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Understanding the vocational functioning of autistic employees: the role of disability and mental health

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ABSTRACT

Purpose: Employment rates for autistic people are low, despite increasing employment-focused programmes. Given the reported complexities for autistic people in finding and keeping work and flourishing there, further exploration is needed to understand how best to help employers accommodate autistic employees.

Material and methods: We assessed 88 employed autistic adults, without comorbid intellectual disability and examined whether self-reported disability and mental health symptoms were associated with two measures of vocational functioning: disability days off work and vocational disability.

Results: Nearly half (47%) reported at least one disability day absence in the previous month. Autism severity and IQ were not associated with either measure of vocational functioning. Greater disability and higher mental health symptoms were associated with both types of vocational functioning. However, the associations of anxiety and stress with both vocational outcomes were attenuated to null in a multivariable model. Disability ($B=6.74$, $p=0.009$; $B=1.18$, $p<0.001$) and depression ($B=4.46$, $p=0.035$; $B=1.01$, $p=0.049$) remained independently associated with both outcomes.

Conclusions: Clinicians and vocational support programmes addressing modifiable factors may need to focus on addressing mental health comorbidities, specifically depression rather than anxiety, or core features of autism to improve vocational outcomes for autistic people.

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► IMPLICATIONS FOR REHABILITATION

- Individual-level interventions that reduce disablement, particularly in social areas, and depressive symptoms as a way of reducing days off work and improving workplace activities in autistic employees are recommended.
- Organisations can accommodate autistic employees by encouraging use of mental health programmes or looking at how the workplace environment can be adapted to limit social disability.

Introduction

For autistic people, just like non-autistic people, employment often results in positive personal outcomes, such as financial independence, social inclusion, improving self-esteem, and contributing to well-being [1]. Autistic people have a desire to work and want to make a valuable contribution to society [2]. Organisations may also benefit from employing autistic employees as they may offer performance advantages, such as reliability, honesty, efficiency, precision, consistency, and high attention to detail [3]. As a result, there has been a growing demand for autistic employees in specific industries for instance, in the technology sector, where these attributes are seen as potential strengths that contribute to organisational productivity [4]. It is not surprising, then, that employment is seen as a priority focus area by researchers, families, and autistic people [5].

The technology sector provides unique opportunities for autistic employment. Technology giants Microsoft and IBM are actively participating in initiatives to hire information technology (IT) specialists with the autism community. The unique cognitive style and traits of autistic people, such as attention to detail, high focus, system processing, and task repetition enjoyment makes the autistic cohort favourable hires within the IT sectors [6]. These initiatives potentially have individual benefits, such as social integration and organisational benefits in productivity, innovation, and quality of work [6].

Despite this, unemployment rates are high and wages low for autistic people, relative to those in the general working population [7–9]. Estimates show that only 25–50% of autistic people are employed [10]. Finding work is not the only challenge, autistic adults tend to be employed in precarious employment with no benefits or short-term contracts [11]. Further, autistic employees

earn less, work fewer hours [12], and are often overqualified for their position [13]. Current employment opportunities for autistic people are concerning given the multifaceted positive effects of gainful employment on both the individual and the social welfare systems [14].

Autistic people can encounter difficulties due to their unique social, communication, and behavioural characteristics [10]. Using the framework of the WHO International Classification of Functioning impairments in these domains can affect the way autistic people function in their day-to-day lives, including employment. For instance there may be difficulties with social interactions and problem-solving in social situations in the workplace, which can lead to challenges and frustrations for the autistic employee, their supervisors, and co-workers [15]. In the context of this study, we refer to these difficulties as “disability” as captured by the World Health Organisation Disability Assessment Schedule 2.0 (WHODAS 2.0) [16].

Successful employment may require adjustments to be made for the individual, their job role, and the working environment, as legislated in many countries disability discrimination laws [17]. Up to 50% of autistic employees may benefit from adjustments during employment [8], although this requires the employer to be aware of the condition. A recent review considering disclosure in autistic employees showed that support with communication and social skills were among the most requested adjustments [18]. Disability in communicating and navigating the complex social norms that are often present in the workplace may result in difficulties in effectively disclosing their often-invisible condition and requesting required adjustments [19–21].

Co-occurring mental health conditions add further complexities for autistic adults and for the organisations that employ them. A recent meta-analysis highlights the high prevalence of co-occurring mental health conditions, especially diagnosable anxiety (20%) and depressive (11%) disorders – estimates that far surpass the prevalence rates in the general population [22].

In general populations, the association between gainful employment and better mental health is well established [23]. Yet, for autistic people, employment is not necessarily associated with improved mental health outcomes. For autistic people, poorer mental health may exacerbate day-to-day disabilities [24–26] and, depressive symptoms in autistic adults have been shown to be associated with greater disability [27]. In particular, challenges with social skills can lead to heightened anxiety and stress in autistic adults [28]. There is, however, limited evidence examining the workplace impact of common mental health conditions in autistic employees [29]. A scoping review on barriers and facilitators to employment for autistic adults indicated a bi-directional impact of co-occurring mental ill-health. That is, diagnosed mental health conditions, such as depression and anxiety can act as co-occurring complications when at work, as well as barriers to gaining employment [30].

When considering the multi-layered complexities autistic people may experience, such as disability in communication and executive function, these may lead to more time off work as a result of not being able to properly disclose their conditions, or discuss what supports are required to prevent taking time off work [21].

Given these complexities for autistic people in finding work, keeping work, and flourishing at work, further investigation is necessary to better understand what influences the vocational function of autistic employees. This study is a secondary analysis of a sample of autistic employees without intellectual disability investigating disability, and mental health symptoms, of such

employees and their association with disability days away from work in the previous month and vocational disability. We hypothesised that disability and mental health symptom severity would be higher in those autistic employees who take disability days and report higher vocational disability.

Methods

Participants and recruitment

Adults aged 16–65 years were recruited from the Autism Clinic for Translational Research (ACTr) at the Brain and Mind Centre (BMC) between 2008 and 2020. The University of Sydney, Human Research Ethics Committee approved the study (2013/352) and written consent was obtained from participants prior to participation.

All participants were assessed as a part of a larger clinical and research programme for range of reasons, including assessment and diagnostic clarity, neuropsychological assessment, to participate in a clinical trial or for mental health support. A thorough clinical screening process identified those individuals who may be on the autism spectrum. This diagnosis was assessed by a clinical psychologist (in an unstructured clinical interview) against *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; text rev.; DSM-IV-TR; [31]) or *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; [32]) criteria and subsequent ADOS-2 assessments conducted by research reliable therapists or psychologists confirmed the primary diagnosis of autism.

Participants were included in this study if they were working age (16–65 years) and were currently in paid employment, and met clinical cut-offs (a score of 7 or above) for autism spectrum on the Autism Diagnostic Observation Schedule–2nd edition (ADOS-2; [33]). Participants were excluded from this study if they had an additional intellectual disability (as indexed by an IQ score < 70 on the Wechsler Test of Adult Reading (WTAR; [34]), if they had neurological impairment or current substance dependence, or were students without additional employment.

Measures

Demographic information was collected on all participants including, age in years, gender, and education. Employment status was self-reported by participants answering the question, “Are you currently employed?” with a follow-up classification of type of employment, which was coded to full-time or part-time, where part-time employees include those working casually.

Clinical information, including autism severity (ADOS-2 score) and intellectual functioning (IQ scores) were assessed by experienced and qualified clinicians.

Disability

The 36-item version of the WHODAS 2.0 [35] was used in this study to attain a measure of disability based on the International Classification of Function, Disability, and Health [16]. The WHODAS 2.0 examines six major life domains: understanding and communicating (cognition); getting around (mobility); self-care (ability to attend to personal hygiene, dressing, and eating, and to live alone); getting along with people (social and interpersonal functioning); household and work activities (vocational disability); and participation in society (involvement in family, social, and community activities) during the previous 30 d. The instrument produces an overall WHODAS 2.0 score and six domain-specific scores, ranging from zero (none) to 100 (extreme/cannot do).

The WHODAS 2.0 has high internal consistency (Cronbach's alpha for different domains of $\alpha = 0.79 - 0.98$), a stable factor structure, high test-retest reliability (intraclass correlation coefficient of .93 to .96), good concurrent validity, and good responsiveness [35]. The WHODAS 2.0 has recently been validated for use in autistic adults without intellectual disability and showed adequate internal consistency for all domain scores ($\alpha = 0.78 - 0.97$ for 36-item) [27]. It also showed excellent reliability in the current sample ($\alpha = 0.95$ for 36-item total score).

Vocational disability outcomes

- A. **Disability days off work.** Subjective measures within the WHODAS 2.0 [35] captured reported time off work (total loss days) over the previous 30 days. Specifically, respondents were asked a single question: "In the past 30 days, for how many days were you totally unable to carry out your work or usual activities because of any health condition?" In this study, participants were coded into either requiring no (0 d) or any (>1 d) disability days off from work in the previous 30 d.
- B. **Vocational disability.** The WHODAS 2.0 subdomain of work activities was removed from the overall disability and used as its own variable to measure overall "vocational disability". Participants were asked four questions: "In the past 30 days, how much difficulty did you have in ... (i) Your day-to-day work?, (ii) Doing your most important work tasks well?, (iii) Getting all the work done that you need to do?, and (iv) Getting your work done as quickly as needed?" Scale overall vocational disability scores ranged from none to extreme/cannot do on all four questions.

Participants answered the four questions using the five-option categorical scale to each question rating their individual disability in terms of none, mild, moderate, severe, or extreme. When coding these options none = 0 and extreme = 4. Following the scoring description provided on the WHODAS 2.0 website (<https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health/who-disability-assessment-schedule>) we adopted this scoring approach:

- Step 1 – Summing of recoded item scores within each domain (0–4 for each of the questions within each of the six domains then transforming the individual domains into a score out of 100 by taking the total score from the domains and dividing it by the maximum possible score in that domain and then times by 100 to reach a percentage disability in each domain. For instance, the first domain has six items. The equation would be (score of the six items)/24(the maximum score in the domain) \times 100 (to reach a percentage)).
- Step 2 – Summing of all six domain scores.
- Step 3 – Converting the summary score into a metric ranging from 0 to 100 (taking the total score from the six domains and dividing by 144 (the highest possible score) then times by 100 to reach a percentage of disability out of 100%, where 0 = no disability; 100 = full disability).

Mental health symptoms

Symptoms of depression, anxiety, and stress in this sample are referred collectively here as "mental health symptoms". The Depression, Anxiety, and Stress Scale–21 items (DASS-21; [36]) is a set of three self-report scales assessing seven-items across anxiety, depression, and stress symptoms. This measure is a short version of the full 42-item DASS. The short version has good reliability and validity (Cronbach's alpha 0.94, 0.87, and 0.91 for the

depression, anxiety, and stress subscales, respectively [37,38], along with good construct validity [39]. The DASS-21 has also previously been used with autistic adults [27] and demonstrated excellent reliability in this sample ($\alpha = 0.94$).

Participants are asked to rate items, such as "Over the past week: I found it hard to wind down." Each item is scored on a 4-point Likert scale ranging from zero (did not apply to me at all) to three (applied to me very much or most of the time). Because the DASS-21 is a short-form version of the original DASS (42 items), the final score of each item groups were multiplied by two so that they could be compared with the standard DASS scores [36,38]. Higher scores indicate higher mental health symptoms. Using the original cut-off scoring method, scores pertaining to severe depression = > 21, anxiety = > 15, and stress = > 27 [36].

Statistical analyses

Statistical analyses were performed using SPSS version 26 (SPSS Inc., Chicago, IL). Missing values within the DASS-21 ($\leq 20\%$ of missing data) were replaced by the mean of the remaining items from each subscale [27]. Following the WHODAS 2.0 manual [35], missing data for items with less than 30% per domain were replaced by the mean of the remaining domain values. In this sample, data were imputed for eight participants, with a cumulative percentage of 5.8% missing data.

All data were checked visually by plotting a histogram and tested for normality. Tests for normality were met for IQ, overall disability, anxiety, depression, stress, and social interaction anxiety, but age and autism severity were not normally distributed. The number of cases and percentages for categorical data or means and standard deviations for numerical data were reported for all outcome measures.

The individual association of demographic and clinical characteristics with the two outcomes, disability days and vocational disability, were evaluated with, Chi-square tests, independent sample *t*-tests, Kruskal–Wallis *H*, Pearson correlations as appropriate. Effect sizes (Cohen's *d*) with 95% confidence intervals (CIs) were also reported, where $d = 0.2$ is considered a small effect, $d = 0.5$ a medium effect, and $d = 0.8$ a large effect [40].

To test for multicollinearity, multiple linear regressions were conducted by iterating the independent variables. Intercorrelations are reported using the variance inflation factor (VIF), a measure of the amount of multicollinearity. This ratio is calculated for each independent variable. A high VIF (a cut-off of 5 or more) indicates that the associated independent variable is highly collinear with the other variables in the model; in such instance, these variables were removed from future regression analyses. Visual checks confirmed assumptions for multiple regression analyses (multivariate normality and linearity, and multicollinearity) were fully met.

To examine whether disability and mental health symptoms were related to disability days, we performed a multiple logistic regression by entering all independent variables (predictors) simultaneously into the model. Variables were evaluated by examining how much unique variance they contributed to the prediction of the dependent variable (disability days). The Chi-squared (χ^2) test was used to determine the significance of each predictor and standardised beta coefficients was used to determine the magnitude of prediction for each independent variable. Similarly, the association of disability and mental health symptoms to vocational disability were evaluated in a multiple linear regression model using same simultaneous entry process. Variables were

Table 1. Sociodemographic and clinical characteristics of employed autistic people and their association with disability days and vocational disability.

| Variable | All (<i>n</i> = 88) | No disability days (<i>n</i> = 47, 53.4%) | Disability days (<i>n</i> = 41, 46.6%) | Disability day <i>p</i> value | Vocational disability <i>p</i> value |
|------------------------------------|------------------------|---|--|---|---|
| | <i>n</i> (%) | <i>n</i> (%) | <i>n</i> (%) | Chi square | ANOVA |
| Gender: male (vs. female) | 65 (73.90) | 38 (80.85) | 27 (65.85) | $r = 2.551$ $p = 0.088$ | $F^{1,87} = 1.425$ $p = 0.159$ |
| Education: University (vs. not) | 17 (19.32) | 10 (21.28) | 7 (17.07) | $r = 0.248$ $p = 0.412$ | $F^{1,87} = 1.216$ $p = 0.180$ |
| Work: full-time (vs. part-time) | 28 (31.82) | 11 (23.40) | 17 (41.46) | $r = 3.292$ $p = 0.056$ | $F^{1,87} = 0.961$ $p = 0.509$ |
| | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>M</i> (<i>SD</i>) | <i>t</i> -Test or Kruskal–Wallis <i>H</i> | ANOVA |
| Age | 23.31 (6.68) | 22.94 (6.11) | 23.73 (7.35) | $H^{1,87} = 0.804$ $p = 0.581$ | $F^{1,87} = 1.438$ $p = 0.154$ |
| Autism severity (ADOS-2) | 9.39 (2.51) | 9.77 (3.17) | 9.07 (1.77) | $H^{1,87} = 4.335$ $p = 0.294$ | $F^{1,87} = 0.557$ $p = 0.886$ |
| IQ (WTAR) | 108.96 (6.31) | 109.11 (6.27) | 108.86 (6.56) | $F^{1,87} = 0.002$ $p = 0.927$ | $F^{1,87} = 0.697$ $p = 0.724$ |

Note: Age and Autism severity: Kruskal–Wallis *H*; IQ: Intellectual Quotient; ADOS-2 = Autism Diagnostic Observation Schedule–2nd edition; WTAR: Wechsler Test of Adult Reading.

evaluated by examining how much unique variance they contributed to the prediction of the dependent variable (vocational disability). Regression interactions were examined to confirm if any of the dependant or independent variables interacted with each other.

Results

Demographic characteristics

We identified eighty-eight participants. The average age was 23.3 years of age (*SD* = 6.7) ranging in age from 16 to 41 years. The majority were male (*n* = 65; 74%), were not university educated (*n* = 71; 81%) and were in part-time employment (*n* = 60; 68%). Just under a third of participants (*n* = 28; 32%) were employed full-time. Almost half (*n* = 41, 47%) of whom required at least one disability day in the previous 30 d. Overall, the mean number of disability days was 5.29, ranging from 1 to 30 d. The median vocational disability score was 37.50 showing moderate disability across the vocational sub-domain, ranging from 0 to 100. There were no significant associations of age, gender, university attainment, work hour pattern, intellectual functioning, or autism severity (as indexed by ADOS-2 scores) with taking leave due to disability days or vocational disability (Table 1).

Disability

Participants reported a substantial level of disability, with mean scores (*M* = 26.22, *SD* = 14.33) corresponding to the 86th percentile when compared to population norms [41] (Table 2). This perceived disability was most evident in of the subdomains of communicating with others (*M* = 25.73, *SD* = 12.99), getting along with people (*M* = 35.43, *SD* = 21.01), and being able to do household activities (*M* = 36.76, *SD* = 29.53).

Disability and disability days

Those that took disability days off work reported significantly higher disability scores overall, scoring, on average, 12.17 points higher than those employees who did not take leave from work due to disability ($F = 18.28$, $p < 0.001$, $d = 0.94$). Disability scores were also significantly higher for most subdomains except getting around and self-care (Table 2).

Disability and vocational disability

Overall, significant correlations were found in employees that reported higher vocational disability and overall disability ($r^2 = 0.550$, $p < 0.001$), and all sub-domains (Table 2).

Mental health symptoms and disability days

On average, autistic employees in this sample had moderate-to-severe depressive symptoms (*M* = 20.44, *SD* = 12.72), severe anxiety symptoms (*M* = 15.53, *SD* = 10.51), and moderate stress symptoms (*M* = 22.23, *SD* = 10.17). Participants with at least one disability day, reported significantly higher depression ($F = 13.57$, $p < 0.001$, $d = 0.80$), anxiety ($F = 6.80$, $p = 0.011$, $d = 0.57$), and stress ($F = 8.67$, $p = 0.004$, $d = 0.64$) (see Table 2). With symptom scores in the disability days group reaching clinical-significance (depression = > 21 and anxiety = > 15) on average (Table 2).

Mental health symptoms and vocational disability

Similarly, to disability, depression ($r^2 = 0.378$, $p = 0.001$), anxiety ($r^2 = 0.365$, $p = 0.001$), and stress ($r^2 = 0.358$, $p = 0.001$), were all significantly correlated with vocational disability (Table 2).

Considering the overall sample, all variables were significantly inter-correlated (Table 2), but not highly collinear (did not meet $VIF > 5$) with the other variables in the model. No variables were therefore removed from regression analyses.

Factors associated with disability days

Disability scores and mental health symptoms were entered simultaneously to test the contribution of these variables to disability days. The final model showed that disability days was independently associated with two factors, higher overall disability scores Wald $\chi^2 = 6.74$, 95% CI = 0.02–0.11, $p = 0.009$, and higher depression scores Wald $\chi^2 = 4.46$, 95% CI = 0.01–0.15, $p = 0.035$ (Table 3).

Factors associated with vocational disability

Disability scores and mental health symptoms were entered simultaneously to test the contribution of these variables to vocational disability. The final model showed that vocational disability was independently associated with the same two factors as disability days, higher disability scores $B = 0.510$, 95% CI = 0.69–1.68, $p < 0.001$, and higher depression scores $B = 0.314$, 95% CI = 0.10–0.203, $p = 0.049$ (Table 4).

As we found significant correlations between disability days, vocational disability, depression, and disability (Table 2) and

Table 2. Overall mean, SD and between-group differences of none vs. any disability days and correlation with vocational disability.

| Variable | All (<i>n</i> = 88) | No disability days (<i>n</i> = 47) | Disability days (<i>n</i> = 41) | Mean diff | Cohen's <i>d</i> | Significance test disability days | Correlation with vocational disability score |
|--------------------------------|-------------------------|--|-------------------------------------|-----------|------------------|---|--|
| | <i>M</i> (SD) | <i>M</i> (SD) | <i>M</i> (SD) | | | <i>t</i> -Test | <i>R</i> and <i>p</i> value |
| Disability (WHODAS 2.0) | | | | | | | |
| Range 0–100 | | | | | | | |
| Overall | 26.22 (14.33) | 20.28 (13.85) | 32.45 (12.12) | 12.17 | 0.94 | $t^{1,87} = 4.320$ $p < 0.001^{***}$ | $r = 0.550$, $p < 0.001^{***}$ |
| Communicating with others | 25.73 (12.99) | 22.42 (14.33) | 29.20 (10.63) | 6.78 | 0.54 | $t^{1,87} = 2.464$ $p = 0.016^*$ | $r = 0.525$, $p < 0.001^{***}$ |
| Getting around | 14.38 (15.45) | 11.16 (15.77) | 17.75 (14.53) | 6.59 | 0.44 | $t^{1,87} = 1.990$ $p = 0.050$ | $r = 0.372$, $p = 0.001^{**}$ |
| Self-care | 13.02 (18.57) | 11.19 (19.93) | 14.94 (15.45) | 3.75 | 0.21 | $t^{1,87} = 0.924$ $p = 0.358$ | $r = 0.323$, $p = 0.003^{**}$ |
| Getting along with people | 35.43 (21.01) | 28.84 (22.80) | 42.34 (16.56) | 14.00 | 0.68 | $t^{1,87} = 3.093$ $p = 0.003^{**}$ | $r = 0.370$, $p = 0.001^{**}$ |
| Life activities household | 36.76 (29.53) | 28.05 (27.63) | 45.88 (29.00) | 17.83 | 0.63 | $t^{1,87} = 2.886$ $p = 0.005^{**}$ | $r = 0.431$, $p < 0.001^{***}$ |
| Social participation | 16.69 (11.42) | 12.39 (11.79) | 21.19 (9.16) | 8.80 | 0.83 | $t^{1,87} = 3.806$ $p < 0.001^{***}$ | $r = 0.512$, $p < 0.001^{***}$ |
| Mental Health (DASS-21) | | | | | | | |
| Range 0–42 | | | | | | | |
| Depression | 20.44 (12.72) | 16.04 (12.95) | 25.50 (10.49) | 9.46 | 0.80 | $t^{1,87} = 3.684$ $p < 0.001^{***}$ | $r = 0.378$, $p = 0.001^{**}$ |
| Anxiety | 15.53 (10.51) | 12.87 (10.79) | 18.60 (9.39) | 5.73 | 0.57 | $t^{1,87} = 2.608$ $p = 0.011^*$ | $r = 0.365$, $p = 0.001^{**}$ |
| Stress | 22.23 (10.17) | 19.35 (10.53) | 25.55 (8.75) | 6.20 | 0.64 | $t^{1,87} = 2.945$ $p = 0.004^{**}$ | $r = 0.358$, $p = 0.001^{**}$ |

Key: $p < 0.001^{***}$, $p < 0.010^{**}$, and $p < 0.050^*$.

WHODAS 2.0: World Health Organisation Disability Assessment Schedule 2.0; DASS-21: Depression, Anxiety and Stress Scale Short Form.

Table 3. Multivariable logistic regression model of association of disability days.

| Variable | <i>B</i> | SE | Wald | Sig | OR | 95% CI | |
|-----------------------|---|-------|-------|---------|-------|--------|-------|
| | | | | | | Lower | Upper |
| Constant | −3.394 | 1.120 | 9.181 | 0.002** | | | |
| Disability (0–100) | 0.061 | 0.023 | 6.736 | 0.009** | 1.063 | 1.015 | 1.113 |
| Depression (0–42) | 0.074 | 0.035 | 4.461 | 0.035* | 1.076 | 1.005 | 1.153 |
| Anxiety (0–42) | −0.005 | 0.043 | 0.012 | 0.911 | 0.995 | 0.915 | 1.082 |
| Stress (0–42) | −0.001 | 0.045 | 0.000 | 0.983 | 0.999 | 0.914 | 1.092 |
| Model | $\chi^2 = 28.70$ (<i>df</i> 4) $p < 0.001^{***}$ | | | | | | |

Key: $p < 0.001^{***}$, $p < 0.010^{**}$, and $p < 0.050^*$.

Disability: WHODAS 2.0 Scale; Depression, Anxiety, Stress: DASS-21 Scale.

associations in the regression analysis (Tables 3 and 4), we conducted regression interactions and found there was no significant interaction between depression and disability $B = 0.195$, $p = 0.658$ on disability days. Similarly, there was no significant interaction between depression and disability $B = 0.131$, $p = 0.525$ on vocational disability. Suggesting the effects of depression and disability on disability days and vocational disability are independent of each other. However, we did find a significant interaction between disability days and vocational disability $B = 0.669$, $p < 0.001$ suggesting that these two variables are likely to predict each other.

Discussion

This novel study shows, as expected, that autistic employees who took disability days in the previous month had higher overall disability than those that did not take any disability days. Interestingly in this sample, autism symptom severity and IQ scores were not associated with either vocational functioning

Table 4. Multivariable linear regression model of association of vocational disability.

| Variable | Unstandardised | | | <i>t</i> | Sig | 95% CI | |
|-----------------------|--|-------|-----------------------|----------|----------|--------|-------|
| | <i>B</i> | SE | Standardised <i>B</i> | | | Lower | Upper |
| Constant | −0.039 | 8.278 | − | −0.005 | 0.996 | | |
| Disability (0–100) | 1.183 | 0.247 | 0.510 | 4.794 | 0.000*** | 0.691 | 1.675 |
| Depression (0–42) | 1.014 | 0.508 | 0.314 | 1.997 | 0.049* | 0.102 | 2.027 |
| Anxiety (0–42) | 0.069 | 0.356 | 0.027 | 0.194 | 0.847 | −0.640 | 0.778 |
| Stress (0–42) | −0.331 | 0.535 | −0.102 | −0.619 | 0.538 | −1.398 | 0.736 |
| Model | $r^2 = 0.607$ (<i>df</i> 4) $p < 0.001^{***}$ | | | | | | |

Key: $p < 0.001^{***}$ and $p < 0.050^*$.

Disability: WHODAS 2.0 Scale; Depression, Anxiety, Stress: DASS-21 Scale.

domains. Suggesting that disability days and vocational disability are not affected by level of IQ or autism severity. Higher disability was observed among those employees that took disability days in the previous month in those domains involving social interactions, specifically, communication with others, getting along with others, and social participation, which are key skills that are likely required within the workplace. In contrast to the disability observed in social domains, disability scores were lower, on average, and no significant group difference was observed in the area of mobility. These findings align with the diagnostic picture of autism, as well as scientific evidence that suggests a somewhat uneven functioning profile, whereby impairments in social functioning may occur alongside generally intact functioning across other domains [42]. We were able to confirm that self-reported vocational disability was also associated with overall disability and depression. Thus, giving more weight to the importance of focusing further research on treatment of mental health, specifically, depression in autistic employees to explore further if

improvements found in vocational functioning this study are replicated in larger samples.

Disabilities by themselves may not impact employees retaining employment as some evidence supports the notion that autistic people, especially those without intellectual disability, may be able to sustain employment while living with substantial disabilities involving social interactions [42]. However, merely sustaining employment should not be the focus area in the workplace. Another key focus should be on improving and supporting and vocational disabilities to assist autistic employees to flourish in their roles [43].

In addition to substantial and vocational disabilities, it was not surprising that mental health symptoms were high in this help-seeking sample. It was also unsurprising that mental health symptoms were much higher in autistic employees who took disability days compared to those who did not, as previous research has identified that employed autistic adults experience high rates of anxiety, depression, and stress [13]. Clinical thresholds were met for severe symptoms of depression and anxiety in the “disability days” group. The findings in this study echo Virtanen et al. findings that mental health symptoms may be exacerbated in those that require time off work by way of increased disabilities [44], and add weight to findings that stress and anxiety are increased in autistic employees due to their difficulties in managing workplace-specific social demands [45]. Co-occurring mental ill-health might be more prevalent in the autistic employee population than in the general working population, based on clinical evidence [22]. Careful assessment of mental health is an essential component of clinical care for all people on the autism spectrum and could be a consideration for integration into organisational surveys and intervention programmes within the workplace.

The wider interpretation of our findings support a theory posed by Annabi and Locke whereby autistic individuals experience the workplace differently due to differences in social function and interactions [6]. By showing preliminary support of this theory at an individual level, organisations, and clinicians might consider aiming to assist autistic employees in addressing depressive symptoms and vocational disability as associations were found with the need for disability days. Evidence is lacking in examining the impact of disability in autistic employee samples. However, our findings, novel in the autism field, are in line with evidence in general working populations, with mental health conditions considered the leading cause of disability, absence, and long-term work incapacity in most developed countries [46], most notably depression, anxiety, and stress-related conditions [46–48]. Contrary to expectations, general and social interaction anxiety and stress in this sample were not associated with disability days off work in this sample of autistic employees. This finding is intriguing as anxiety is considered to be more prevalent than depression in autistic people and is a possible barrier to workplace success [22]. It may, however, have less of an impact on disability days required when considered along with other symptoms that are likely to impact function, such as depression and disability. Caution is warranted, however, given that we asked novel research questions, albeit using secondary data. More research is required to confirm these findings using a prospective design.

Future considerations for research and practice at legislative and organisational levels

At an individual level, there is a growing evidence base suggesting that modified cognitive behavioural therapy (CBT) can be beneficial to those autistic individuals with co-occurring mental

health symptoms [49]. CBT-based approaches delivered in the workplace both face-to-face and digitally have shown to be useful in the prevention and the treatment of depressive symptoms [50–52] but not yet specifically for autistic employees. Future research should consider developing face-to-face and digitally modified CBT interventions for autistic employees, with the aim of improving mental health symptoms.

Employers should consider not just individual-level workplace accommodations to address individual mental ill-health and disability in autistic employees, but also ways that the organisation can implement interventions and organisational changes to improve the experience at work for autistic employees.

One way to improve relationships, workplace performance [43], and, as our findings suggest, potentially reduce disability days required might be to help support autistic people with social interaction difficulties. At an organisational level universal workplace interventions could focus on equipping individuals with knowledge and schemas of how to successfully initiate, engage in, and maintain social interactions that may be specific to the workplace. Some examples may include the adaptation of clear structures for roles being implemented in the workplace to provide guidance on the relevant social norms, this will likely benefit all employees, not just autistic employees.

It is important for organisations to understand the mechanisms that contribute to disability days from an economic perspective. The findings of this study suggest that emphasis should be placed on promoting the programmes and supports for autistic employees that might address their function and depressive symptoms, particularly the vocational abilities and mental wellbeing of autistic employees. For the organisation, and society as a whole, interventions have the potential to increase economic gains and improve productivity. The costs of providing such interventions in the workplace have been shown to be outweighed by the benefits reported [53].

Another, essential component to improving employment success for autistic employees could be by looking beyond individual-based programmes to interventions, strategies, and supports at the organisational level. It is equally as important for organisations to increase their management’s knowledge of the characteristics of autism to adequately support, and to prepare for managing their needs [54]. Johnson and Joshi, point to the importance of all stakeholders, including policy makers, employers, supervisors, and co-workers in understanding the difficulties that autistic individuals may have in the workplace [19,20]. Supportive management processes have been shown to assist autistic individuals in managing workplace demands and improving social interactions in the work environment [55], which is important as our findings suggest a link between vocational disability and the need for time off work. Organisations should endeavour to increase their employees understanding of the potential needs of their autistic peers, a greater understanding from managers and co-workers will likely lead to appropriate accommodations to better suit autistic individuals’ needs [18], which may also reduce frustrations in peers [15].

Focus could be placed on improving the workplace environment. The successful integration of autistic employees is determined, in part, by the organisational culture, including the extent to which diversity and inclusive workplaces are valued and promoted by both leadership teams and within colleagues [56]. The methods used during organisational integration of employees are an important part of developing an inclusive organisational culture. In a disability context, one way to promote inclusivity within the organisational culture is through the creation of employee

resource groups [57]. The presence of employee resource groups, especially among those with less apparent disabilities has been found to increase disability-related knowledge in co-workers and be a facilitator of disclosure and thus, access to accommodations [58].

We acknowledge that these recommendations for services should be interpreted carefully as this is a novel study, the first study, to our knowledge, on this topic. In the future research, authors should consider how many disability days are associated with poorer mental health to understand more about the definitive impact on autistic employees and the organisation at large.

Strengths and limitations

This study has a number of strengths, such as the extensive assessments of autism *via* the ADOS-2. We were also able to confirm that the WHODAS 2.0 measure of disability days was appropriate to assess “days off work” in a workplace sample due to the association and interaction with vocational outcomes. However, this study is not without limitations. First, the cross-sectional design made it possible to determine associations among the level of function, mental ill-health, and disability days, but not their causal relationships. Future research should consider longitudinal designs to inform our understanding of long-term predictors of employment and disability days. Second, all data were based on self-report measures rather than objective measures of function. Nevertheless, how people feel and perceive reality is core to the development of poor function and mental ill-health [59]. Third, the individuals in this sample were help-seeking and thus symptoms may be elevated relative to the broader autistic population. Fourth, this sample is, on average, younger than the general populations observed in workplace samples and may have limited generalisability. Fifth, this is a secondary analysis of a larger study. The questions included in the main dataset limited the options for further clarification of type of employment, and the impact of outcomes on the objective number of disability days required. This novel, secondary analysis was restricted to only a subset of autistic employees – those without an intellectual disability. It remains unknown whether these findings generalise across the spectrum. Further, we were unable to ascertain what, if any, workplace accommodations were requested or received in this sample. Understanding the extent and nature of these accommodations (and their associated barriers and pitfalls) is the first step in being able to test the effectiveness of specific measures to support autistic employees and must be a priority for future research. Finally, we note that participants presented for assessment for a range of possible reasons, including seeking diagnostic clarity and neuropsychological assessment, attending for comorbid mental health concerns, or opting into offered clinical trials. This recruitment base may have led to selection biases that are associated with increased disability days in comparison to recruitment in general autistic populations.

Conclusion

This is a novel study that describes the disability and mental health symptoms reported by autistic employees, and their association with their vocational functioning. The key findings highlight specific complexities to consider when supporting autistic individuals to do their job to the best they can. These findings, offer preliminary support to the evaluation of individual-level interventions that reduce disablement, particularly in social areas, and depressive symptoms as a way of reducing days off work and improving

workplace activities in autistic employees. Organisations truly interested in workplace disability-inclusive practices, might consider using these findings to help accommodate autistic employees, for instance, by encouraging use of mental health programmes, or looking at how the workplace environment can be adapted to limit social disability, potentially increasing vocational function, and providing a win-win solution for employers and employees alike.

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