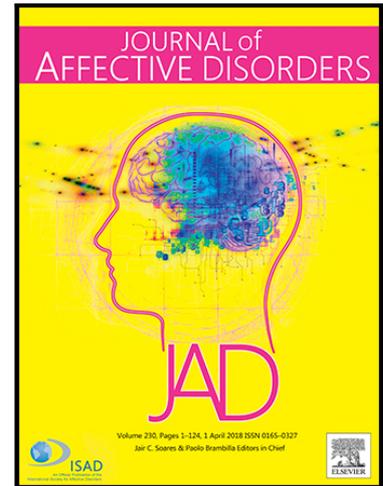


## Journal Pre-proof

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PII: S0165-0327(20)32699-9  
DOI: <https://doi.org/10.1016/j.jad.2020.09.005>  
Reference: JAD 12406



To appear in: *Journal of Affective Disorders*

Received date: 5 January 2020  
Revised date: 17 July 2020  
Accepted date: 1 September 2020

Please cite this article as: Katerina Papagavriel , Rebecca Jones , Rory Sheehan , Angela Hassiotis , Afia Ali , The association between loneliness and common mental disorders in adults with borderline intellectual impairment, *Journal of Affective Disorders* (2020), doi: <https://doi.org/10.1016/j.jad.2020.09.005>

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**Highlights for paper: The association between loneliness and common mental disorders in people with borderline intellectual impairment**

- People with borderline intellectual impairment represent 10% of the population
- They have a higher prevalence of loneliness than the general population
- Loneliness is associated with socio-demographic factors such as being single and low income
- Loneliness was associated with depression, anxiety disorders and suicidal thoughts
- People with borderline Intellectual functioning who had lower income and suicidal thoughts in the last week were more likely to be lonely than their counterparts in the general population

Journal Pre-proof

# The association between loneliness and common mental disorders in adults with borderline intellectual impairment

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**Abstract**

**Background**

Loneliness is linked to a number of adverse health outcomes in the general population. There is a lack of evidence on the prevalence and impact of loneliness in people with borderline intellectual impairment.

## Methods

Data from the 2014 Adult Psychiatric Morbidity Survey, a national survey of England, was analysed using Weights-adjusted regression analyses to compare the prevalence of loneliness and the association between loneliness and socio-demographic and clinical variables in people with borderline intellectual impairment and the general population.

## Results

Data from 6877 participants were included. Ten percent (n=671) of the sample had borderline intellectual impairment and their prevalence of loneliness was 24.5% compared to 18.4% in the general population. This difference was explained by exposure to social disadvantages. Associations were found in both groups between loneliness and being single, unemployed, low income, lower social support, feeling unsafe and discrimination in the past year. Loneliness was associated with lower wellbeing and higher rates of common mental disorders, suicidal thoughts and chronic physical disorders in both groups. Intellectual functioning moderated the relationship between loneliness and income (OR 1.82; 95%CI 1.06 to 3.11) and suicidal thoughts in the last week (OR 0.13; 95% CI 0.02 to 0.93).

## Limitations

IQ was measured using the National Adult Reading Test (NART), which is only valid for English speakers and loneliness was measured using a single item.

## Conclusion

Loneliness is more prevalent in people with borderline intellectual impairment. Interventions targeting social disadvantages (e.g. low income) may lead reduce loneliness and vulnerability to mental health problems.

## 1. Introduction

A recent report, published using data from the Adult Psychiatric Morbidity Survey 2014 (McManus et al, 2014), has defined borderline intellectual impairment as an IQ below 80 (McManus et al, 2018), although it has also been defined as an IQ between 71 to 84 (Weiland & Zitman, 2016)). The prevalence of borderline intellectual impairment is approximately 13% depending on the criteria used to define the population (Hassiotis, 2015). This contrasts with 1% for people with intellectual disability (IQ below 70 and functional impairment, arising before the age of 18; McKenzie et al, 2016). Several epidemiological studies have shown that people with borderline intellectual impairment have a higher prevalence of psychiatric illness compared to people in the general population including psychosis, depression, anxiety disorders, personality disorders, and substance misuse disorders (Hassiotis et al, 2018; Hassiotis et al, 2008, McManus et al, 2018). Although no

longer a discrete diagnostic entity in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013), people with borderline intellectual impairment share a number of features in common with people with intellectual disability including higher rates of mental illness across the life span (Bhaumik et al, 2008; Einfeld et al, 2011; Seltzer et al, 2005); socio-economic disadvantage (Hassiotis et al, 2008; Emerson et al, 2008) and require high levels of support from health and social care services (Nouwens et al, 2017). Unlike people with intellectual disability, they are unable to access specialist clinical services in the UK and their needs are poorly met by mainstream services (Wieland & Zitman 2016).

Loneliness is defined as a subjective, unpleasant experience that occurs when a person's social network lacks quality and quantity (Perlman & Peplau, 1981). Loneliness may arise from differences between the subjective experience of social relationships and the expectations of such relationships (Wang et al 2017); when the number of people in an individual's network is smaller than expected, or when the affection one desires is not received (De Jong-Gierveld, 1987). The prevalence of loneliness in the general population is estimated to be 10.5% (Beutel et al, 2017) but appears to be significantly higher in people with intellectual disability at nearly 45% (Petroutsou et al, 2018). Loneliness has been associated with a number of demographic factors in the general population including both female and male sex and younger or older age (Upmanyu et al, 1992; Pinquart & Sorensen, 2001). Other risk factors for loneliness are being single; living alone; not having children (Beutel et al, 2017); lower income; unemployment; lower educational attainment (Pinquart & Sorensen, 2001) and lower perceived levels of social support (Alspach, 2013).

#### *Impact of loneliness on mental and physical health*

There is growing recognition of the profound and wide-ranging deleterious effects of loneliness on both physical and mental health. Lifestyle factors such as smoking, physical inactivity and poor diet occur more often in people who report being lonely (Richard et al, 2017) and translate to increased rates of metabolic and cardiovascular disease (Hakulinen et al, 2018). In relation to mental health outcomes, loneliness is an important risk factor for depression (Cacioppo et al, 2006) and is associated with generalised anxiety disorder and both suicidal ideation and attempts (Beutel et al, 2017; Mezuk et al, 2014 23). Older people who are lonely have a two-fold increase in the risk of dementia (Holwerda et al, 2012).

The prevalence of loneliness in people with borderline intellectual impairment is unknown but could be expected to be similar to people with intellectual disability (Petroutsou et al, 2018). Risk factors associated with loneliness in people with borderline intellectual impairment have not been examined, although, people with borderline intellectual impairment report lower levels of social support, and have lower income and educational levels (Hassiotis et al, 2008), which are likely to be associated with loneliness. It is not known whether people with borderline intellectual impairment share the same risk factors for loneliness as people in the general population or whether there are specific risk factors associated with loneliness in this group. Understanding the prevalence of loneliness and its association may help to elucidate the importance of loneliness as a risk factor for mental illness in this population.

## **2. Aims and objectives**

Our aim was to examine the prevalence of loneliness and the association between loneliness and socio-demographic and health outcomes in people with borderline intellectual impairment and the general population using the Adult Psychiatric Morbidity Survey (APMS), 2014 (MacManus et al, 2014)

Our objectives were to:

1. Compare the prevalence of loneliness in people with borderline intellectual impairment and the general population.
2. Explore associations between loneliness and age, sex, ethnicity, marital status, income, employment, social support, discrimination and neighbourhood characteristics in both groups
3. Explore differences in the relationship between loneliness and common chronic diseases, self-reported physical health, mental wellbeing, common mental disorders, and suicidal thoughts in both groups
4. Explore interaction effects between level of intellectual functioning (people with borderline intellectual impairment and the general population) and loneliness in relation to the above socio-demographic and clinical variables.

We hypothesised that people with borderline intellectual impairment would have a higher prevalence of loneliness due to increased exposure to risk factors; that there would be strong associations between loneliness and socio-demographic and clinical variables; and the level of intellectual functioning may moderate relationships between socio-demographic variables and loneliness and between loneliness and common mental disorders and physical health.

### **3. Methods**

#### *3.1 Design and participants*

The APMS is a series of surveys examining the prevalence of mental illness, treatment and service use in a representative sample of people living in private households in England. The survey used a multi-staged stratified probability sampling design based on the small user Postcode Address File, appropriate for identifying private households. This sampling frame consists of Royal Mail delivery locations receiving less than 50 items of mail daily. As a result, most large institutions and businesses are not included in the sample. Small institutions and businesses receiving less than 50 items are excluded after further verification. The primary sampling units (PSU) were individual or groups of postcode sectors. Prior to selection, the PSU were divided by a number of strata and a systematic random sample was obtained from the list. One person over the age of 16, per household, was randomly selected and invited to take part in the survey and informed consent was obtained.

Trained interviewers carried out the assessment face-to-face using computer assisted interviewing but some information was collected via self-completion, also using a computer. Assistance was provided where necessary (e.g. reading out questions and entering responses into the computer).

#### *3.2 Measures*

*i. Intellectual functioning and definition of Borderline Intellectual Impairment*

Intellectual functioning was measured using the National Adult Reading Test (NART), a validated measure of pre-morbid intelligence in adults suspected of having cognitive impairment (Nelson, 1982). The NART contains a list of 50 words that are presented in ascending order of difficulty. The estimated IQ score is calculated by recording the number of reading errors that are made by the individual. The Lowest obtainable verbal IQ score on the NART is 70. The NART is not sensitive enough to detect an IQ below 70 and therefore participants with an actual IQ below 70 (i.e. those with intellectual disability) cannot be accurately identified. In our sample, participants were identified as having borderline intellectual impairment if they had an IQ below 80 (McManus et al, 2014). It is possible that the sample may have included some people with mild intellectual disability, but all the participants would need to have had the cognitive and verbal skills required to have been able to participate in a long interview (McManus et al, 2014). Those with an IQ of 80 and above were classed as belonging to the general population comparison group.

*ii. Loneliness*

Loneliness was measured using one item from the eight-item Social Functioning Questionnaire (Tyrer et al, 2005): "I feel lonely and isolated from other people". Responses were recorded on a four-point Likert scale and were re-categorised for analysis as Lonely (Very much, Sometimes) or Not lonely (Not often, Not at all), in keeping with other studies on loneliness (Nygqvist et al, 2016; Routasalo et al, 2006)

*iii. Wellbeing*

The 14 item Warwick-Edinburgh Mental Wellbeing Scale (WEBWBS) was used to measure wellbeing (Stewart-Brown et al, 2011; Tennant et al, 2007). The total score ranges from 14-70, with higher scores indicating a higher level of mental wellbeing.

*iv. Common mental disorders*

The Clinical Interview Schedule Revised (CIS-R) (Lewis et al, 1992) was used to identify participants with common mental disorders (depression, generalised anxiety disorder (GAD), agoraphobia, any phobia and panic disorder) who had been diagnosed and treated in the last 12 months.

*v. Self harm and suicide*

Participants were asked whether they had thought about suicide in the last week and the last 12 months and responses were recorded as Yes or No.

*vi. Physical Health*

Participants were asked whether they had suffered from any of the following chronic diseases in the last 12 months: asthma, cancer, epilepsy, diabetes and high blood pressure. Responses were recorded as Yes or No. Self-reported health was assessed using one item: "how is your health in general?" The item was scored on a five-point Likert scale, ranging from Excellent to Poor and was re-categorised for analysis as Generally Poor (fair to poor) or Generally Good (excellent to good).

*vii. Socio-demographic variables*

The socio-demographic variables that were used in the analysis included age, sex, marital status, ethnicity, paid work in the last seven days, and whether participants had ever had a job. Participants were asked to indicate their income band. Equivalised income was calculated by adjusting income to take into account the number of people living in the household. We have summarised this information into tertiles to represent high (>£36, 228); middle (£17, 868-£36, 224), low (< £17, 868) and N/A (no income) income groups based on national data. Equivalised income was also analysed as a binary variable in the regression analysis (High Income ( £17, 868) and Low Income (<£17, 868)) to aid interpretation. Data collection was between May 2014 and September 2015, therefore the stated income was earned during that period. Marital status was re-categorised as being in a relationship (married, cohabiting, or same sex couple) or not (single, separated, divorced or widowed). The variables of marital status, ethnicity and income were analysed as binary for ease of analysis.

*viii. Neighbourhood safety*

One item was used to measure whether people felt safe in their neighbourhood “I feel safe around here in the daytime”. The item was scored on a five-point Likert scale and was categorised to either Feeling Safe (Strongly Agree to Neither Agree nor Disagree) or Not Safe (Disagree or Strongly Disagree).

*ix. Discrimination.*

Participants were asked whether they had experienced discrimination in the last 12 months in relation to the following: ethnicity, sex, religious beliefs, age, sexual orientation, mental health and any other health problems or disability. Responses were recorded as Yes or No. Discrimination was re-categorised to Yes (reporting Yes to any one of seven items on the discrimination measure) and No (reporting No to all the items).

*x. Social support*

Social support was measured using a validated measure (McManus et al, 2007) comprising seven items, including “There are people I know amongst my family and friends who make me happy” and “There are people I know amongst my family and friends who can be relied on no matter what”. These statements were scored on a three-point Likert scale (Not True, Partly True and Certainly True). The scores on the seven items were combined to give a total score ranging from 0-14, with higher scores indicating greater perceived social support.

*3.3. Statistical analysis*

Socio-demographic characteristics were summarised using descriptive statistics. The association between the prevalence of loneliness and intellectual functioning was assessed using logistic regression with intellectual functioning (borderline intellectual impairment or general population) as the explanatory variable and loneliness as the outcome.

Associations between socio-demographic characteristics and loneliness and the possible moderating effect of intellectual functioning on these associations were explored using logistic regression. Separate statistical models were fitted for each socio-demographic characteristic (sex, age, marital status, ethnicity, employment status, previous employment,

income, neighbourhood safety, experience of discrimination and social support) with loneliness as the outcome variable. The socio-demographic characteristic, intellectual functioning and the interaction between them were specified as explanatory variables. A further multivariate analysis was carried out to explore whether differences in the prevalence of loneliness in the two intellectual functioning groups could be explained by differences in exposure to indicators of social disadvantage. Loneliness was the dependent variable and intellectual functioning was the main independent variable of interest. The confounders included in the model as independent variables were being single, not having a current paid job, lower income, feeling unsafe in the neighbourhood, lower social support, and having experienced discrimination.

Associations between loneliness and mental and physical health outcomes and the possible moderating effect of intellectual functioning were explored using generalised linear models with the health measure as the outcome. Separate logistic regression models were fitted for the binary measures of depression, generalised anxiety disorder, agoraphobia, any phobia, panic disorder, suicidal thoughts, chronic physical health disorders and self-reported health. A linear regression model was fitted for the continuous WEMWBS score. Loneliness, intellectual functioning and the interaction between them were specified as the main explanatory variables in these models, with age and sex as covariates.

Missing data were handled by doing a complete case analysis, therefore, we only included participants with observed data. The loneliness variable had 463 observations missing, which makes up 6.1% of the overall data. The second highest percentage of missing data was 1.1% for the WEMWBS variable. The remaining variables had missing data of less than 1% of the overall data.

The data were weighted to take into account selection probabilities and non-response. Results are presented as unweighted frequencies and weighted odds ratios with 95% Confidence intervals. All analyses were performed using Stata version 15 (StataCorp, 2017).

#### **4. Results**

The sample comprised participants aged 16 or over who were living in private households. 13,313 individuals were contacted and 7,546 (57%) completed the survey. Participants with missing IQ data and who did not speak English, were excluded. Data from 6877 participants were analysed.

##### *4.1. Demographic characteristics*

The characteristics of the borderline intellectual impairment group and the general population group are presented in Table 1. The borderline impairment group comprised 671 participants (10.2% of the total sample). There were significant differences between the two groups in terms of people with borderline intellectual impairment having a higher proportion of the sample with the following characteristics: males (49.0% v 40.0% ); younger people aged 16-34 (25.0% v 19.1%) and people aged over 75 (18.5% v 14.5%); being single (44.3% v 58.9%); no paid employment (48.8% v 65.5%); on low incomes (33.4% v 19.8%); feeling unsafe in the neighbourhood (3.9% v 2.0%) and experiencing discrimination (23.1% v 13.2%). They also reported lower mean levels of social support (19.4 v 20.2).

*Table 1 near here*

#### 4.2. Prevalence of loneliness

The proportion of people with borderline intellectual impairment group who reported feeling lonely and isolated from other people was 24.2% compared to 18.4% from the general population. The odds of feeling lonely or isolated were 1.41 times greater in the intellectual impairment group compared to the general population (95% CI 1.13 to 1.76). After adjusting for indicators of confounders and indicators of social disadvantage, there was no evidence of a difference in the prevalence of loneliness in people with borderline intellectual impairment compared to the general population (OR 1.13; 95% CI 0.85 to 1.50).

#### 4.3. Relationship between loneliness and socio-demographic variables

The prevalence and associations between loneliness and the socio-demographic variables in people with Borderline intellectual impairment and general population are summarised in Table 2. In people with borderline intellectual impairment being single was associated with more than 1.8 times the odds of being lonely compared to people who were in a relationship (OR 1.83; 95% CI 1.18 to 2.83). Having a low income was associated with more than twice the odds of being lonely compared to those with a higher income (OR 2.73; 95% CI 1.63 to 4.59). Those with no current paid employment had twice the odds of reporting feeling lonely than those with a paid job (OR 2.09; 95% CI 1.32 to 3.31). Feeling lonely was also associated with not feeling safe in the neighbourhood (OR 4.09; 95% CI 1.36 to 12.30), discrimination (OR 2.36; 95% CI 1.28 to 4.35) and lower social support (OR 0.76; 95% CI 0.70 to 0.83). There was no association between loneliness and sex, age and ethnicity.

There were similar associations between loneliness and socio-demographic variables in the general population. However, unlike the sample with borderline intellectual impairment, both older age (age 55-75 OR 0.62; 95% CI 0.51 to 0.76; age over 75 OR 0.69; 95% CI 0.54 to 0.90) and being female (OR 1.20; 95% CI 1.03 to 1.40) were associated with loneliness.

Analysis of interaction effects revealed no moderating effect of intellectual functioning on the relationship between loneliness and sex, age, marital status, ethnicity, previous employment, income, neighbourhood characteristics and social support. However, intellectual functioning was found to moderate the relationship between income and loneliness (OR 1.82; 95% CI 1.06 to 3.11). People with borderline intellectual impairment are more likely to be lonely if they have low income compared to people from the general population who have low income.

#### 4.4. Relationship between loneliness and clinical variables

The results of the relationship between loneliness and mental and physical health outcomes in people with borderline intellectual impairment and the general population are summarised in Table 3.

In people with borderline intellectual impairment, reporting loneliness was associated with lower wellbeing. The mean score on the WEMWBS in those who were lonely was 9.86 points lower compared to those who were not lonely (95% CI -12.08 to -7.64). Those who reported feeling lonely had over ten times greater odds of having a diagnosis of depression

than those who were not lonely (OR 10.73; 95% CI 3.99 to 28.82). The odds of having a diagnosis of any type of phobia in those reporting feeling lonely were over 20 times higher than those who were not lonely (OR 20.07; 95% CI 5.95 to 67.70). Feeling lonely was also associated with having a diagnosis of generalised anxiety disorder (OR 11.01; 95 CI 5.19 to 23.38), agoraphobia (OR 11.52; 95% CI 3.26 to 40.71). People who were lonely had over five times the odds of having suicidal thoughts in the last seven days (OR 5.73; 95% CI 1.13 to 29.00) and ten times the odds of having suicidal thoughts in the last year compared to those who were not lonely (OR 10.38 ; 95% CI 4.19 to 25.72). There was no association between loneliness and panic disorder. People who were lonely were more likely to report having poor health (OR 2.68; 95%CI 1.70 to 4.23) and having a chronic physical disorder (OR 1.68; 95%CI 1.07 to 2.64). Similar associations were found in people from the general population

Intellectual functioning moderated the relationship between loneliness and suicidal thoughts in the last week (OR 0.13; 95% CI 0.02 to 0.93). People with intellectual impairment are more likely to have had suicidal thoughts in the last seven days if they felt lonely compared to people from the general population who reported loneliness. However, intellectual functioning did not moderate the association between loneliness and any of the other mental health outcomes or chronic disorders.

Table 3 near here

## 5. Discussion

### 5.1 Main findings

The prevalence of loneliness in people with intellectual impairment was higher (24.2%) compared to the general population (18.4%) and the odds of being lonely were 1.4 times higher in people with intellectual impairment. However, there was no evidence that loneliness was higher in people with intellectual impairment compared to the general population after accounting for exposure to social disadvantage.

The associations between loneliness and socio-demographic variables were similar in people with borderline intellectual impairment and the general population. In people with borderline intellectual impairment, loneliness was associated with being single, not having a current paid job, lower income, feeling unsafe in the neighbourhood, lower social support and having experienced discrimination in the last 12 months but unlike the general population, there was no association with age and gender. Analysis of interaction effects found that people with borderline intellectual impairment who had lower income were more likely to be lonely compared to people from the general population who also had low income.

In relation to common mental disorders, the associations were similar in both groups. Those who reported feeling lonely had lower wellbeing, were more likely to have depression, generalised anxiety disorder, agoraphobia, and any type of phobia, in the last 12 months and to report suicidal thoughts in the past week and last year than those who were not lonely. Loneliness was also associated with chronic diseases and poor self-reported health. Analysis of interaction effects found that people with borderline intellectual functioning who

reported suicidal thoughts in the last week were more likely to be lonely compared to people who people in the general population who reported suicidal thoughts.

## 5.2 Results in context

The prevalence of borderline intellectual impairment was 10.2% of the sample. The findings are consistent with previous studies that have suggested a prevalence of around 13% (Hassiotis, 2015).

The prevalence of loneliness was found to be higher in people with borderline intellectual impairment compared to the general population but lower than the prevalence of loneliness found in people with intellectual disability, which has been reported as 44.7% (Petroutsou et al, 2018) suggesting that lower IQ may be a vulnerability factor for loneliness. However, the difference in the prevalence of loneliness between the general population and people with borderline intellectual impairment was explained by differences in the exposure to social disadvantages, with the borderline impairment group experiencing higher levels of social disadvantage. It is therefore likely that exposure to social disadvantages may also explain the higher levels of loneliness reported by people with intellectual disability.

We found that the prevalence of loneliness in the general population was higher than that reported in other northern European countries (Beutel et al, 2017; Yang & Victor, 2011 ) but was lower compared to Switzerland (Richard et al, 2017) and countries in eastern Europe. Differences in the measurement of loneliness and population characteristics (e.g. the distribution of age groups) may have influenced the variation in the results.

Our results are in agreement with findings from previous studies that demonstrate an association between loneliness and single marital status; (Beutel et al, 2017; Pinquart 2003) unemployment; income (Creed & Reynolds, 2001), lower social support (Pinquart & Sorensen, 2001) and discrimination in the general population (Lee & Bierman, 2019; witaj et al, 2015). Neighbourhood characteristics such as higher levels of antisocial behaviour, lower perceptions of collective efficacy and feeling unsafe at night, were associated with loneliness in a population-based study of deprived areas in Glasgow, Scotland (Kearns et al, 2015). Feeling afraid at home and in the neighbourhood is also associated with loneliness in people with intellectual disability (Stancliffe et al, 2005).

Intellectual functioning moderated the relationship between income and loneliness. It is not clear why having a low income is more strongly associated with loneliness in people with intellectual impairment but it may be the common pathway linking lack of opportunities and possibly inability to sustain paid employment in this population.

Our study confirmed findings from previous studies that loneliness is associated with lower wellbeing, depression, anxiety disorders, suicidal thoughts and poorer health in the general population (Alspach 2013; Heinrich & Gullone, 2006). In addition, intellectual functioning moderated the relationship between loneliness and suicidal thoughts in the last seven days. Our findings suggest that people with borderline intellectual impairment may be more vulnerable to experiencing suicidal thoughts if they are feeling lonely compared to the general population.

Hawkey and Cacioppo (2010) have proposed mechanisms through which loneliness may impact on physical and mental health, which include loneliness being perceived as a threat, leading to negative cognitive biases that reinforce negative social interactions. This leads to feelings of stress, anxiety and low self-esteem with consequent activation of physiological and behavioural responses such as reduced self-regulation and increased maladaptive behaviours. Loneliness also has effects on sleep, the hypothalamic pituitary axis and inflammatory and immune responses that also have direct and indirect effects on health.

### *5.3 Strengths and limitations*

This was the first study to measure loneliness in a representative national sample of people with intellectual impairment living in the community using standardised assessments, and the results can therefore be generalised to average households in England. Limitations include the measurement of loneliness with only one item: "I feel lonely and isolated from other people". This item includes constructs related to both loneliness and social isolation rather than just loneliness and this needs to be taken into consideration when comparing findings with other studies. IQ was measured with the NART, which is based on reading ability and therefore excludes people who are unable to read or who do not have English as their first language. Given that people with borderline intellectual impairment may have poor reading ability or may not be able to read at all, this may not be the best measure of IQ in this group. In addition, only individuals with sufficient verbal and cognitive ability to complete the questionnaires and people living in private households were included. As some people with borderline intellectual impairment may live in residential homes, which were not included in the survey, we may have potentially under-ascertained those with borderline intellectual impairment.

Due to the cross-sectional nature of the study, causality cannot be determined. The relationship between loneliness and the social demographic and health variables are likely to be complex and bidirectional. Furthermore, the number of people with a diagnosis of a mental health disorder were small, particularly in people with borderline intellectual impairment, and this has resulted in wide confidence intervals for some of the estimates.

### *5.4 Implications*

People with intellectual impairment are a vulnerable and socially disadvantaged group in terms of lower income, less paid employment and opportunities for employment as well as established self-reported difficulties in tasks of daily living compared to the general population (McManus et al 2018). Moreover, they do not have access to specialised services that people with intellectual disability are able to access. Some researchers advocate the need for improved recognition of people with intellectual impairment and that health services should pay greater attention to their specific health needs (Wieland & Zitman, 2016).

The higher prevalence of loneliness in this group was explained by the higher prevalence of social disadvantages that may perpetuate health inequalities (Strategic Review of Health Inequalities in England post-2010, 2010). Our findings suggest that loneliness could be reduced in people with borderline intellectual impairment by targeting modifiable variables such as income, neighbourhood safety and social support. This in turn could reduce the impact of loneliness on mental and physical health. People with borderline intellectual impairment who had low incomes were found to be particularly susceptible to feeling lonely,

compared to the general population. Interventions aimed at increasing income such as promoting employment opportunities through education and training initiatives, mentoring and individualised support, including reasonable adjustments at work, may be effective in reducing loneliness. People with borderline intellectual impairment who were lonely were also more likely to report suicidal thoughts in the past week. They may therefore be at an increased risk of suicide. Mental health services need to be aware of this risk and ensure that appropriate support is provided to mitigate this risk.

Intellectual functioning did not moderate the relationship between loneliness and other sociodemographic characteristics or clinical outcomes. The relationship between loneliness and socio-demographic and clinical variables is likely to be similar for people with and without borderline intellectual impairment and therefore interventions aimed at reducing loneliness that are effective for the general population may also be appropriate for people with borderline intellectual impairment.

A recent systematic review explored the effectiveness of interventions tackling loneliness (Man et al, 2017), but found that all lacked a strong evidence base. However, Interventions that target maladaptive cognitions using Cognitive Behavioural Therapy show some promise (Man et al, 2017). A recently published trial found that mindfulness techniques using openness and acceptance reduced loneliness and increased social contact in people from the general population (Lindsay et al, 2019). It is not known what interventions are likely to be most effective and what adaptations may be necessary to maximise their benefit to people with borderline intellectual impairment. Evidence from a pilot study of mentoring to promote participation in community groups in older adults with mild intellectual disability has been shown to improve social satisfaction, and it is possible that this type of intervention may also be helpful for people with borderline intellectual impairment on the basis that they share similar characteristics (Stancliffe et al, 2015).

## **6. Conclusions**

People with intellectual impairment experience high levels of social and health inequalities compared to the general population. This is the first study to investigate loneliness in this group and to compare risk factors as well as associations with mental and physical disorders in people from the general population. Loneliness was found to be more prevalent in people with intellectual impairment compared to the general population suggesting that they have an increased vulnerability to developing mental and physical health problems. Low income was particularly associated with loneliness in people with borderline intellectual impairment. Loneliness was also strongly associated with suicidal thoughts in the last seven days in people with borderline intellectual impairment. Interventions that target loneliness and improve access to employment may help to reduce loneliness and social disadvantage in this group, which may in turn lead to a reduction in the prevalence of mental disorders.

## **Acknowledgements**

We acknowledge NHS Digital for their permission to use the data.

**Financial support**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Declaration of interest**

None.

**Author Agreement***Contributors*

AA and KP conceptualised the study and carried out the analysis, with support from RJ. All the authors (KP, RJ, RS, AH and AA) were involved in interpreting the results and in writing and reviewing the contents of the paper. AA has access to the final data set. All the authors have seen and approved the final version of the manuscript being submitted. The article is the authors' original work, has not been published and is not under consideration for publication elsewhere.

*Role of funding source*

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

*Acknowledgements*

We acknowledge NHS Digital for their permission to use the data.

**Declaration of interests**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

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## Tables

Table 1: Comparison of socio-demographic characteristics in people with borderline intellectual impairment and the general population.

Characteristic	Numbers (%)		<i>p</i>
	Intellectual Impairment	General Population	
<b>Sex</b>			
Male	329 (49.0)	2,485 (40.0)	<0.001
Female	342 (51.0)	3,721 (60.0)	
<b>Age</b>			
16-34	168 (25.0)	1,187 (19.1)	<0.001
35-54	188 (28.0)	2,008 (32.4)	
55-74	191 (28.5)	2,114 (34.1)	
75+	124 (18.5)	897 (14.5)	
<b>Marital Status</b>			
In a relationship	276 (41.1)	3,457 (55.7)	<0.001
Single	395 (58.9)	2,749 (44.3)	
<b>Ethnicity</b>			
White	609 (91.4)	5,889 (95.0)	<0.001
Black/African/Caribbean/Black	28 (4.2)	111 (1.8)	
British Asian/Asian British	19 (2.9)	121 (2.0)	
Mixed/Multiple ethnic groups/Other ethnic groups	10 (1.5)	79 (1.2)	
<b>In paid employment</b>			
Yes	230 (34.5)	3,177 (51.2)	<0.001
No	436 (65.5)	3,027 (48.8)	
<b>Income</b>			
Highest tertile ( £36,228)	50 (11.2)	1,694 (34.0)	<0.001
Middle tertile ( £17,868, <£36,228)	124 (27.7)	1,752 (35.2)	
Lowest tertile (<£17,868)	273 (61.1)	1,533 (30.8)	
N/A	224 (33.4)	1,227 (19.8)	
<b>Feel safe in neighbourhood</b>			
Yes	636 (96.1%)	6,078 (98.0)	0.001
No	26 (3.9%)	124 (2.0)	
<b>Discrimination</b>			
Yes	155 (23.1)	817 (13.2)	<0.001
No	516 (76.9)	5,389 (86.8)	
<b>Social support – mean (SD)</b>	19.41 (2.81)	20.17 (1.96)	<0.001

All statistics are N (%) unless otherwise specified

**Table 2. Associations between socio-demographic characteristics and feeling lonely in people with borderline intellectual impairment and the general population**

	Intellectual Impairment			General Population		
	Numbers (%) reporting feeling lonely	OR (95% CI)	<i>p</i> value	Numbers (%) reporting feeling lonely	OR (95% CI)	<i>p</i> value
<b>Sex</b>						
Males	75 (26.1)	1	-	440 (18.5)	1	-
Females	87 (29.7)	1.37 (0.90 to 2.07)	0.139	765 (21.6)	1.20 (1.03 to 1.40)	0.019
<b>Age</b>						
16-34	48 (30.6)	1	-	264 (22.6)	1	-
35-54	49 (29.3)	0.8 (0.63 to 1.86)	0.770	473 (24.1)	1.01 (0.83 to 1.23)	0.948
55-74	43 (25.6)	0.98 (0.57 to 1.69)	0.942	333 (16.5)	0.62 (0.51 to 0.76)	<0.001
75+	22 (25.0)	1.01 (0.53 to 1.90)	0.981	135 (17.6)	0.69 (0.54 to 0.90)	0.005
<b>Marital status</b>						
In a relationship	46 (18.2)	1	-	423 (12.7)	1	-
Single	116 (35.5)	1.83 (1.18 to 2.83)	0.007	782 (30.3)	2.58 (2.20 to 2.98)	<0.001
<b>Ethnicity</b>						
White	146 (27.7)	1	-	1,132 (20.2)	1	-
Any other ethnic group	13 (26.5)	1.01 (0.48 to 2.12)	0.978	72 (23.9)	1.03 (0.74 to 1.43)	0.857
<b>Employment status</b>						
In paid employment	37 (17.0)	1	-	560 (18.1)	1	-
Not in paid employment	122 (34.1)	2.09 (1.32 to 3.31)	0.002	644 (22.8)	1.33 (1.15 to 1.54)	<0.001
<b>Income (tertiles)</b>						
Middle/ High	27 (16.70)	1	-	582 (17.4)	1	-
Low	135 (32.3)	2.73 (1.63 to 4.59)	<0.001	623 (24.3)	1.50 (1.30 to 1.75)	<0.001
<b>Feel safe in neighbourhood</b>						
Yes	147 (26.5)	1	-	1,152 (19.9)	1	-
No	10 (50.0)	4.09 (1.36 to 12.30)	0.012	51 (44.4)	2.84 (1.82 to 4.45)	<0.001
<b>Discrimination</b>						

No	130 (25.2)	1	-	972 (18.0)	1	<0.001
Yes	32 (50.0)	2.36 (1.28 to 4.35)	0.006	233 (43.8)	3.32 (2.67 to 4.12)	
<b>Social support</b>	-	0.76 (0.70 to 0.83)	<0.001	-	0.75 (0.72 to 0.78)	<0.001

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**Table 3. Associations between loneliness and mental and physical health outcomes in people with borderline intellectual functioning and the general population**

	Intellectual Impairment				Not lo
	Not lonely	Lonely			
	Mean (SD)	Mean (SD)	Mean difference (95% CI)	<i>p</i> value	Mean
	N (%)	N (%)	OR (95% CI)*	<i>p</i> value	N(%)
Wellbeing	52.76 (9.31)	42.48 (11.06)	-9.86 (-12.08 to -7.64)	<0.001	54.41 (
Depression	6 (1.4)	27 (16.7)	10.73 (3.99 to 28.82)	<0.001	54 (1
Generalised Anxiety Disorder	13 (3.1)	37 (22.8)	11.01 (5.19 to 23.38)	<0.001	136 (;
Agoraphobia	4 (1.0)	17 (10.5)	11.52 (3.26 to 40.71)	<0.001	23 (0
Any Phobia	4 (1.0)	25 (15.4)	20.07 (5.95 to 67.70)	<0.001	35 (0
Panic Disorder	2 (0.5)	1 (0.6)	0.82 (0.07 to 9.22)	0.873	17 (0
Suicidal thoughts in the last week	2 (0.5)	8 (4.9)	5.73 (1.13 to 29.00)	0.035	5 (0.
Suicidal thoughts in the last year	8 (1.9)	33 (20.4)	10.38 (4.19 to 25.72)	<0.001	86 (1
Any chronic disease in the last year	145 (34.8)	69 (42.6)	1.68 (1.07 to 2.64)	0.023	1,468 (;
Poor self-reported health	117 (28.0)	77 (47.5)	2.68 (1.70 to 4.23)	<0.001	739 (1

\* adjusted for age and sex

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