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Letter to the Editor

Authors' response to Atee et al.

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We thank you for the opportunity to respond to the comments raised in Atee et al.'s letter to the editor [1] and thank Mr Atee and his colleagues for their interest in our paper [2].

1) Mr Atee et al. are concerned about the confounding effect of prescribed psychotropic medications on sleep outcomes. In our paper, we had shown that participants' medication usage, as measured by the Medication Quantification Scale-III (MQS-III), at baseline was similar in both the intervention and control groups (Table 1). While we acknowledge that medication can have an impact on both groups, in this instance, we believe that medication use had minimal impacts on the study outcomes. However, future larger-scale studies should be mindful of this potential issue and, if necessary, appropriately adjust for its effect
during data analysis.

2) Mr Atee et al. raise concerns about the use of proxy pain assessments for the total sample, including those who might have had the ability to verbalize their pain experience, and about not using a validated pain assessment tool in the study. In this study, proxy assessments of pain (e.g., pain frequency, onset, intensity, locations, and nonpharmacological therapies) were collected through structured interviews with the nursing staff who had regular contact with the resident. This approach is considered to be an appropriate method to collect pain-related information for people with dementia [2]. We do agree that self-reports should where possible be obtained from all participants, especially those with mild cognitive impairment [3]. However, most participants in this study had severe cognitive impairment, with an average MMSE score of 9.93 (±8.05), and data collection/analysis of the self-reported pain before and after each intervention session was not achievable. Moreover, there were also fluctuations in individuals' ability to describe their pain level, even for those with mild cognitive impairment, and this resulted in a large amount of missing data in self-reported
pain. Therefore, a decision was made to use the observational pain measurement - Pain Assessment in Advanced Dementia Scale (PAINAD), a valid observational pain assessment

tool for people with advanced dementia [4] – as the primary measurement of pain for all participants, and this allowed the total sample data to be included in the data analysis, which was reported as the primary outcome in our previously published paper [5].

3) Mr Atee et al. question the definition of chronic pain used. We agree that the decision concerning whether or not someone with advanced dementia was in chronic pain could be contested. However, this is because the self-reporting of pain, which is the gold standard for pain assessment, is compromised in this group. In this study, residents with chronic pain were identified if they were prescribed regular pain medications or if there was an indication of pain from the staff, as surrogate measures of pain. We believe that these methods are reasonable in people with dementia who are considered to be experiencing chronic pain.

Furthermore, all participants in this study had experienced chronic pain (> 3 months) and had at least one pain-related condition (osteoarthritis, fracture/fall, low back pain and stroke, etc.). As the objective of this study was focused on the secondary outcomes of sleep and motor activity, pain-related information was reported in the previously published paper [5].

In summary, our results provide preliminary support for the hypothesis that the PARO intervention could potentially improve sleep for long-term care residents with dementia and chronic pain. We acknowledge that the assessment of pain is challenging in people with dementia, and we are undertaking further work to understand the effect of social robot interventions and using technologies to help pain assessment in this group.

Conflict of interest

The authors declare that they have no conflict of interest in relation to this letter.

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Table 1
Demographics and medical conditions of participants with SenseWear data

Variables	Control group (n = 20)	Intervention group (n = 21)	*p* value
Age*	85.50±6.02 86.5 (72, 93)	86.48±8.81 90 (65, 97)	0.234†
Gender			
Female	11 (55.0%)	18 (85.7%)	0.033‡
Male	9 (45.0%)	3 (14.3%)	
Dementia subtypes			0.766§
Alzheimer's disease	7 (35.0%)	9 (42.9%)	
Vascular dementia	3 (15.0%)	2 (9.5%)	
Frontal-temporal dementia	1 (5.0%)	0 (0.0%)	
Dementia unspecified	9 (45.0%)	10 (47.6%)	
Living unit			0.354‡
Secure dementia unit	9 (45.0%)	13 (61.9%)	
Facility unit	11 (55.0%)	8 (38.1%)	
Facility room-type			1.000§
Single room	18 (90.0%)	18 (85.7%)	
Shared room	2 (10.0%)	3 (14.3%)	
Activity level			0.280§
Ambulatory	1 (5.0%)	4 (19.0%)	
Assistive devices	11 (55.0%)	6 (28.6%)	
Wheelchair	3 (15.0%)	3 (14.3%)	
Bedridden	5 (25.0%)	8 (38.1%)	
Walking exercise, yes	10 (50.0%)	15 (71.4%)	0.160‡
Admission month*	33.2±29.32 25 (3, 100)	24.8±23.68 16 (3, 99)	0.449†
MMSE*	11.55±8.06 (0, 23)	7.71±7.84 (0, 24)	0.114†
MMSE <11	9 (45.0%)	15 (71.4%)	0.086†
BMI*	25.10±7.04 (16.4, 49.6)	22.12±4.93 (11.83, 35.8)	0.134†
The intensity of pain			0.486§
No pain	1 (5.0%)	7 (33.3%)	
Mild	8(40.0%)	6 (28.6%)	
Moderate	11 (55.0%)	7 (33.3%)	
Severe	0 (0.0%)	1 (4.8%)	

Variables	Control group (n = 20)	Intervention group (n = 21)	*p* value
Nurse-estimated pain score*	3.05±2.09 3 (0, 8)	3.24±2.49 3 (0, 9)	0.915†
MQS score for medication*	14.54±8.59 13.5 (2.2, 36.9)	14.56±7.86 12.4 (3.8, 33.7)	0.896†

Note. * values presented as Mean ± *SD*/median (range), Bold values are statistically significant ($p < .05$).
Abbreviations: SD, Standard Deviation; MMSE, Mini-Mental State Examination; BMI, Body Mass Index; MQS, Medication quantification scale-III.

† value was calculated with Mann-Whitney *U* test

‡ value was calculated by Chi-square test

§ value was calculated by Fisher's exact test

‖ value was calculated with independent *t*-test