* (%) 100 (13.6)**	**Mood stabilisers *n* (%) 88 (12)**
Depression 139 (18.9)	30 (21.6)	33 (23.7)	65 (46.7)	128 (92.1)	96 (69.1)	91 (65.5)	53 (38.1)	32 (23.0)	29 (20.9)
Manic depression 28 (3.8)	2 (7.1)	7 (25.0)	16 (57.1)	25 (89.3)	21 (75.0)	7 (25.0)	12 (42.9)	9 (32.1)	15 (53.6)
Anxiety 193 (26.2)	40 (20.7)	54 (28.0)	79 (40.9)	173 (89.6)	137 (71.0)	85 (44.0)	83 (43.1)	45 (23.3)	39 (20.2)
Schizophrenia and/or psychosis and/or hallucinations 86 (11.7)	15 (17.4)	22 (25.6)	48 (55.8)	85 (98.8)	81 (94.2)	38 (44.2)	37 (43.0)	28 (32.6)	20 (23.3)
Mood swings 143 (19.4)	27 (18.9)	43 (30.1)	66 (46.2)	136 (95.8)	109 (76.2)	67 (46.9)	57 (39.9)	35 (24.5)	35 (24.5)
Emotional Problems 99 (13.5)	16 (16.2)	27 (27.3)	49 (49.5)	92 (92.9)	77 (77.7)	48 (48.5)	40 (40.4)	24 (24.2)	25 (25.3)
None of these 21 (2.9)	7 (33.3)	5 (23.8)	6 (28.6)	18 (85.7)	14 (66.7)	6 (28.6)	7 (33.3)	4 (19.0)	3 (15.0)
Do not know what type of mental health condition 16 (2.2)	6 (37.5)	4 (25.0)	5 (31.3)	15 (93.8)	14 (87.5)	5 (31.3)	4 (25.0)	1 (6.3)	5 (31.3)

of psychotropics. Our findings are considerably higher than those in the general older population in Ireland; among 6666 community dwelling adults over 50 years, prevalence of antipsychotic, antidepressant and anxiolytic use was established as 1.2%, 6.3%, and 5.5%, respectively (Richardson *et al.* 2014).

Factors associated with pyschotropic use and pyschotropic polypharmacy

In the multivariate model, after adjustment, we found no significant relationship between age, sex the psychotropic use. This is consistent with one previous study in the ID population, which also found no significant gender difference (Stolker *et al.* 2001) but is in contrast with a small sample of 114 older adults with ID in Australia, where male gender was found associated with CNS polypharmacy (Chitty *et al.* 2015) and a large sample of 1023 people with ID 16–63 years, by Cooper *et al.* (2007), which identified mental ill health as associated with female gender. There was an association with use of 1 psychotropic with severe/profound ID but not with psychotropic polypharmacy.

At the bivariate level, there was a significant association between age and antidepressants, with almost one-third of those over 65 reporting consumption. We also noted a corresponding higher prevalence (59%) of reported history of mental health conditions in those oldest. Among 1023 people with ID 16–63 years, Cooper *et al.* (2007) identified no association between mental ill health and advancing age, after adjusting for relevant confounders. The association between psychotropic use, mental health conditions and age will need further investigation using validated measures in addition to those used here. While treatment of mental health issues is particularly important to improve quality of life in older age, given the increased risk profile of use of these agents in older people, and the lack of research in older people with ID, this also warrants further study.

Reporting a history of a mental health condition was the most significant factor associated with polypharmacy; however, the wide CIs (OR 37.56; 95% CI 22.30–63.26) suggest another factor(s) influencing the association.

Although psychopathology is more common in both patients with epilepsy and those with ID

Table 4 Results of multinomial logistic model of factors associated with use of 1 psychotropic and psychotropic polypharmacy (n = 653)

	Psychotropic use			
	1 psychotropic		Psychotropic polypharmacy	
Characteristic	**OR (95% CI)**	***P*-value**	**OR (95% CI)**	***P*-value**
Gender				
Male	1.00		1.00	0.61
Female	0.92 (0.56–1.51)	0.74	0.89 (0.55–1.42)	
Age				
41–49 years	1.00		1.00	
50–64 years	1.41 (0.81–2.44)	0.22	0.98 (0.59–1.65)	0.95
65+ years	1.81 (0.87–3.77)	0.11	1.26 (0.63–2.50)	0.52
Level of ID				
Mild	1.00	**0.032**	1.00	0.33
Moderate	1.05 (0.53–1.91)		0.75 (0.41–1.36)	
Severe/profound	**2.26 (1.07-4.78)**		1.42 (0.70–2.87)	
Residence				
Independent/community group home	1.00		1.00	
Residential	0.95 (0.54–1.65)	0.85	**2.45 (1.45–4.14)**	**<0.001**
Sleep				
No sleep problem	1.00		1.00	**0.01**
Sleep problem	1.67 (0.99–2.81)	0.06	**1.92 (1.17–3.15)**	
History of mental health condition				
No	**1.00**		**1.00**	
Yes	**14.71 (8.52–25.40)**	**<0.001**	**37.56 (22.30–63.26)**	**<0.001**
Epilepsy				
No	1.00		**1.00**	
Yes	1.19 (0.70–2.02)	0.53	**0.53 (0.31–0.89)**	**0.02**

Reference category = no polypharmacy; $P < 0.05$ is significant; all significant factors in bold.
Cox and Snell $r^2 = 0.432$; Nagelkerke $r^2 = 0.49$.
ID, intellectual disability; CI, confidence interval; OR, odds ratio.

(Leunissen *et al.* 2011), notably, our multivariate regression revealed that those with epilepsy were significantly less likely to report psychotropic polypharmacy. There are several potential reasons for this: perhaps, prescribers are more cautious in prescribing combinations, given the potential for interactions with antiepileptic agents; it also may be that some antiepileptic drugs prescribed primarily to control seizures also act as mood stabilisers, or that some antipsychotics, the most commonly used psychotropics, reduce severe anxiety and thus the need for other psychotropics. In the Netherlands, Leunissen *et al.* (2011) carried out a retrospective cohort study with 246 adults with ID and epilepsy in a long-stay institution and found that patients with epilepsy taking lamotrigine used significantly less antidepressants, while those taking carbamazepine, valproic acid and lamotrigine used less anxiolytics.

Place of residence

Similar to some previous findings in the ID literature (Robertson *et al.* 2000; Spreat *et al.* 2004), those living in residential settings were significantly more likely to be exposed to psychotropic use and polypharmacy. These findings may be in part explained by the fact that those living in institutional settings had more severe ID and may have had multiple complex presentations of mental health diagnoses that may require more intensive treatment. These trends were previously been noted by Spreat *et al.* (2004) and Robertson *et al.* (2000), while Tsiourus *et al.* (2012)

found no difference in the prevalence of psychotropic use between those living in developmental centres or community group homes but lower rates for adults living with family. There has been evidence in Ireland and the UK of poorer prescribing and psychotropic medicines monitoring practices in some institutional settings for people with ID (Health 2012; HSE 2016). As people with ID in Ireland continue to move from residential settings into the community, the longitudinal nature of the study where participants will be interviewed every 3 years will enable us to address the questions in relation to the influence of place of residence and the effect of transitions of environment and care settings on psychotropic medication use patterns.

Factors associated with psychotropic polypharmacy

A high prevalence of concurrent use of psychotropic agents from within (intraclass) and between (interclass) different therapeutic classes was identified. Two-thirds of those who reported psychotropic use reported interclass polypharmacy with use of antipsychotics in combination with anxiolytics/hypnotics being the most commonly reported interclass combination. Of those reporting psychotropic use, 3.6% reported medicines from four different psychotropic classes. McGillivray and McCabe (2006) described the management of 873 people with ID and challenging behaviours and found interclass polypharmacy in 53% of treatment regimens, with antipsychotics and mood stabilisers being most common. Our findings are also similar to those found by De Kuijper *et al.* (2010) of 17% of those with antipsychotic use reporting combinations with antidepressants and 20% with benzodiazepines, and in the UK where Paton *et al.* (2011) found 33% of those reporting antipsychotics also used antidepressants and 15% benzodiazepines.

The assessment and balancing of benefits and risk in the use of combinations of pyschotropics and of antipsychotics over the course of treatment have been described for people with ID (Deb *et al.* 2014). Mahan *et al.* (2010) found a greater prevalence of side effects including effects on the CNS, gastrointestinal side effects and behavioural/akathisia on the CNS in people with ID taking two or more psychotropics compared with those taking one. Drug–drug interactions involving the cytochrome P450 system between some antidepressants and antipsychotics and between some mood stabilisers and other drugs are also potential complicating factors. Without doubt, there is higher risk and potentiation of side effects such as sedation that could have a detrimental impact on quality of life for people with ID. While we do not know the length of exposure to multiple medicines, there is a possibility that medicine regimens are not frequently reviewed; people remain on regimens for many years, and in some instances, poor clinical practice may be a contributor.

Study strengths

Our study had a number of strengths. To our knowledge, this is the first nationally representative study in Ireland examining the prevalence, patterns and predictors of psychotropic use and polypharmacy in a representative population ageing with ID. The use of a large, randomly sampled population-representative sample enabled us to have sufficient power for our multivariate analysis and means our findings may be generalisable to the Irish older ID population and can be compared with older ID populations in other countries. For our definition of psychotropic use and polypharmacy, we adopted a literature-based consensus approach to classification of psychotropics. That our dataset included information on history of mental health morbidity, which meant use of medication could be examined in the context of illness. The study also breaks new ground in the literature on people with ID by examining older age groups, looking at combinations of psychotropics and including mood-stabilising antiepileptic drugs. Furthermore, participants and/or proxy respondents answered detailed questions in relation to health characteristics, self-rated health, allowing us to examine in our regression model potential confounders that are usually unavailable in pharmacoepidemiological studies. Moreover, we examined concurrent and other agents affecting the CNS, giving a comprehensive picture of CNS influencing drug use in the ID population. The longitudinal nature of the IDS-TILDA study will allow monitoring of patterns and incidence of psychotropic use every 3 years, as people with ID age move from congregated settings back into the community. This will enable examination of the association of psychotropic use with functional and

cognitive outcomes and amendments to the scope of and type of medicines information have been made for Wave 2.

Study limitations

Our study had a number of limitations. First, mental health condition information was based on self-report or proxy report, or combinations of reporting styles. The questions used, however, were well established in the English Longitudinal Study on Ageing and other longitudinal studies in the general population. While this is a limitation, both medication information and mental health questions were included as part of a pre-interview questionnaire sent to participants at least 1 week in advance of the face-to-face interview, thus giving time to review case notes and medication information and gather the information. In addition, to further increase reliability and accuracy, all information was cross-checked by the interviewer at the time of interview by asking the participant and/or their proxy that the list provided was the full and complete list of medicines and to check against medication kardexes where available to ensure no medicines or medical conditions were omitted from the original.

Second, we do not know the extent to which answers in the face-to-face interview, for example in relation to sleep problems, were influenced by the different responses styles used by participants in interviews; some interviews were conducted directly with participants, some with proxy only and some adopted a hybrid approach where the participant was supported in answering by a proxy. The goals of including all people with ID in the research regardless of level of ID were very important to the study. Those with severe or profound ID were more likely to have a proxy only interview or a mixed answer style. The validity of proxy responses on more subjective items has been called into question (Emerson *et al.* 2013).

Third, we did not collect information about the duration of exposure to psychotropic medications nor did we have full information about medicines doses, which limits comments about appropriateness of use of these agents.

Fourth, we did not have information about the severity of mental health conditions and if the mental health conditions were current. We also did not have definitive information about challenging behaviours, so it was not possible to establish the number of people receiving medications for these indications.

Fifth, the cross-sectional multivariate analysis examined associations between factors associated with psychotropic use but cannot address relating to outcomes of psychotropic polypharmacy. It is possible that there were other confounding factors contributing to psychotropic use.

Sixth, those with autism may be underestimated in this study because there was no consensus about the assessment of autism in Ireland until 2011 and there has not been a retrospective assessment of people registered with the NIDD. It is not surprising, therefore, that a diagnosis of autism in this cohort of older people with ID is infrequent.

Conclusions

Our findings indicate that the use of psychotropic agents is commonplace in older adults with ID, with almost six in 10 reporting use, with the frequent use of complex multiclass regimens and antipsychotics being a potential cause for concern. Our findings revealed higher levels of antipsychotics, anxiolytics and hypnotics, antidepressants and interclass regimens than seen in the general population, but interpretation of appropriateness of use of these agents was limited by our lack of detailed information in relation to severity of mental health diagnoses, of detailed information on current mental health conditions and length of exposure to agents. Our multivariate model revealed that, after adjusting for relevant confounders, those having a history of reported mental health conditions, sleep difficulties and those living in residential settings were more likely to be exposed to psychotropic polypharmacy; those with epilepsy were significantly less likely. Age, sex and were not significant predictors of exposure to psychotropic polypharmacy possibly because the use began earlier in life, and those in the oldest group may comprise the 'healthy survivors' (Cooper *et al.* 2015). Antidepressant use increased with age, which may reflect the impact or perceived impact of depression in later life in this group.

The importance of identifying and managing mental health conditions in this population must be balanced against the ever increasing evidence base for

adverse effects associated with psychotropic drug use (Maher *et al.* 2011; de Gage *et al.* 2014; Maust *et al.* 2014; Weich *et al.* 2014). As there is limited data in the ID population supporting the efficacy and safety of most commonly employed psychotropic combinations, such as multiple antipsychotics, or antipsychotics combined with antidepressants, renewed efforts are needed to limit the use of these combinations to clearly documented and justified clinical circumstances, and regular review and monitoring of efficacy and side effects associated with these therapies should take place. If use of antipsychotics is indicated and appropriate, the lowest possible dose should be used to minimise adverse drug reactions, impairment in new learning and movement disorders (Janicki & Dalton 2014). At the same time, more research is needed in this population to assess the benefits, including adverse effects on prosocial behaviours, and safety of common psychotropic combinations, particularly as this population continues to age and present with complex mental health morbidity. Our findings reinforce the need for regular multidisciplinary review of psychotropic medications taken by older people with ID so that optimisation of each therapeutic group, alone and in combination may occur throughout their old age.

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Conflict of Interests

All authors declare there are no conflicts of interest.

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Supporting Information

Additional Supporting Information may be found online in the supporting information tab for this article.

Table S1 Psychotropics Reported in Study