Exploring the psychosocial needs and nutritional status of older adults with alcohol use disorder: A mixed-methods study (The OLA Study)

Stephanie Hughes

sh3r11@soton.ac.uk

University of Southampton

Rebecca Band

Swansea University

Zarah Linssen

University of Southampton

Sophie Crouzet

University of Southampton

Stephen Lim

University of Southampton

Julia Sinclair

University of Southampton

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Abstract

Background

Alcohol-related hospital admissions are rising in England, particularly among individuals aged 65 and over. While alcohol intake and nutritional status are important factors in health outcomes, they are often overlooked. Loneliness, also common in this age group, is associated with poorer health and increased mortality.

Objectives

To explore the clinical and sociodemographic characteristics, and nutritional status of older adults with alcohol use disorder (AUD) admitted to hospital.

Methods

Participants were recruited from a UK tertiary teaching hospital and identified as drinking at increased risk using routine AUDIT-C alcohol screening. Measures including 6CIT (Six-item Cognitive Impairment Test), Depression and anxiety (HADS), 24-hour Dietary Recall, Social network composition, De Jong Loneliness Scale, and Meaning in life questionnaire were measured at baseline and 6 months. Qualitative telephone interviews were conducted at 6 months (n = 7). Qualitative data were analysed using reflexive thematic analysis.

Results

Thirty older adults (mean age 71) were recruited. Over half (53%) showed cognitive impairment and 50% met the threshold for clinical depression. Median intakes for 4 out of 5 (80%) macronutrients were below Recommended Nutrient Intake (RNI). Recruitment and retention were challenging; 46.7% of participants were lost to follow-up including 20% who died. Qualitative findings highlighted links between social isolation and alcohol consumption.

Conclusion

Addressing alcohol use in older adults requires a holistic approach that incorporates both health and social factors. Future research should focus on improving study retention, and further exploring the intersections between alcohol use, nutrition, and social connection.

Introduction

Alcohol Use Disorder (AUD) contributes to over 200 health conditions [1]. 10,048 deaths from alcohol-specific causes were registered in 2022 in the UK, the highest figure on record [2]. Estimated figures from 2019–2020 suggest there are over 600,000 alcohol dependent adults in England [3], and this figure has risen since the COVID-19 pandemic [2]. Alcohol poses health risks to older adults, even at levels that may have been considered "safer" earlier in life [4]. Alcohol -related hospital admissions in England are rising and the proportion of those aged 65 and older has increased significantly[5].

It is well documented that AUD is a highly stigmatised condition[6], with research showing high levels of both internalized (felt) and external (enacted) stigma[7]. Stigma impacts both the medical and social consequences of individuals with AUD [6]. Compared to younger adults, older adults experience a greater sense of stigma and shame associated with problematic alcohol use[8]. Stigma and fear of being judged can hinder help seeking behaviour [8], and facilitate reluctance to participate in social activities [9], compounding feelings of loneliness (10).

Loneliness is an unwelcome emotional state arising from the ‘perceived discrepancy between desired and actual social relationships’ [11] as well as insufficient connections, and a lack of social intimacy[12]. Factors contributing to loneliness include not having a spouse, a limited social network, low mood, self-perceived poor health, a low level of social activity and a limited social network [13]. Loneliness negatively impacts health and mortality outcomes[14] and older adults are particularly vulnerable to these consequences [15]. Specific to alcohol-related behaviour, research has demonstrated a clear but complex link between the number of social contacts a person has, whether those contacts consume alcohol and how supportive they are of an individual wishing to achieve and maintain abstinence [16].

Exploration of drinking behaviour must consider individual, contextual and social factors [4]. Among older adults, various psychosocial factors shape drinking behaviour, including life transitions like retirement and bereavement, social norms, and changes in self-identity [4]. While existing research into the treatment needs of working-age adults with AUD is well documented, there is a dearth of literature specific to older adults.

A body of literature relating to health outcomes for older adults is developing, including literature exploring complex conditions such as multi-morbidity, frailty and falls [17], [18], [19]. Alcohol intake and nutritional status are especially relevant when considering health outcomes [19], especially in relation to falls, but are rarely considered. The most vulnerable members of society, such as older adults, are disproportionately affected by alcohol-related harms [20]. This vulnerability is worsened by poor nutritional status; malnutrition leads to increased mortality, morbidity and physical decline[21]. The combined impact of alcohol use and malnutrition in older adults remains underexplored. The OLA study takes a novel approach by holistically exploring the treatment needs of older adults with AUD, alongside the interaction with their nutritional status and degree of loneliness.

Methods

Ethical approval and consent to participate

Ethical approval for this study was granted by West Midlands - Solihull Research Ethics Committee (23/WM/0080) and study procedures adhered to the Declaration of Helsinki. All participants provided informed consent to participate, and for publication of anonymised data.

Study design and participants

This is a mixed-methods longitudinal observational study of older adults (aged > 64) with AUD aiming to explore the clinical and sociodemographic characteristics and support needs after admission for acute hospital care. Potential participants were identified through admissions to University Hospital Southampton (UHS) in August 2023 – April 2024; those aged > 64 and identified as drinking at increased risk (scoring 4+) according to the Alcohol Use Disorders Identification Test Consumption (AUDIT-C) [22] were eligible for the study.

Data collection

Quantitative measures were completed at baseline (in hospital) and 3–6 months by telephone. These included: Alcohol Use Disorders Identification Test (AUDIT) [23], 6CIT (Six-item Cognitive Impairment Test) [24], Depression and anxiety (HADS) [25], 24-hour Dietary Recall [26], Social network composition, De Jong Loneliness Scale [27], Meaning in life questionnaire[28] and a review of the medical notes.

In addition, at follow up outcome data included the SF-12 Mental and Physical Health composite scale score [29], The Timeline Followback (TLFB) [30], and Service use Inventory, as well as questionnaires assessing Self-efficacy [31], and Collective efficacy (CENS) [32].

Qualitative semi-structured telephone interviews with a subset of participants were conducted at 6 months to gain a richer insight into the topics covered by the questionnaire. A topic guide was used flexibly and amended iteratively throughout the data collection process. Interviews included a social network mapping exercise using the concentric circles method[33] to provide insight into who participants viewed as important in their daily lives.

Data analysis

Quantitative data analysis: Descriptive statistics were used to analyse baseline characteristics and the quantitative measures.

Qualitative data analysis: Transcripts were analysed using reflexive thematic analysis[34], [35]. The analysis was led by SH with input from JS and RB throughout the process. Transcripts were read multiple times for familiarity and coded in NVivo. Similar codes were grouped together into broader themes while patterns, relationships and overarching narratives were explored. Research team discussions facilitated the refinement of themes throughout the process.

Nutritional analysis: The Nutridata app[36], which provides nutritional information on the meals served in hospital, supported the coding of baseline data. Data from the diet timeline followback [30] were analysed using software called 'myFood24'. Myfood24 is a comprehensive dietary software package that quantifies raw dietary intake data into numerical nutrient intakes. Its extensive database and strong content validity reduced systematic errors and enhanced the validity of the nutrient intake analysis[37]. The participant intakes of 32 nutrients were calculated as a percentage of the reference nutrient intakes (RNI) derived from the UK Government's Dietary Recommendations and adjusted for age [38].

Results

Characteristics of the study participants

30 participants were recruited to the study aged 65–91 (mean age of 71). Participants had a mean body mass index (BMI) of 24.1(range 16.7–50.2). 20 participants (67%) lived alone. Participant postcodes were used to calculate the Index of Multiple Deprivation (IMD) and indicated a variation in socioeconomic status with 36.7% of participants living in the most deprived quintile and 20% in the least deprived. See Table 1 for an overview of characteristics.

Table 1: Participant characteristics

Total n=30	N (%)
Age	
65-74	21 (70%)
74+	9
Gender	
Male	21 (70%)
Female	9
Marital status	
Married	8
Not married	22 (73%)
Index of multiple deprivation	
Quintile 1 (most deprived)	11 (36.67%)
Quintile 2	
Quintile 3	6 (20%)
Quintile 4	2 (6.67%)
Quintile 5 (least deprived)	5 (16.67%)
	6 (20%)

Challenges in recruitment and retention

Both recruitment and retention proved difficult in this study. Initially eligibility criteria required a referral to the Alcohol Care Team (ACT), but in the first 3 months, although 98 patients > 64 were referred to the

ACT, only 27 (28%) were deemed clinically fit to be approached, and of these, 7 (26%) consented to take part. To improve recruitment rates, a substantial amendment to include all patients who scored 4 + on the AUDIT-C through routine screening were eligible to be approached with clinical permission. When the amendment was approved 23 more patients were recruited.

14 (46.7%) participants were lost to follow-up. 3 (10%) withdrew, 4 (13.3%) died between baseline and follow-up, and 7 (23.3%) were unreachable. Two further participants died shortly after follow-up (noted while reviewing medical notes) resulting in a mortality rate of 20% overall. Those lost to follow-up were similar to the sample overall in terms of alcohol consumption (AUDIT), cognitive impairment (6CIT), anxiety and depression (HADS).

Quantitative results

Due to the small sample size, statistical analysis was not powered to assess significant differences between baseline and follow-up scores. See Table 2 for the mean scores at baseline and follow-up and Table 3 for case analysis.

Table 2: Mean scores at baseline and follow-up

Measure (potential range)	Baseline (n=30) Mean(sd)	Follow-up (n=16) Mean(sd)
AUDIT (0-40) AUDIT-C (0-12)	17.1(10.6) 8.2(2.9)	12.3(8.5) 4.9(4.2)
6CIT (0-28)	8.4(6.0)	6.4(3.9)
HADS-A (0-21)	7.5(5.1)	5.4(5.1)
HADS-D (0-21)	7.5(3.8)	6.9(5.4)
De Jong Loneliness Scale (0-6) Emotional loneliness (0-3) Social loneliness (0-3)	3.5(1.8) 1.7(1.2) 1.8(1.0)	3.0(2.2) 1.3(1.1) 1.7(1.3)
Meaning in Life Questionnaire Presence (5-35) Searching (1-7)	 21.0(6.0) 2.7(2.1)	 21.7(7.6) 2.9(2.2)
Brief Situational Confidence Questionnaire (BSCQ) (0-100)	N/A	68.0(42.2)
Collective efficacy (Network Responsiveness) (1-5) Collective efficacy (Access to Collective Efficacy) (1-5)	N/A N/A	4.0(1.0) 2.8(0.9)
Social network composition	4(2.5)	N/A

Table 3: Case analysis at baseline and follow-up

Measure	Baseline (n=30) n(%)	Follow-up (n=16) n(%)
AUDIT		
Low risk (0-7)	6 (20%)	6 (37.5%)
Increasing risk (8-15)	12 (40%)	4 (25%)
High risk (16-19)	2 (6.7%)	2 (12.5%)
Possible dependence (20+)	10 (33.3%)	4 (25%)
Total with harmful alcohol use	24 (80%)	10 (62.5%)
6CIT		
No cognitive impairment (0-7)	14 (46.7%)	8 (50%)
Mild cognitive impairment (8-9)	4 (13.3%)	2 (12.5%)
Significant cognitive impairment (10+)	12 (40%)	6 (37.5%)
Total cognitive impairment	16 (53.3%)	8 (50%)
HADS-A		
Normal (0-7)	17 (56.7%)	12 (80%)
Elevated distress (8-10)	5 (16.7%)	1 (6.7%)
Abnormal distress (11-14)	4 (13.3%)	1 (6.7%)
Severe distress (15-21)	4 (13.3%)	1 (6.7%)
Total with anxiety	13 (43.3%)	3 (20%)
HADS-D		
Normal (0-7)	15 (50%)	8 (53.3%)
Elevated distress (8-10)	10 (33.3%)	2 (13.3%)
Abnormal distress (11-14)	3 (10%)	3 (20%)
Severe distress (15-21)	2 (6.7%)	2 (13.3%)
Total with depression	15 (50%)	8 (50%)

AUDIT and AUDIT-C scores indicated high-risk drinking (mean = 17.1 and 8.2, respectively), although, the majority were not screened as drinking at dependent levels (AUDIT score > 20). At follow-up, scores decreased (on average) by one ‘drinking risk’ level to 12.3 and 4.9. 50% participants showed some level of cognitive impairment.

Baseline HADS-A and HADS-D scores (mean = 7.5) were borderline, with 43.3% scoring as anxious and 50% with depressive symptoms. At follow-up, mean scores normalised, but 20% still showed levels of anxiety and 50% with ongoing depressive symptoms.

Overall loneliness scores at both baseline and follow-up indicate our sample were ‘moderately lonely’. Scores on the Meaning of Life Questionnaire remained relatively stable, showing a moderate presence of meaning (21.0 to 21.7) and a slight increase in searching for meaning (2.7 to 2.9). The BSCQ (measured at follow-up) mean score of 68.0 indicates a moderate level of confidence in resisting alcohol across different situations.

Scores for the collective efficacy scale can fall between 1 and 5 with higher scores indicating good perceived access to network support and perceived general network collective efficacy. The mean

scores for this sample (measured at follow-up) were 4.0 for network responsiveness and 2.8 for collective efficacy.

Participant social networks consisted of an average of 4 people (SD 2.5), with the majority of contacts being adult children.

Nutrition results

Overall, the dietary intake of nutrients among OLA participants was below the UK government's recommended reference nutrient intake (RNI), adjusted for age. Nutrient intake decreased at follow-up compared to baseline. At both baseline and follow-up, the median intakes (as a percentage of the RNI) for 4 out of 5 (80%) macronutrients were below the RNI (see Fig. 1 below).

Qualitative results

All participants who completed quantitative measures were approached for interview and 7 agreed. Table 4shows the characteristics of these participants.

Table 4: Characteristics of the subset of participants in the qualitative study:

Total n=7	N (%)
Age	
65-74	2 (28.6%)
74+	5 (71.4%)
Gender	
Male	3 (42.9)
Female	4 (57.1)
Marital status	
Married	2 (28.6%)
Not married	5 (71.4%)
Index of multiple deprivation	
Quintile 1 (most deprived)	2 (28.6%)
Quintile 2	1 (14.2%)
Quintile 3	0
Quintile 4	2 (28.6%)
Quintile 5 (least deprived)	2 (28.6%)

The personal situation and alcohol consumption of participants in the qualitative study varied. Several factors impacted the elicited data, such as cognitive impairment, possible feelings of shame and stigma, inconsistency in responses, and participant defensiveness when discussing this sensitive topic. Participants described links between social isolation, loneliness and drinking alcohol. All participants considered their drinking to be 'non-problematic.'

Social isolation and loneliness impact on problematic drinking behaviour

Participants' social contacts were limited with an average of around 4 people who were mostly siblings or adult children. 4 participants had one network member, and for one participant their only social contact was their cleaner. Some participants were unable to leave the house and had interactions only with those providing practical help, for example, with food shopping or meal preparation. The participants who were more mobile reported integration into the community and were socially active.

Housebound participants with limited social networks all described having more people in their lives previously, and often had no particular reasons for the change, or viewing it as part of aging:

Interviewer: "So there used to be a lot more people around?"

PT022: "Yes".

Interviewer: "What happened to your friends and family?"

PT022: "Well, it just disappeared over time. Got married or died. Whatever."

Interviewer: "How do you feel about that, the way that things have changed?"

PT022: "That's life."

Another participant felt his reduction in friends was due to his poor health:

PT013: "Before I had the cardiac arrest I used to talk and play cards with a couple of them (friends), but now they've… It's like they blank you, because you're not the same."

All participants rejected the idea that alcohol had any impact on their important relationships. For those who were socially isolated loneliness was common, with one participant describing this as a contributing factor to drinking alcohol:

Interviewer: "Do you ever feel lonely?"

PT026: "Yes."

Interviewer: "and how does that impact you?"

PT026: "Probably I drink too much."

Those who were housebound, or mostly housebound admitted to drinking alcohol all day long, with one exception, who stated he has not consumed alcohol for 2 years since a health-related event. However, the answers this participant provided in their 6-month follow-up questionnaire do not match this narrative.

Housebound participants did not have interests or enjoyable activities they were able to do at home, with most describing watching television, or doing nothing all day. Frustrations around mobility issues

contributed to feelings of unfulfillment:

Interviewer: “what do you normally do during the day?”

PT018: “Sit in my chair, because I can't walk.” (irritated tone)

The consequences of being housebound have been devastating for some, leading to a deep sense of despair:

PT013: “I just wish they'd never fetched me back after the cardiac arrest because if I knew then what I was going to know now - that I've got to live like this - you know. I've got a DNR against me now from the hospital anyway, where … they wouldn't resuscitate if something did happen… You know, it's demoralising, really.”

Those who were more mobile and socially active described themselves as not lonely and described different alcohol habits; One participant decided to stop drinking alcohol completely since the hospital admission when they were recruited to the study. Others described self-set rules around drinking alcohol only in the evenings or limiting themselves to one glass of wine with an evening meal. Although the sample was small, the impact of social isolation or cohesion on alcohol habits and mood were clearly described.

Issues accurately measuring alcohol use

Various factors impact the validity of the data collected in the interviews. Feelings of shame and stigmatization are common in people with AUD (6,7) and may impact on what people were prepared to say in both quantitative data collection and the interviews. In addition, participants living with cognitive impairment may be uncertain about aspects of their current situation. Often there was a discrepancy between the answers provided at the quantitative 6-month follow-up, and the qualitative interview conducted shortly afterwards. For example, one participant reported they drink alcohol 2–4 times a week in their 6-month questionnaire, but in the interview explained he has not consumed alcohol for 2 years since a significant health event.

One participant appeared defensive and agitated when asked about her social network, her daily activities and her alcohol consumption. This barrier was hard to break down, and it is difficult to know how truthful her answers were. This same participant claimed ‘never’ to need their first drink of the day in the morning but admitted in the interview they usually start drinking “early, nine or ten o'clock, because I've been up probably two or three hours” PT026.

Alcohol is not a problem

All participants stated that alcohol was not, and never has been, a problem for them. Only one participant expressed the desire to reduce her alcohol intake, attributing her drinking to back pain:

“I'd drink less brandy if I had more decent painkillers.” (PT026)

One participant describes drinking port from approximately 10am onwards everyday; he said he has drunk this way since his teenage years, although probably drinks less now due to age. When asked how alcohol makes him feel he said “tired”. When asked to describe his relationship with alcohol he said:

“I can take it or leave it. I've been in hospital for 15 weeks. I didn't miss it.” (PT022)

Alcohol habits of participant social networks

The people within the social networks of some participants drink alcohol, whereas others do not. One participant described being part of a culture where drinking alcohol was the norm throughout her lifetime:

“I was brought up in a very social atmosphere and it's just continued through my life.” PT016

The same participant describes herself as a ‘social drinker’ and those close to her consume alcohol in a similar way:

“I can't think of anybody we know that we mix with that doesn't particularly enjoy a drink.” PT016

However, some participants had members in their social circles who did not drink alcohol, and a couple of the participants appeared baffled by how little the younger generations in their family drink:

“It seems a lot of young people, they don't. They're ever such goody two shoes. They don't go out. They don't have fun like I used to when I was a teenager going dancing.” PT026

One participant was particularly closed off and said her friends “have wine” but was not willing to discuss their drinking habits further. For participants with limited social networks, it was hard to establish whether there ever had been a social aspect to the way they drink alcohol.

Discussion

Summary of findings

Our findings provide an initial insight into AUD, and alcohol consumption more broadly, in older adults. There was a notable mortality rate of 20% throughout the study period. This study highlights the challenges of recruiting and retaining participants within this population, offering valuable insights for future research. A key issue was the prevalence of cognitive impairment - both among those who took part and those deemed ineligible by clinical teams due to cognitive concerns. Our qualitative findings indicate; social isolation has an impact on alcohol consumption, self-report data in this group needs to be interpreted with caution, and that participants in this study did not feel their alcohol consumption was, or ever had been, a problem. Participant social networks consisted mostly of adult children who, according to the participants, either did not drink alcohol, or consumed very little. Overall, the participants’ nutritional status was poor in hospital and worsened once back home.

Reflection on recruitment and retention

It proved difficult to recruit to the study. Most older adults referred to the alcohol care team where too clinically unwell and cognitively impaired to be eligible. Of those who were, given the nature of acute hospital stays, there was a very brief window between patients being fit to take part and being discharged from hospital. Potential participants were given the study information to read, and adequate time to decide whether to take part (e.g. 24 hours) by which time they had been discharged, before the researchers were able to gain consent.

Reasons for declining to take part were not recorded, however, based on researcher fieldnotes and drawing on previous literature the following are likely to contribute; feelings of stigma in relation to alcohol use are well documented and are especially prominent in older adults [6], [7], [8]. Interactions with potential participants were approached sensitively, however, to provide informed consent it was necessary they were made aware the study was exploring the topic of alcohol, and that they were eligible for the study because their alcohol use had been assessed as increased or higher risk. Those fearful of judgment about their alcohol consumption may have shied away from engaging in activities that explore their drinking patterns. One individual (with capacity) agreed to take part, but her daughter who visited later that day, persuaded her to withdraw. In addition, individuals who did not want to change their drinking habits may have feared participating in an alcohol study would initiate input from alcohol-related services. As our results corroborate, cognitive impairment in older adults with AUD is common [39], impacting recruitment rates.

In addition to the recruitment difficulties, retention was impacted by a high dropout rate of 47%. Additionally, the mortality rate was considerable at 20%, further affecting follow-up. While it was not possible to determine the reasons for non-participation in follow-up among those who declined or were unreachable, insights into the role of shame within this population [40] offer a potential explanation. Some participants may have initially agreed to take part when speaking face-to-face with a clinician in a hospital setting, despite concerns about judgment, but later felt unable to provide follow-up data due to feelings of shame, particularly if they struggled to adhere to the advice given.

Comparison to previous literature

There is limited literature on the barriers to recruiting individuals with AUD into research; however, relevant insights can be drawn from studies on the recruitment of older adults. Our study's poor retention rates align with previous findings, which highlight that retention in older populations is often affected by illness, loss of interest, and mortality[41]. Additionally, prior research on recruitment barriers in older adults has identified that family members frequently discourage participation [41].

Our sample reported elevated levels of depression, corroborating the already established link between AUD and depressive disorder [42]. Co-occurrence is associated with greater severity and worse prognosis for both disorders [43], [44], [45].

Previous research has found connections between alcohol use and socialising among older adults, and that people often share the drinking habits of those closest to them [46], [47]. Our findings in this area were mixed, but the limited social networks of our sample may have influenced our results; While one participant described drinking in a sociable manner, and others reflected on past social drinking, the majority reported consuming alcohol alone, with their close circles drinking significantly less or abstaining altogether.

Although our participants reported 'good' access to network support overall, our qualitative findings indicated those who were more socially isolated tended to drink alcohol differently to those who were not. This aligns with previous research suggesting older adults drink alcohol to relieve depression, loneliness [48] and boredom [49].

Results from the nutrition analysis were compared against the Scientific Advisory Committee on Nutrition's report on community dwelling older adults [50]. Overall, older adults have a low dietary intake of nutrients, however, the OLA participants' dietary intake of nutrients was notably lower, emphasising the complex intersection between alcohol, anorexia of ageing, poor health and nutritional status.

Limitations

The small sample size means the quantitative data needs to be viewed with caution, with limited generalisability of our findings to the wider population; participants were recruited from one hospital, lived in one geographical location within the UK, with a less ethnically diverse population. Nonetheless, participants in the study were from areas of highest to the lowest deprivation, as indicated by the index of multiple deprivation. As a small preliminary study, the insight provided by both the data and the study processes are invaluable in terms of generation of new knowledge to guide future research in this important area.

The BSCQ was poorly understood by participants, raising concerns about the validity of the results. This questionnaire assessed participants' confidence in resisting alcohol in various situations. However, many found the questions irrelevant, as they had no desire to refrain from drinking, making confidence a non-factor.

Our results report a mean BMI for the sample; however, only two participants had their weight measured on admission, with calculations relying on patient-reported data, affecting accuracy. For other participants, BMI was derived from weight and height measurements in hospital notes, which may have been outdated due to weight fluctuations. Additionally, nutritional status was assessed using the TLFB self-report measure, making its accuracy uncertain, particularly given the high levels of cognitive impairment in our sample.

Implications for future research

Future research should carefully consider recruitment strategies to address resistance driven by stigma, as well as the challenges that health problems requiring hospital admission in older adults entail.

Additionally, efforts to improve retention rates are essential. Given the limitations of our small sample, broader studies on alcohol use in older adults at the population level would help inform future alcohol-reduction interventions. To enhance data reliability, incorporating objective health assessments alongside self-reported measures is recommended. Exploring existing interventions that integrate both social and health-related aspects of AUD in older adults would be a valuable next step. By addressing the challenges identified in this study, future research can help develop more effective support pathways for this high-risk population.

Conclusion

This study provides valuable preliminary insights into AUD in older adults, highlighting key challenges in recruitment, retention, and data reliability. Our findings suggest that while participants reported good access to personal network support, social isolation played a critical role in shaping drinking behaviours. Additionally, the poor nutritional status observed within our sample highlights the complex intersection of alcohol use, ageing, and health outcomes, warranting further investigation.

The high mortality rate observed emphasises the vulnerability of this population and underscores the need for tailored support and interventions, which are integrated into mainstream services. Barriers relating to shame and stigma must be carefully addressed in future studies to ensure robust and representative findings.

Declarations

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Clinical trial number

Not applicable.

Availability of Data and Materials

The datasets generated and analysed during the current study are not publicly available due to the sensitive nature of the data and the need to protect participant confidentiality. In line with the conditions

of ethical approval, anonymised data may be made available from the corresponding author upon reasonable request.

Consent for publication

Not Applicable

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Figures

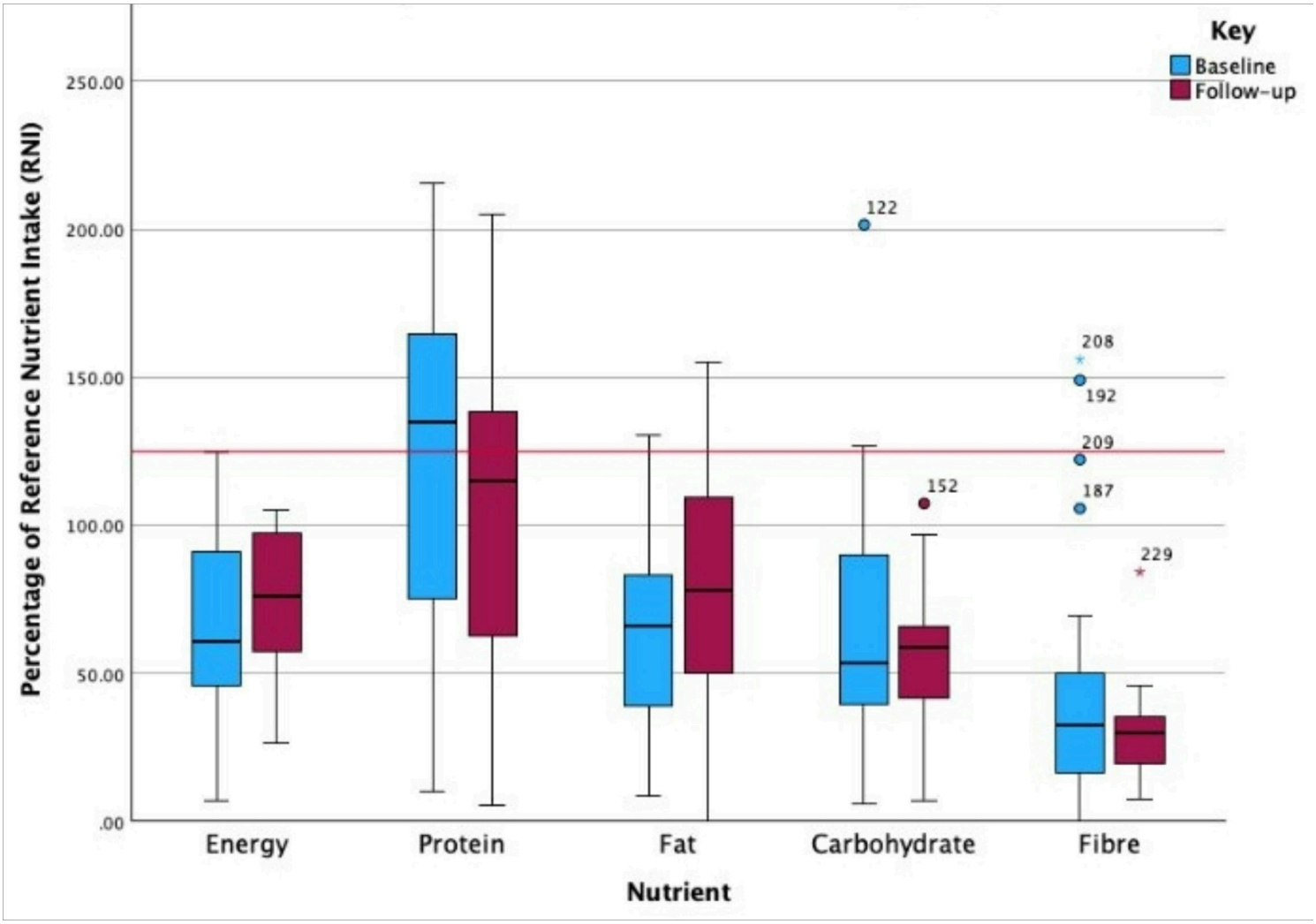

Figure 1

Clustered Boxplot to show the nutrient intake of participants at baseline and follow-up