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## Establishing the measurement properties of the Residential Environment Impact Scale (Version 4.0)

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### ABSTRACT

**Background:** Developed as an environment assessment informed by the Model of Human Occupation, the Residential Environment Impact Survey considered the physical, social and activity features of the environment, evaluating the impact of the environment on resident's quality of life. Clinicians reported that the Residential Environment Impact Survey was a useful tool; however, it had not been structured to be a measurement tool and did not have established psychometric properties.

**Aims/objectives:** This study examines the psychometric properties of the restructured Residential Environment Impact Scale Version 4.0 (REIS), which measures the level of environment support provided to residents.

**Material and methods:** The REIS was completed across residential sites for people with complex mental health needs. A many facets Rasch analysis was conducted to establish the reliability and validity of the REIS.

**Results:** The REIS demonstrated reasonable psychometric properties, with items demonstrating internal scale validity and scale items following an expected pattern of increasingly challenging environment support.

**Conclusions and significance:** Initial evidence suggests that the REIS provides a valid and reliable measure of environment support, providing a detailed assessment of how physical, social and activity elements of the environment support or inhibit participation and can be applied across a range of living environments.

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## Introduction

Understanding the features of living environments and how these support people with a variety of health conditions to participate in routine daily living activities, roles and interests is important in occupational therapy practice [1,2]. Where people live, who they live with and how they are supported are important in enabling participation within the home environment and enabling access to the wider community to support the individual's goals [3]. Barriers to participation can be created by elements of the built environment [4,5] and the relationships people have with their families, co-habitants or staff who support them [6–8]. It is possible to change environments to enable people to engage in routine daily living activities and

there has been increasing research focussed on the design or adaptation of living environments [9,10]. Furthermore there is increased evidence of the benefits of non-institutional living environments in ensuring people with a range of complex health conditions have increased opportunities to participate in daily living activities [11,12]. Assessing the multiple, complex and interdependent features of residential environments that impact on participation is therefore important but difficult [13,14]. Conceptualization of the environment and its impact on people's participation is therefore important when assessing people's living environments.

The International Classification of Functioning, Disability and Health [15] is a classification of health and health related domains, considering the

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Shona Henderson has now retired.

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experience of disability holistically by acknowledging people live and function within a physical, social and attitudinal environment. The ICF identifies environmental factors as being either in the immediate environment (products and technology) or distant environments (social services and policy) and ascertains how these can act as barriers or facilitators to a person's functioning. Due to its universal applicability, it has been suggested that it lacks the ability to accurately capture or conceptualize the dynamic nature of the experience of the environment, the person with a disability and the effect this has on their participation in life [16].

The Canadian Model of Occupational Performance and Engagement (CMOP-E) [17] primary focus is on how the interaction of the person, environment and occupation results in occupational performance and engagement. In the CMOP-E, environment is defined as the surroundings or conditions in which a person lives or operates and consists of four different aspects; physical, social, cultural and institutional. The environment is only considered in so far as it impacts on occupational performance or occupational engagement.

Using a systems perspective, the Person-Environment-Occupation-Performance Model (PEOP) [18] recognizes there is a dynamic interaction between the person, environment and occupational elements which is reciprocal and supports occupational performance, participation and wellbeing. The PEOP model identifies environmental factors as including cultural factors, social determinants of health, social support and social capital, education and policies, physical and natural environments and assistive technology. The environment can therefore create barriers or enable occupational performance.

The Model of Human Occupation (MOHO) [19] is also informed by a systems perspective and addresses concepts in relation to human occupation focussed on the motivation for occupation, the routine patterning of occupational performance, the nature of skilled performance and the influence of environment on occupation. MOHO defines the environment as the particular physical, social, occupational, economic, political and cultural components within a person's context that influence the motivation, organization and performance of occupation [20]. There are several dimensions of the environment that may have an impact on an individual's occupational life, including the different spaces, objects, people and expectations and opportunities for doing things that individuals encounter [21–26]. In MOHO, the environment can

therefore provide resources, opportunities, demands or constraints for an individual [20,27].

The assessment of living environments forms an essential part of occupational therapy practice and identifying the combined impact of environmental features on individual's participation within in and outside the home environment is important.

### **Residential Environment Impact Survey**

The Residential Environment Impact Survey [28] was originally developed in 2002. Items were developed based on a literature review looking at quality of life for adults with intellectual disabilities. Its purpose was to evaluate the impact of the residential environment on residents' quality of life and guide occupational therapists in making recommendations to increase environmental support for residents. It was a non-standardized, semi structured assessment and consulting tool designed to assess community residential facilities for people with learning disabilities. Version 2.0 [29] had a total of 24 items, assessing four areas: spaces, objects, tasks/activities and social groups/environments. A short form version was developed in the UK in 2011 [30], which adapted the Residential Environment Impact Survey v 2.0 for occupational therapists to use when conducting home assessments with individuals. The Residential Environment Impact Survey-Short Form had a reduced number of items, 17 in total, which were organized around 4 subheadings: physical space, resources, social support, opportunities. A further iteration of the Residential Environment Impact Survey v 3.0 was created in 2013 [31], with 21 items organized around five subheadings: space, objects and equipment, support for occupational participation, social environment and opportunities for self-determination. It also improved elements of data collection to support its usability for clinicians following Fisher and Kayhan's evaluation of the Residential Environment Impact Survey v 2.0 and the Residential Environment Impact Survey-Short Form [32]. A Swedish translation of Version 3 was created in 2013 [33], which retained the same number of items as the original Residential Environment Impact Survey v 3.0.

Research and evaluation of the tool with a group of international occupational therapists identified that the Residential Environment Impact Survey 2.0 and Residential Environment Impact Survey-Short Form were useful in identifying areas for improvement in residential environments and other settings, including nursing facilities, private homes, residential substance misuse centre, forensic units and hospitals and had clinical

**Table 1.** REIS items. Decision-making about the structure of activities, participation in decision-making when desired/able of the structure of routines (incl. rules, policies)

Item	Description	Expanded description
1	Accessibility of space	Barrier free, hazards, safety/risk, ease of access, indoors/outdoors
2	Adequacy of space	Availability, tailored to needs, space availability matches personal routines
3	Homelike qualities (space)	Personalization of space, indoors/outdoors, walls. Floors. ambience, culturally appropriate, décor
4	Sensory space	Odours, temperature, noise, tactile, warm lighting, private/shared space
5	Visual supports	Visual cues, visual signage, prompts, navigation
6	Availability of objects	Ease of access, personal storage, not having objects create risks. Objects locked away
7	Adequacy of objects	Right objects for needs, fit to interests/needs, fit to culture/meaning, matched to capabilities
8	Homelike qualities (objects)	Personalization, culturally appropriate, comfortable furniture
9	Physical attributes of objects	Weight, size, pliability, texture
10	Variety of objects	Range of objects, Self-care, productivity & leisure objects, beyond basic objects
11	Availability of people	Inside/outside setting, peers, health worker, worker, family, friends, anticipation/responsiveness
12	Enabling respect	Empathy, collaboration, understanding, respecting interests
13	Support and facilitation	Moving and handling, supervision/touching, creating opportunities for doing, cognitive cues
14	Provision of information	Materials, factual information, notice boards/ posters, regular meetings, info on community resources
15	Empowerment	Support for autonomy, self-expression, opportunity for choices, expressing needs and desires
16	Activity demands	Too easy, enjoyment, satisfaction, well matched to ability
17	Time demands	Unoccupied time, pressured, deadlines, pace, rushing
18	Appeal of activities	Status, value, attraction, interest
19	Routines	Flexibility responsiveness, frequency/balance of activity offered, variety offered
20	Decision-making	

relevance. This evaluation also highlighted that the tool would benefit from further development, particularly structuring and validating it as a measurement tool [32].

### Development of the Residential Environment Impact Scale 4.0

Working with the original authors, the Residential Environment Impact Scale Version 4.0 (REIS) [34] was developed. Item definitions were refined using key concepts related to environmental support, that is, the combined influence of space, objects, social groups and expectations and opportunities to do things on participation in daily living and desired activities. Table 1 details the 20 items. The 20 items delineate a single construct measuring the support the environment provides. Items are rated by an occupational therapist on a four point ordinal rating scale which indicates whether the environment strongly supports (4); supports (3), interferes (2) or strongly interferes (1) with people's sense of identity and competence by providing opportunities, resources, demands and constraints to engage in meaningful culturally appropriate activities. Data are gathered using a range of observations and interaction with residents and staff incorporating a walk-through of the home/facility; an observation of residents engaged in activities; a group interview with residents (or one person if it is a single home) and an interview with staff.

### Rationale

This study tests the reliability and validity of the REIS through the use of a many facets Rasch model. The

REIS has been developed with the intention that the 20 items delineate a single construct measuring environmental support by identifying the fit between a person and their residential environment. This was investigated by determining whether and how the REIS items corresponded to a continuum representing the scope of environmental support, that is, how they formed a single construct, conceptualized as unidimensionality. The study aimed to answer the following research questions

- I. Do the REIS items demonstrate evidence of internal scale validity, that is, form a valid unidimensional measure of the construct of environmental support?
- II. Does the hierarchical ordering of the REIS items support validity of the scale by following an expected pattern of increasingly challenging environmental supports along a continuum?
- III. Does the four-function point response scale function adequately and does it demonstrate acceptable rater severity values?

### Method

#### Participants

Convenience sampling [35] was used to select participants with a diagnosed mental illness who were being supported in a range of residential sites differing in terms of living arrangement (group or individual), level of staffing provided, type of support received and intervention focus [36], across a large city and adjacent localities served by a Scottish Health Board.

**Table 2.** Description of residential sites.

Shared accommodation	Several people living in a house where there are staff present on site to provide support. Support staff can be available up to 24 h day.
Core and cluster	People live in their own flat in a grouping of accommodation where there will be other people with similar needs. There is a staff base at the same site and a group of staff provide support to residents in the 'cluster'.
Individual tenancies	People who live on their own and have support staff visiting at agreed times throughout the week.
Hospital wards	People who are currently in an inpatient unit in a psychiatric hospital receiving support from a multidisciplinary team; there are staff available on a 24 h basis.

Residential sites included shared accommodation, core and cluster, individual tenancies and hospital wards. Further details regarding the level of support and type of accommodation across the residential sites is detailed in Table 2.

### Demographic data

Data were gathered for 193 residents with complex mental health needs across the residential sites. Sixty seven percent of residents were male, with the age of residents ranging from 17 to 75 years, with a mean age of 45 (SD = 13.9) years. The ICD-10 classification system was used to record residents' diagnoses. A total of 208 diagnoses were recorded as some residents had multiple diagnoses. The most frequently recorded diagnoses were in the schizophrenia, schizotypal and delusional disorders category (69%), followed by the mood (affective) disorders category (9%). The mean level of staff experience was 7.83 years (SD = 4.4).

### Residential sites

A total of 34 residential sites were assessed. These consisted of 18 shared accommodations, 4 core and cluster, 7 individual tenancies and 5 hospital wards.

### Ethical considerations

Ethical approval was gained from the local authorities involved in the study and NHS Board Quality Improvement Team was informed that the REIS study would be carried out under the Wayfinder Quality Improvement Team protocol. Information about the study was provided to managers at each site prior to researchers attending to complete the REIS. Consent was gained from all residents and staff who participated.

### Procedure

Two researchers (occupational therapists) used the REIS to gather data utilizing a range of methods: a walk-through of the home/residence; an observation of residents engaged in activities; a group interview with residents (or one person if it was a single home) and an interview with support staff. The researchers both completed REIS assessments in three sites together, however, rated the site separately which served as interrater data. In addition, a report including the REIS ratings and the observed strengths, challenges and areas for improvement was provided to each site to support reflection on how to improve their environment.

### Theory/calculation

#### Statistical analysis

To test the assumption that the REIS scale measures a single, unidimensional construct of environment support we fitted a many facets Rasch model. This specifies item response probabilities as a function of multiple facets, indicating how accurately or predictably data fit the model [37]. The facets were *residential site*, *item* and *rater*. A sample size of >30 provides 95% confidence in item calibrations within  $\pm 1$  logit [38]. For the analysis, the model was estimated using joint maximum likelihood estimation (JMLE) using the FACET programme in Winsteps (version 3.61.1) [39].

#### Scale evaluation

**Item fit.** Rasch analysis generates fit statistics which indicate how well each item fits the underlying construct or latent trait. Misfit of items indicates there is a variance in fit between observed and model predicted response patterns in the data [40]. Individual item misfit was examined using infit and outfit Mean-square (MnSq) statistics and associated standardized fit z-scores (zStd). Mean-square statistics indicate how much misfit there is and z-scores indicate how likely the misfit is. Examining both infit and outfit statistics in conjunction is useful because they are affected in different ways by any discrepancy in responses. MnSq values of 1.0 indicate ideal fit for an item. MnSq values between 0.5 and 1.5 are considered productive for measurement [41] with MnSq values greater than 1.5 with zStd > 2.0 judged as indicating misfitting elements. Problems with outfit statistics are less of a threat to measurement than infit, with high infit statistics indicating that the item does not measure the same construct as the other items [42]. Location of

items on the scale is important for content validity assessment, with order of items reviewed to establish if items follow expected patterns, denoting construct validity.

**Separation and reliability.** Separation and reliability were calculated for items and residential sites. Separation indexes can be used to evaluate how well elements within a facet can be discriminated from one another providing the different levels of item or residential site difficulty in the data. The separation index also indicates the number of distinct strata the sample can be divided into. Reliability indicates how reproducible the residential site and item measure orders are if the items were administered to another sample or tested on another occasion. A high item and residential site separation index is desirable and is denoted by a separation index  $>2$  and reliability of  $>0.80$ .

**Response scale evaluation.** A combination of rating scale diagnostics are used to establish scale validity. We assessed the functioning of the proposed four-point rating scale of the REIS using the criteria set out by Linacre [43,44]. Firstly, to establish item thresholds, we examined the distribution of responses across categories and the extent to which they represented a departure from a uniform distribution. Secondly, we checked that the mean logit measure increased as the response category increased, meaning that the scale accurately measures the increased rating in relation to environment support. Fit statistics were also examined, with outfit mean squares  $>2$  indicating that the response category is not fulfilling its

purpose. Finally, we checked that the category thresholds were correctly ordered, by reviewing if there was an increase between thresholds of  $\geq 1.4$  logits to  $\leq 5$  logits, to confirm there is an observed distinction between categories.

**Rater evaluation.** We examined rater leniency and fit statistics to evaluate whether the two raters were using the scale in a consistent manner. Large differences in leniency could suggest that the scale leaves open the possibility for substantial variability in ratings of levels of environment support dependent on who is doing the rating. Over-fit could indicate patterns of responses that were too consistent e.g. a response set. Under-fit could indicate patterns of responses that were too haphazard e.g. a lack of care or attention. A low separation index is desirable for raters.

**Residential site evaluation.** The residential site fit statistics were examined to identify any which were not adequately measured by the scale. Misfitting residential sites could indicate a lack of independence among residential sites. A high separation index is desirable for residential sites.

## Results

### Rating scale evaluation

Item difficulty estimates are presented in Table 3. The hardest items, that is the items less likely to be rated higher, were 19 'routines', 17 'time demands' and 16 'activity demands'. The easiest items, that is the items that are more likely to be rated higher, were 12

**Table 3.** Item measurement report.

Item	Description	Measure (SE)	Infit MnSq	zStd	Outfit MnSq	zStd
19	Routines	1.01 (0.26)	1.31	1.3	1.28	1.1
3	Homelike qualities (space)	0.88 (0.26)	1.48	1.9	1.52	2.0
17	Time demands	0.74 (0.26)	0.65	-1.7	0.63	-1.8
16	Activity demands	0.55 (0.26)	0.62	-1.9	0.62	-1.9
1	Accessibility of space	0.48 (0.26)	1.22	1.0	1.45	1.8
4	Sensory space	0.28 (0.26)	0.97	0	0.97	0
20	Decision-making	0.28 (0.26)	0.78	-1.0	0.72	-1.3
2	Adequacy of space	0.22 (0.26)	0.92	-0.3	0.96	-0.1
6	Availability of objects	0.22 (0.26)	0.82	-0.8	0.84	-0.6
8	Homelike qualities (objects)	0.22 (0.26)	0.99	0	0.93	-0.2
5	Visual supports	0.15 (0.26)	1.01	0.1	0.93	-0.2
7	Adequacy of objects	0.15 (0.26)	1.21	0.9	1.19	0.8
18	Appeal of activities	0.09 (0.26)	0.59	-2.2	0.57	-2.2
10	Variety of objects	0.02 (0.26)	0.69	-1.5	0.68	-1.5
14	Provision of information	-0.18 (0.26)	1.33	1.4	1.42	1.7
11	Availability of people	-0.39 (0.26)	0.72	-1.3	0.72	-1.2
13	Support and facilitation	-0.39 (0.26)	1.34	1.4	1.33	1.3
15	Empowerment	-0.53 (0.27)	0.94	-0.1	0.95	-0.1
9	Physical attributes of objects	-1.23 (0.29)	1.14	0.6	1.46	1.4
12	Enabling respect	-2.57 (0.40)	1.12	0.4	1.14	0.4

Notes: Items in order of difficulty (most difficult at top). SE: standard error. MnSq: mean square fit statistics; ZStd: Z-score standardized fit statistics. MnSq ideal is 1; Infit MnSq  $> 1.5$  with ZStd  $> 2$  indicates misfit.

‘enabling respect’, 9 ‘physical attributes of objects’, 15 ‘empowerment’ and 13 ‘support and facilitation’. No items were misfitting, confirming that the REIS provides a unidimensional measure of environment support. The separation index for the items was 2.77 (reliability = 0.88), which implies that separation into four strata is possible.

### Response scale

Response scale statistics are provided in Table 4. Item thresholds were correctly ordered, average measures increased with response category and outfit statistics were <2, supporting the validity of the response scale. There was, however, comparatively little use of the ‘Environment Strongly Interferes’ response category.

### Rater effects

Infit and outfit statistics associated with both raters were close to 1 suggesting adequate fit. The measures for the two raters were 0.32 (SE = 0.08) and -0.32 (SE = 0.08). Therefore, the confidence intervals for the rater measures did not overlap, suggesting that the two raters differed in their leniency. This was corroborated by the large standard deviation of rater measures (0.45) and separation index of 5.31 with reliability of 0.97.

### Residential sites

Residential site statistics are provided in Table 5. The mean residential site measure was 1.42 compared with a mean item measure of 0. Residential site fit statistics identified one residential site that was misfitting with MnSq 2.31, Zstd 8.97, otherwise all other residential sites showed good fit. The separation index for residential sites was 3.25 (reliability = 0.91), which implies that separation into three strata is possible. In the present study, the precision was low for many of the residential site measures as indicated by the large standard errors (up to 0.54).

## Discussion

Understanding how environments support people’s participation is an important part of occupational

therapy practice [13]. This study presents analysis of the REIS, a measure of environment support for individual’s participation in a range of living environments in one city in the UK. The findings show that the REIS tool showed reasonable psychometric properties, with items demonstrating internal scale validity by forming a valid unidimensional measure of the construct of environment support, scale items followed an expected pattern of increasingly challenging environment support and an adequately functioning response scale.

All items fit the construct of environment support, demonstrating acceptable measurement properties. Item difficulty hierarchies were found to be consistent with clinical expectations, being comparable to the

**Table 5.** Residential site report.

Residential site	Measure (SE)	Infit MnSq	zStd	Outfit MnSq	zStd
2	3.47 (0.54)	1.38	0.3	1.10	0.3
1	3.20 (0.49)	0.96	0.1	0.98	0.1
2	3.07 (0.40)	1.05	0.2	1.09	0.3
2	2.98 (0.46)	1.28	0.8	1.08	0.3
2	2.92 (0.38)	1.44	1.3	1.99	2.1
1	2.78 (0.37)	0.71	-1.0	0.78	-0.5
2	2.78 (0.37)	0.58	-1.5	0.59	-1.2
2	2.78 (0.37)	1.02	0.1	1.04	0.2
1	2.78 (0.37)	0.83	-0.5	0.77	-0.5
1	2.44 (0.40)	0.76	-0.7	0.76	-0.5
2	2.14 (0.37)	1.13	0.5	1.04	0.2
1	2.03 (0.34)	0.78	-0.7	1.04	0.2
3	1.84 (0.24)	0.86	-0.7	0.96	-0.1
1	1.69 (0.33)	0.76	-0.8	0.92	-0.1
1	1.58 (0.33)	1.42	1.4	1.45	1.4
3	1.58 (0.33)	0.72	-1.0	0.85	-0.4
3	1.39 (0.34)	1.59	1.9	1.53	1.6
3	1.35 (0.33)	<b>2.31</b>	<b>3.5</b>	<b>2.26</b>	<b>3.3</b>
1	1.24 (0.34)	0.97	0	1.08	0.3
1	1.17 (0.34)	1.54	1.8	1.69	2.0
1	1.17 (0.34)	0.99	0	0.94	-0.1
1	1.06 (0.33)	0.67	-1.2	0.66	-1.2
1	0.78 (0.34)	0.39	-2.6	0.39	-2.5
1	0.63 (0.24)	0.57	-2.3	0.56	-2.4
1	0.52 (0.24)	1.10	0.5	1.10	0.5
4	0.50 (0.34)	1.01	0.1	0.98	0
4	0.41 (0.36)	0.79	-0.6	0.82	-0.4
4	0.38 (0.34)	1.21	0.7	1.20	0.7
1	0.15 (0.34)	0.79	-0.6	0.79	-0.6
4	-0.09 (0.35)	0.90	-0.2	0.91	-0.2
1	-0.22 (0.36)	0.61	-1.3	0.61	-1.1
4	-0.48 (0.36)	1.46	1.3	1.44	1.2
1	-0.54 (0.38)	0.69	-0.9	0.71	-0.8
1	-1.17 (0.38)	0.82	-0.4	0.79	-0.5

Notes: Residential sites in order of level of environment support (highest level of environment support at top). Property/residential site 1 = shared accommodation; 2 = individual tenancy; 3 = core and cluster; 4 = hospital ward. SE: standard error. MnSq: Mean Square Fit Statistics; Zstd: Z-score standardized fit statistics. MnSq ideal is 1; Infit MnSq > 1.5 with Zstd > 2 indicates misfit.

**Table 4.** Rating scale category statistics.

Rating scale category	Observed counts	Average measure	Expected measure	Outfit MnSq	Step calibration (SE)
1 = Environment strongly interferes	16 (2%)	-0.60	-0.42	0.9	
2 = Environment interferes	205 (28%)	0.29	0.35	1	-2.60 (0.26)
3 = Environment supports	289 (39%)	1.42	1.31	1	0.47 (0.10)
4 = Environment strongly supports	230 (31%)	2.48	2.55	1	2.13 (0.10)

item hierarchy identified for the Work Environmental Impact Scale (WEIS) by Ekbladh et al. [45], providing further evidence of validity. Both assessments found that time demands, activity demands and routines were the hardest items, and these are areas that people with complex mental health needs in a variety of residential settings can have difficulties with, particularly structuring time and initiating and participating in activity [46–48]. Reliability and separation statistics confirmed that the REIS was able to distinguish between residential sites and differentiated four strata or levels of environment support. The response scale was valid; however, there was limited use of the ‘Environment Strongly Interferes’ response category. It is not unusual to see this type of distribution of category use in real world data [40] and as there were >10 responses in this category further review of this category was not indicated [44]. Exploration of the use of this category in future studies could assist in identifying if this remains the case in larger samples to establish if this category remains applicable to the majority of residential sites.

Only one residential site was misfitting, a core and cluster residence. This type of residence can provide a level of staff support similar to shared accommodation, which could explain the misfitting of this site. Other studies highlight the heterogeneity in different types of residences linked to who provides support (formal vs informal) [49–51], differences in relationships with support staff, type and frequency of contact with staff, personal choice and autonomy [52,53] and routines and decision-making about type and frequency of activities [54,55]. The separation statistics showed that separation of residential sites into three strata is possible. The study incorporated a range of residential sites, with 68% of these being congregate residences i.e. shared accommodation and wards. The similarities in living arrangements and onsite staff support provided in shared accommodation and on wards could create comparable levels of environment support. People residing in these type of residences will usually have greater rehabilitation needs compared to people living in individual tenancies or core and cluster residences who have increasing levels of independence [56]. The results are consistent with having sampled residential sites that are not representative of the population, and future studies will need to consider sampling approaches to further explore this.

The two raters used the REIS in a valid manner, with no misfit identified. Difference in rater severity was indicated between the raters by the high

separation index. The inclusion of more raters in future research would assist in establishing if there is similar variability in rating of level of environment support and if this requires further exploration.

## Limitations

The study was conducted across a range of residential sites for people with complex mental health needs in one city in the UK. This has enabled initial confirmation of the validity and utility of the REIS in identifying how residential environments support participation. Convenience sampling was used to support completion of the study; however, this can introduce selection bias. In future studies it would be useful to select residential sites using a more targeted sampling approach, considering both features of the residential sites (living arrangement, level of staffing provided, type of support received and intervention focus [36]) and contextualized with regards to local and national policy contexts, geographical differences (urban vs rural communities) and funding contexts to inform the sampling process [26,57,58].

## Future research recommendations

The REIS is being used successfully internationally to guide interventions within living environments that improve resident’s participation and quality of life [59,60]. Further research in different countries, with larger samples of participants who have a range of health conditions and occupational therapists with differing levels of clinical experience is required to support further confirmation of the REIS’ utility and cross-cultural validity [32,33]. Additional research considering the impact of environment support and the resident’s experience of the living environment on their participation could also inform understanding about the features of the environment that are supportive to residents.

## Conclusion

This study demonstrates that the REIS provides a valid measure of environment support. It adds to existing MOHO assessment tools by enabling a detailed understanding of the features of the environment that can support or interfere in people’s participation and can be applied in practice across a range of living environments.



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## Data availability statement

Due to the nature of the research, participants of this study did not agree for their data to be shared publicly, so supporting data are not available.

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