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Measuring the therapeutic properties of nursing home environments in the Italian context: findings from a validation and cross-sectional study design

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Abstract

Background. *The social and the physical features of the nursing home (NH) environment can offer a therapeutic support capable of maximising residents' physical and cognitive functions. A total of 23 instruments evaluating the therapeutic properties of a NH has been documented to date; among them, the most recent and widely used is the Therapeutic Environment Screening Survey for Nursing Homes (TESS-NH) composed of 13 domains and 84 items: higher scores in each domain indicate a higher presence of therapeutic principles. Validating the Italian version of TESS-NH tool and describing the therapeutic properties of Italian NH environments were the aims of this study.*

Study design. *A validation and a cross-sectional study design, undertaken in 2017.*

Methods. *After having ensured the cross-cultural and the conceptual equivalence, together with the face and the content validation, 13 NHs accounting for 1,161 beds and articulated in 31 units have been evaluated with the TESS-NH tool via direct observation by trained researchers. Inter-rater reliability, test-retest, criterion validity, inter-dimension correlations and internal consistency were measured. Descriptive statistics was also calculated.*

Results. *The inter-rater reliability was Pearson (r) >0.917 for continuous variables and weighted kappa statistics (κ) of > 0.779 for non-continuous variables; the test−retest reliability was r > 0.848 and κ of > 0.778, respectively. The criterion validity was r > 0.500 between each dimension and the single TESS-NH global item; moreover, correlations among the domains varied from not significant to significantly strong, while the internal consistency resulted in all evaluable dimensions in Cronbach alpha > 0.600. In the involved NH units, the TESS-NH total score was on average 122.19 out of the possible score from 0 to 149 (confidence interval (CI) 95%, 115.89−128.49). 25% of the units (=7) reported a total score of ≤ 113, and another 25% reported scores ≥ 133, thus from poor to excellent therapeutic properties.*

Conclusions. *The TESS-NH tool can be used in Italian facilities to support managers and researchers in evaluating the therapeutic properties of NH environments. Furthermore, the tool can support the evaluation of the effectiveness of interventional studies or quality improvement projects aimed at improving the NH's environment.*

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Introduction

Despite the nursing home (NH) being an institutional setting, for many older individuals it is also the home where they spend many years of their life before dying: as recently reported from large Australian and Italian studies each involving respectively > 9,000 residents, after admission they live in a NH for a median of two (1) to 2.6 years (2). Therefore, the NH becomes a place where older individuals have the right to achieve the maximum level of their quality of life (QoL) and well-being as well as to maintain their functional independence for as long as possible (3). Stemming from this point of view, a growing interest regarding the effects of the NH's physical and social environment on a resident's wellbeing, QoL, functional independence as well as on mood disturbances, such as depression, have been documented to date (4, 5).

According to studies available, for those individuals suffering from dementia, the NH environment can offer a therapeutic support capable of maximising both physical and cognitive functions (4, 6), safety, comfort, privacy, and socialisation (7, 8). For example, when personalisation and privacy of residents' bedrooms are ensured, disruptive behaviours have been reported to decrease; moreover, in simple environments where all utilities are easily visible and accessible (for example, the toilet, the dining room) an increased ability of orienting oneself has been reported among individuals with dementia; furthermore, when the furniture is appropriately selected to make the environment home-like, functional dependence, socialisation, and mood have all been reported to ameliorate (4, 6, 9). Conversely, an environment lacking in specific therapeutic features has been reported to determine an excess of functional dependence in the activity of daily living (ADL, for example eating (5)) and to increase the risk of depression (10).

Given this evidence, NHs have started to be designed after considering individuals' needs, aimed at optimising their potentialities and strengths (6, 11) under the framework of the so-called '*evidence-based design'* that has been widely adopted mainly in hospital settings to date (12). With the increased interest in the fundamental aspects that make an NH setting therapeutic, instruments measuring the quality of such an environment have started to be developed and validated (13, 14).

A recent systematic review of the literature (13) has screened the existence of 23 tools, evaluating the quality of NH environments. However, only few of them have been extensively validated reporting good psychometric properties. Specifically, the Therapeutic Environment Screening Survey for Nursing Home (TESS-NH) (15), the Professional Environmental Assessment Protocol (PEAP) (16), and the Multiphasic Environmental Assessment Procedure (MEAP) (17) have been mostly used according to their proved validity (13). Among them, the TESS-NH (15) has been developed as a substantial revision of previous versions of the Therapeutic Environment Screening Survey established in the nineties (18, 19), and given the suffix "NH" in recognition that its development and psychometric evaluation have been conducted in the nursing home setting.

Specifically, the tool has been developed through an extensive review of the literature, after which a pool of items has been generated and judged by experts evaluating for content and face validity (13). Then, the instrument has been assessed for criterion validity (13), inter-rater reliability and test–retest reliability, reporting good properties (15). In addition, while the majority of instruments in this field have not often been used outside of the period of their development (13), the TESS-NH has been widely also used for not-strictly research purposes because it is (a) easy to use following the available

manual, (b) requires limited training for the observers and can be completed in a short time, and (c) it is the most recently developed tool and is thus capable of reflecting recent advancements in the field (13, 15).

To date, the TESS-NH has never been transferred into the Italian context. Making the TESS-NH available in Italy can support NH managers in the environment assessment and help them to detect poor and/or inadequate settings (20) as a basis for self-evaluation but also for an external evaluation during, for example, the process of NH certification allowing the facility to have the licence to function. Having a valid version of the tool in the Italian context can also support in the outcome evaluation of quality improvement projects, aimed at providing the best setting capable of maximising the strengths of each resident (15). Furthermore, it could help researchers to evaluate the environment properties at the baseline as well as to compare properties in multicentre research as a prerequisite to ensure that interventions under study (for example, aimed at promoting eating independence) are measured in their true effect and not as the effect of different therapeutic environments. Therefore, the principal intent of this study was to render available in the context of the Italian nursing homes the TESS-NH tool.

Methods

Aims of the study

The study aims were (a) to validate in the Italian context the TESS-NH tool (15), and (b) to describe the therapeutic principles of NH environments according to the tool.

Study design

A validation and a cross-sectional study design were performed in 2017. The study methods and the findings have bene here reported according to (a) the COnsensus-based Standards for the selection of health status Measurement Instruments guidelines (21), and (b) the procedures adopted by the authors of the original validation of the TESS-NH tool (15).

Setting

A total of 13 public NHs, located in a rural area of north-east Italy, where around 100,000 citizens live, were approached. These NHs were regulated by the same Regional Health Service rules and were preliminarily assessed in their homogeneity: specifically, all NHs were (a) long-term facilities, (b) offering nursing care by nursing aides (NAs) and Registered Nurses (RNs) for on average 75 minutes a day par each resident as a minimum standard as recommended by the low according to the profile of residents, and (2, 22) and (c) admitting residents with moderate/severe functional dependence (22) due to different health conditions, mainly cognitive decline.

All NHs approached agreed to participate.

Data was collected at the 'unit level' as a confined environment (with no commons areas to serve more than one unit) (15) where a group of residents were living at the time of the study, cared for by a nursing team led by a nurse leader.

Instrument conceptual framework

The TESS-NH (15) has been conceptualised in terms of interactions between a physical space and the people, where the QoL and well-being are influenced by the environment (13). Specifically, according to Sloane et al. (15), the instrument was developed on the basis of Lawton's ecological model (23), thus based on the conceptual framework establishing that for an older individual to maintain functional independence and QoL there is a need for congruence between his/her capacity and the environmental demands. According to the evidence indicating that increased sensitivity of individuals with cognitive decline to environmental demands can trigger confusion, agitation,

aggressiveness, dependence in activities of daily living (4, 6, 9, 15), the tool has been aimed at supporting projects providing environmental adjustments (15).

Instrument characteristics and properties

The TESS-NH tool was considered in this research project for the following reasons: (a) the instrument has been widely used in several studies to assess the therapeutic characteristics of facilities where individuals with dementia or cognitive decline may live for a long time (13, 24); (b) it has also been used as a source of criterion-related validity in assessing the psychometric qualities of other instruments (13, 24); (c) it provides a standardised evaluation of the NH environments characteristics, allowing for comparison across different facilities, the identification of strengths and weaknesses and, above all, the identification of improvements, aimed at increasing the wellbeing of patients' and staff (13); and (d) it can also be used as a self-assessment tool (13).

As reported in Table 1, the TESS-NH tool is composed of 84 items categorised in 13 domains (based upon a score of 0–3 or 0-6 according to the item). Higher scores in each domain indicate a higher presence of therapeutic principles (13, 15). Moreover, the tool also provides a global item as a summary of the therapeutic features of the environment, based on a Likert-scale ranging from 1 (low, distinctly unpleasant, negative, and non-functional) to 10 (high, very pleasant, positive, and functional) as perceived by observer(s). For the purpose of our study, we have also calculated the total score by adding the absolute values obtained in each of the 84 items, aimed at providing an overall evaluation of the therapeutic properties of each NH unit.

Embedded in the tool is also included the Special Care Unit Environmental Quality Scale (SCUEQS) devoted to specialised units for individuals with dementia. In this case, too, higher scores in each domain indicate a high-quality environment (13, 15); however, according to the aims of our study this sub-tool was not considered, given that the NHs involved were not organised in specialised units.

Cross-cultural and conceptual preliminarily validation

In order to guarantee a cross-cultural and a conceptual equivalence of the Italian version of the tool with the original, the World Health Organisation guidelines (25) were followed. The first translation was provided by an Italian nurse, proficient in the English language, who provided the cultural and conceptual equivalence of each domain and item; then, an expert panel composed of the original translator, and three expert nurses (two with experience in instrument development and translation; one in NH care) resolved as a group some inadequacies and discrepancies by rewording, revising expressions and suggesting alternatives. Then, the back translation in English was provided by an independent US native translator who did not know the original tool (25). Discrepancies between the original and the second translation have been discussed by the experts' group and the final version was approved.

Data collection

Facilities were approached by the research team in the second semester of 2017. Two nursing researchers were trained in a three hours long meeting and following the tool's manual, visited each NH unit; on average, two hours were required to complete the data collection at the unit level via observation. For larger NHs, data collection was performed over more days.

Four NHs were re-observed after one month by one researcher aimed at collecting data to assess the stability of the tool. The four units were chosen according to the total scores obtained in the first evaluation, as

Table 1 - Therapeutic Environment Screening Survey for Nursing Home (15)

Domains (N=13) and items (N=84) (15)	Metrics
1) "Unit autonomy": nursing station presence/type; nursing station for paperwork; desk for paperwork; combined work area for paper work; enclosed workroom, not a nursing station; unit use as pathway between other units; residents eat on/off units; formal activities on/off unit; residents bathe on/off unit (9 items)	scores 0, 1, 2 or 3 according to the item
2) "Outdoor access": enclosed courtyard; attractiveness of courtyard; courtyard is functional (3 items)	scores 0, 1, 2 or 3 according to the item
3) "Privacy": privacy curtain provides only separation between beds in semiprivate rooms (1 item)	score 0 or 1
4) "Exit control": doors of rest of facility distinguished; doors to outside distinguished; number of exits off of the unit; number of elevators off of the unit; doors are looked; locking device triggered by approach; look disengaged by keypad/switch; looked at night/during bed weather; Doors are alarmed; Alarm triggered by device worn by resident; Alarm disengaged using keypad, card or switch (12 items)	scores 0, 1 or 2 or N/A according to the item
5) "Maintenance": Maintenance of social space; of halls; of residents' rooms; of resident bathrooms (4 items)	scores 0, 1 or 2
6) "Cleanliness": cleanliness of social spaces; of halls; resident rooms; resident bathrooms; Bodily excretion odour in public area; in resident rooms (6 items)	scores 0, 1 or 2
7) "Safety": floor surfaces in social spaces; in halls; in resident rooms; in resident bathrooms; handrails in hallways; in bathrooms (6 items)	scores 0, 1 or 2
8) "Lighting": intensity in hallways; in activity areas; in resident rooms; glare in hallways; in activity areas; in resident rooms; Lightening evenness in hallways; in activity areas; in resident rooms (9 items)	scores 0, 1, 2 or 3 according to the item
9) "Visual/tactile stimulation": bedrooms with a view of the courtyard; public areas with a view of the courtyard; tactile stimulation opportunities; visual stimulation opportunities (4 items)	score 0, 1 or 3
10) "Noise": status of the television in main activity areas; resident screaming/calling out; Staff screaming/calling out; T/radio noise; loud speakers/intercom noise; alarm/call bell noise; other machine noise (7 items)	score 0, 1, 2 or 6
11) "Space/seating": % of rooms with a chair per person; public room inventory; path leads to dead ends; path with places to sit; configuration of rooms on unit (5 items)	from 0 to 1, 2 or 3 or N/A according to the item
12) "Familiarity/home likeness": public areas homelike; kitchen of the unit; pictures/mementos in resident room; non-institutional furniture in resident rooms; residents' appearance (5 items)	score 0, 1, 2 or 3 according to the item
13) "Orientation/cueing": doors left open; resident's name on/near door; current picture of the resident; old picture of the resident; object of personal significance; room numbers; colour coding; bathroom door left open, toilet visible from the bed; bathroom door left open; toilet non visible from the bed; bathroom door closed, picture or graphic; activity areas visible from the 50% of resident rooms; visual indicator of activity areas visible from 50% of resident rooms; direction, identification sign visible from 50% of resident room (13 items)	score 0 or 1
TESS-NH: global single item	from 1 low, distinctly unpleasant, negative, non-functional, to 10 high, quite pleasant, positive, and functional

TESS-NH = Therapeutic Environment Screening Survey for Nursing Home; N/A = Not Applicable

the lowest, the highest, and that below and above the averages, respectively as measured with the TESS-NH. Moreover, units did not change their environment properties after the first data collection.

Data analysis

With regards to the first aim of the study that was to validate the tool, the following evaluations were undertaken (20, 21):

a) face and content validity have been assessed by involving four experts with a nursing background in NH care and research methods: they judged the relevance and the comprehensiveness of the items in terms of whether these were relevant for (i) the construct to be measured; (ii) the population under study; and (iii) the purposes of the tool (15, 21).

b) the inter-rater reliability has been evaluated by calculating the Pearson correlation(r) between the scores obtained in each domain, based on continuous variables filled in independently by two researchers on the same day, as well as on that obtained in the TESS-NH global single item; for non-continuous items ('Orienteering/Cueing' and 'Privacy') weighted kappa (κ) statistics were calculated;

c) the TESS-NH stability has been assessed by remeasuring the environment of four NHs after one month with the same tool and calculating the Pearson correlations (r) between the scores obtained in the first and in the second evaluation in each TESS-NH domain, and in the global item; also in the case of non-continuous items ('Orienteering/Cueing', 'Privacy'), the weighted κ statistics were calculated;

d) the criterion validity has also been assessed by calculating the correlations between the scores obtained in each TESS-NH dimension and the global single item evaluating the whole perception of the observer(s) regarding the environment that was considered as "gold standard" (21);

e) the inter-dimension correlations have been also calculated aiming at assessing the correlations between the dimensions composing the tools;

f) the internal consistency has been calculated for the 'Maintenance', 'Cleanliness', 'Safety', 'Familiarity/home likeness', 'Noises' and for 'Visual/tactile stimulation' dimensions, according to Sloane et al. (15).

Considering the nature of the tool that has been defined as a checklist or a survey (15), construct validity, by performing explorative or confirmative factor analysis, (21) was not assessed; moreover, given that the environments were not subjected to changes, 'Responsiveness' as the tool's ability to detect change over time in the construct to be measured (21) was not measured. Furthermore, given the explorative nature of the study and the homogeneity of the NHs included according to regional rules, no specific hypotheses have been tested (21) as the evaluation of an expected direction and magnitude of correlations or differences among groups (e.g. for profit *vs.* public NHs).

With regards to the second aim of the study that was to measure the therapeutic properties of the Italian NH environments, the average TESS-NH scores and the standard deviations (SD) at the (i) item, (ii) dimension, and (iii) global score levels, were all calculated. Moreover, the total TESS-NH score was also considered by summarising the values obtained in each item; then averages, Stannard Deviations (SD), range, median, mode and confidence interval (CI) at 95% were calculated.

Ethics

In a preliminary fashion the authorisation to use the tool was requested from the original authors who provided a positive feedback (Prof. Sloane, letter available from authors). Then, approval to access the NHs was provided from the health-care

trust responsible of the facilities (prot. N. 66935, 2017). Moreover, with the intent to entry in each facility, to explain the tool and its dimensions, a preliminary meeting was organized in each NH with the nurse managers. Data collected was treated as confidential and analysed in anonymous form. At the end of the process, all NHs received the feedback regarding their scores and discussed areas of improvements.

Results

Unit characteristics

A total of 13 public NHs were observed. As reported in Table 2, NHs were equipped with, on average, 86 beds (from 33 to 200, a total of 1,161) and in the period of the study were hosting, on average, 83 residents (from 30 to 164, a total of 1,080).

As also reported in Table 2, a total of 31 units were observed: specifically, one NH was organised in one unit; seven NHs in two units; four NHs in three units and only one NH was organized in four units.

Validity

Face and content validity of the tool were assessed and confirmed.

The inter-rater reliability resulted from r=0.917 to 1.000 in all TESS-NH domains based on continuous variables, and from κ=0.779 to 1.00 for 'Privacy' and 'Orienteering/cueing', based on non-continuous variables, as reported in Table 3. The test–retest reliability as measured after one month was $r > 0.848$ and $\kappa > 0.976$, respectively. The TESS-NH global score correlations were also strong both in the case of inter-rater correlations (r=0.979) and in the test-retest (r=0.976).

The criterion validity has reported significant positive correlations ($r > 0.500$) with the exception of the 'Privacy' dimension. Moreover, correlations among the TESS-NH dimensions varied, as detailed in Table

Table 2 - Nursing Homes features

NH	Beds in the NH, *n*	Residents living in the NH, *n*	Units, *n*	Residents living in each NH unit, *M*
1	49	46	2	23.0
2	200	164	3	54.7
3	32	30	2	15.0
4	154	152	2	76.0
5	102	95	4	23.8
6	33	25	2	12.5
7	87	80	3	26.7
8	61	55	2	27.5
9	86	80	3	26.7
10	115	115	2	57.5
11	58	58	2	29.0
12	118	117	3	39.0
13	66	63	2	31.5
Total	1,161	1,080[a]	31	33.8 (SD 18.2)

[a] = 83 residents/NH

n = number; NH = nursing home; M = mean; SD = Standard Deviation

Table 3 –Validity measures: inter-rater, test -retest, criterion validity, correlations between dimensions, and internal consistency

				Correlations between dimensions												
TESSH-NH dimensions	Inter-rater *r*	Test-retest *r*	Criterion validity[b] *r*	2. *r*	3. *r*	4. *r*	5. *r*	6. *r*	7. *r*	8. *r*	9. *r*	10. *r*	11. *r*	12. *r*	13. *r*	Internal Consistency α
1. Unit autonomy[a]	1.000**	1.000**	.535**	-	-	-	-	-	-	-	-	-	-	-	-	d
2. Outdoor access	1.000**	1.000**	.604**													d
3. Privacy	1.000**[c]	1.000**[c]	.182	-.271												d
4. Exit control	1.000**	1.000**	.571**	.310	-.233											d
5. Maintenance	.978**	.976**	.788**	.510**	-.209	.501**										.627
6. Cleanliness	.975**	.978**	.656**	.136	.264	.371*	.343									.924
7. Safety	.927**	.956**	.659**	.455*	-.336	.492**	.727**	.593**								.870
8. Lighting	.889**	.948**	.582**	.426*	-.337	.016	.418*	.401*	.710**							d
9. Visual/tactile stimulation	.990**	.993**	.829**	.481**	.049	.405*	.686**	.476**	.620**	.356*						.866
10. Noise	.965**	.848**	.574**	.551**	-.230	-.017	.201	.056	.295	.453*	.051					.659
11. Space/seating	1.000**	1.000**	.678**	.360*	.355	.227	.534**	.348	.363*	-.022	.743**	-.004				d
12. Familiarity/home likeness	.965**	.955**	.517**	.272	.222	.234	.271	.304	.187	-.084	.562**	.153	.715**			.626
13. Orientation/cueing	.779**[c]	.778**[c]	.754**	.434*	.054	.506**	.489**	.388*	.330	.175	.745**	.066	.412*	.510**		d
14. TESSH-NH global single item	.979**	.976**	-	.593**	.261	.376*	.699**	.470**	.471**	.282	.760**	.275	.692**	.537**	.734**	

α = Crombach Alpha; *r* = Pearson coefficient; TESS-NH = Therapeutic Environment Screening Survey for Nursing Home;
[a] Unit autonomy dimension has a constant value; therefore, it was removed from the correlation analysis; [b] the TESSH-NH global single item as a gold standard; [c] weighted kappa (κ) statistics; [d] the internal consistency was evaluated only in some dimensions according to Sloane et al. (15).
** p< 0.01; *p<0.05

3: from significant strong correlations (r=0.745, between 'Orienteering/cueing' and 'Visual Visual/tactile stimulation') to none (for example, between 'Privacy' or 'Noise').

Finally, the internal consistency resulted in different values, from acceptable ('Noises' α=0.659, 'Maintenance' α=0.627; and 'Familiarity/home likeness' α=0.626) to good ('Cleanliness' α=0.924, 'Safety' α=0.870, and 'Visual/tactile stimulation' α=0.866).

The therapeutic properties of the NH environments

The TESS-NH total score, allowing a range from 0 to 149, was 122.19 (CI 95% 115.89–128.49; range 84–149; SD 17.17), with median values of 123 and a mode of 121. At the overall level, 25% of the NH units (=7), reported ≤ 113 total score and another 25% reported scores ≥ 133. In those NHs with more than one unit, the scores were homogeneous.

In Table 4, the average scores for each item, dimensions and for the global item have been reported; moreover, in the same Table, the original data of the US NHs (15) where a total of 53 units were evaluated have been reported as benchmark data.

Discussion

To our best knowledge, this is the first study performed in the Italian context aimed at providing NHs with a tool measuring their therapeutic properties. Alongside the level of quantity and quality of nursing care delivered in NHs, which can affect the resident's outcomes (26), the quality of the environment has been documented as also having therapeutic effects, especially among residents with cognitive decline. The 'therapeutic principles', such as eliminating potentially noxious stimuli, promoting safety, accommodating a range of private and social activities and providing access to outdoors (18), have been progressively incorporated in instruments with the intent to measure NH units and to provide insight for their improvements. Moreover, the quality of the environment has been suggested to also influence the team relationships and their work processes (27, 28), thus improving or threatening quality of care. Among the several instruments available, we have considered the TESS-NH tool due to its recent development, its good properties (13, 15), as well as because it is widely used allowing comparisons across different facilities and at international levels, the identification of strengths and weaknesses and areas for improvement through self-assessment (13, 15, 24).

We have involved 13 NHs, comprising a total of 31 units; previous studies available have involved from 21 (TESS-NH Residential Care version) (29), to 30 (24, 30) and 53 facilities, as performed in the original study (15).

Validity

The face and the content validity of the tool, as well as its cross-cultural and conceptual appropriateness to the Italian context, have been established. According to the nature of the TESS-NH tool, which has been widely defined as a checklist or a survey (15), only some psychometric properties have been scrutinised. Firstly, we have evaluated the inter-rater reliability, which was high, and higher than that documented by the original authors (r from 0.33 to 1.00, κ from 0.13 to 1.00) (15), suggesting that the items were clear and easily evaluated.

The stability of the tool was also evaluated by re-measuring the environment of four units one month after the first assessment, which is less than the average of 129 days performed by the original authors (15). Moreover, according to the findings, the stability was high in both fixed (e.g. 'Unit

Table 4 - TESS-NH dimensions and items averages and ranges in the Italian context as compared to the benchmark considered

			Distribution in a sample of 31 units of 13 Italian NHs		Distribution in a sample of 53 US NHs (15)	
TESSH-NH Domains, Items	Item Description	Scoring Range	M	SD	M	SD
Unit autonomy		**0-3**	**1.33**	**0.00**		
1	Unit nursing station presence/type	0-2	2.00	0.00	1.62	0.49
2a	Nursing station for paperwork	0-1	1.00	0.00	0.71	0.46
2b	Desk for paperwork	0-1	0.00	0.00	0.15	0.36
2c	Combined work area for paperwork	0-1	0.00	0.00	0.04	0.19
2d	Enclosed workroom, not a nursing station	0-1	0.00	0.00	0.13	0.34
3	Unit use as pathway between other units	0-1	0.00	0.00	0.33	0.49
4a	Residents eat on/off unite	0-3	3.00	0.00	2.88	0.31
4b	Formal activities on/off unite	0-3	3.00	0.00	2.33	0.44
4c	Residents bathe on/off unite	0-3	3.00	0.00	2.92	0.29
Outdoor access		**0-3**	**2.10**	**0.94**		
26	Enclosed courtyard	0-3	2.10	1.22	2.45	0.84
27a	Attractiveness of courtyard	0-3	2.23	0.99	2.08	1.16
27b	Courtyard is functional	0-3	1.97	0.84	1.88	1.05
Privacy		**0-1**	**0.35**	**0.51**		
29a	Privacy curtain provides only separation between beds in semiprivate rooms	0-1	0.35	0.51	0.96	0.20
Exit control		**0-2**	**0.91**	**0.18**		
5a	Doors to rest of facility disguised	0-2	1.48	0.57	0.04	0.19
5b	Doors to outside disguised	0-2	1.61	0.56	0.04	0.02
6a	Number of exits off of the unit	N/A	2.29	1.16	3.79	1.83
6b	Number of elevators off of the unit	N/A	1.87	0.99	1.00	1.04
6c	Doors are locked	0-1	0.87	0.34	0.77	0.42
6d	Locking device triggered by approach N/A	0-1	0.06	0.25	0.06	0.23
6e	Lock disengaged by keypad/switch	0-1	0.55	0.51	0.71	0.46
6f	Locked at night/during bad weather	0-1	0.65	0.49	0.04	0.14
6g	Doors are alarmed	0-1	0.74	0.44	0.75	0.44
6h	Alarm triggered by device worn by resident	0-1	0.00	0.00	0.09	0.30
6i	Alarm disengaged using keypad, card, or switch	0-1	0.71	0.46	0.46	0.33
6j	Alarm sounds with all entries/exits	0-1	0.03	0.18	0.17	0.38
Maintenance		**0-2**	**1.70**	**0.36**		
7a	Maintenance of social spaces	0-2	1.84	0.45	1.66	0.52
7a	Maintenance of halls	0-2	1.61	0.62	1.55	0.57
7c	Maintenance of resident rooms	0-2	1.74	0.44	1.68	0.47
7d	Maintenance of resident bathrooms	0-2	1.61	0.72	1.72	0.46
Cleanliness		**0-2**	**1.92**	**0.16**		
8a	Cleanliness of social spaces	0-2	1.97	0.18	1.40	0.69
8b	Cleanliness of halls	0-2	1.84	0.37	1.72	0.46
8c	Cleanliness of resident rooms	0-2	1.97	0.18	1.76	0.43
8d	Cleanliness of resident bathrooms	0-2	1.87	0.34	1.79	0.41
9a	Bodily excretion odor in public areas	0-2	1.97	0.18	1.68	0.58
9b	Bodily excretion odor in resident rooms	0-2	1.94	0.25	1.55	0.57
Safety		**0-2**	**1.84**	**0.28**		
10a	Floor surface in social spaces	0-2	1.90	0.30	0.72	0.66
10b	Floor surface in halls	0-2	1.84	0.52	0.77	0.87
10c	Floor surface in resident rooms	0-2	1.92	0.36	0.64	0.59
10d	Floor surface in resident bathrooms	0-2	1.87	0.43	1.30	0.75
11a	Handrails in hallways	0-2	1.68	0.48	1.92	0.27
11b	Handrails in bathrooms	0-2	1.84	0.37	1.38	0.57

Lighting		**0-3**	**1.85**	**0.18**		
12a	Light intensity in hallways	0-3	1.74	0.51	0.70	0.72
12b	Light intensity in activity areas	0-3	1.84	0.37	1.15	0.69
12c	Light intensity in resident rooms	0-3	1.87	0.34	0.58	0.66
13a	Glare in hallways	0-2	2.00	0.00	1.00	0.80
13b	Glare in activity areas	0-2	2.00	0.00	1.00	0.67
13c	Glare in resident rooms	0-2	1.94	0.25	1.12	0.64
14a	Lighting evenness in	0-2	1.45	0.72	0.38	0.49
14b	Lighting evenness in activity areas	0-2	1.90	0.30	0.66	0.48
14c	Lighting evenness in resident rooms	0-2	1.94	0.25	0.17	0.38
Visual/tactile stimulation		**0-3**	**2.42**	**0.54**		
24a	Bedrooms with view of courtyard	0-3	2.61	0.67	5.24	1.37
24b	Public areas with view of courtyard	0-3	2.45	0.85	2.66	0.85
25a	Tactile stimulation opportunities	0-3	2.19	0.60	1.30	0.77
25b	Visual stimulation opportunities	0-3	2.42	0.50	1.83	1.00
Noise		**0-3**	**1.76**	**0.53**		
30	Status of television in main activity area	0-6	2.13	2.16	1.57	0.82
31a	Resident screaming/calling out	0-2	1.52	0.57	2.62	0.54
31b	Staff screaming/calling out	0-2	1.87	0.34	2.49	0.58
31c	TV/radio noise	0-2	1.45	0.72	1.85	1.33
31d	Loud speaker/intercom noise	0-2	1.84	0.52	2.66	0.55
31e	Alarm/call bell noise	0-2	1.84	0.45	1.30	0.68
31f	Other machine noise	0-2	1.68	0.60	1.83	0.61
Space/seating		**0-3**	**0.80**	**0.38**		
15	% of rooms with a chair per person	0-3	1.81	1.01	2.62	0.57
16a	Public room inventory	N/A	0.77	0.43	N/A	N/A
17a	Path leads to dead ends	0-1	0.58	0.50	0.13	0.34
17b	Path with places to sit	0-1	0.42	0.50	0.45	0.50
18	Configuration of rooms on unit	0-2	0.45	0.51	0.21	0.50
Familiarity/home likeness		**0-3**	**0.84**	**0.50**		
19	Public areas homelike	0-3	1.32	1.08	1.43	0.98
20	Kitchen on the unit	0-2	0.00	0.00	0.89	0.78
21	Pictures/mementos in resident rooms	0-3	1.29	1.19	1.94	1.01
22	Noninstitutional furniture in resident rooms	0-3	0.26	0.50	1.36	1.11
23	Resident appearance	0-2	1.32	0.48	1.30	0.61
Orientation/cueing		**0-1**	**0.38**	**0.14**		
28a1	Doors left open	0-1	0.81	0.40	0.79	0.40
28b1	Resident's name on/near door	0-1	0.87	0.34	0.24	0.43
28c1	Current picture of resident	0-1	0.00	0.00	0.21	0.41
28d1	Old picture of resident	0-1	0.06	0.25	0.01	0.14
28e1	Objects of personal	0-1	0.42	0.50	0.00	0.00
28f1	Room numbers	0-1	1.00	0.00	0.64	0.48
28g1	Color coding	0-1	0.35	0.49	0.0	0.00
28a2	Bathroom door left open; toilet visible from bed	0-1	0.19	0.40	0.00	0.00
28b2	Bathroom door open; toilet not visible from bed	0-1	0.55	0.51	0.29	0.45
28c2	Bathroom door closed; picture or graphic	0-1	0.16	0.37	0.17	0.39
28a3	Activity area visible from 50% of resident rooms	0-1	0.42	0.50	0.42	0.47
28b3	Visual indicator of activity area visible from 50% of resident rooms	0-1	0.10	0.30	0.25	0.26
28c3	Direction, identification sign visible from 50% of resident rooms	0-1	0.06	0.25	0.00	0.00
Global rating	Subjective rating of overall environment (by observers)	1-10	7	1.55	5.75	1.70

M = mean; N/A = not applicable; NH = Nursing Home; SD = Standard Deviation; TESS-NH = Therapeutic Environment Screening Survey for Nursing Home; US NHs, there were considered as a benchmark the work made by Sloane et al. (15).

Autonomy', 'Exit Control', 'Privacy', 'Outdoor Access') and in modifiable dimensions (e.g. 'Maintenance', 'Safety', 'Lighting', 'Noise') that can reflect residents or staff behaviours. This seems to suggest that the tool provides stable measures of the therapeutic properties of the NH environment, and therefore it can be useful in monitoring the effects of improvement strategies adopted to increase the quality of a given environment.

While evaluating the TESS-NH for criterion validity, dimensions emerged as positively correlated from moderate (e.g. 'Family/homelike') to strong ('Visual/tactile stimulation) to the global item as the subjective measure to evaluate an environment as therapeutic, with the exclusion of that of the 'Unit autonomy' and 'Privacy'. Therefore, the TESS-NH tool seems capable of measuring the therapeutic property precisely and at the granular level (11, 18), thus supporting the identification of specific areas for improvement; conversely, the TESS-NH global item seems to return an overall perception of the observers regarding the therapeutic property of the environment and is not as fully informative as the dimensions of the tool are.

Moreover, according to the correlations, it is clear that the tool is a checks list as defined by the authors (15) with dimensions not always correlated to each other. Some dimensions such as the 'Unit autonomy' and the 'Privacy', have reported constant values not significantly correlated with other dimensions: these can be associated with the degree of homogeneity achieved by NHs due, for example, to the regional norms and/or rules in ensuring privacy. The highest correlations were reported between the 'Orienteering/cueing' and 'Visual Visual/tactile stimulation' dimensions, followed by 'Space/Seating' and 'Visual/tactile stimulation' suggesting that these are strongly interconnected with each other.

With regard to the internal consistency, some of the dimensions were, in general, above those documented by Sloane et al. (15) with the exception of 'Maintenance', which was below ($\alpha = 0.627$ vs. 0.83 in Sloane et al. (15)). However, emerged values were all acceptable (31).

The therapeutic properties of Italian NH environments

The overall evaluation of the environments suggests that the NHs involved have in general good therapeutic properties in all dimensions: single items and dimensions have in fact reported values above the benchmark considered (the work of Sloane et al. (15)), especially in 'Safety', 'Lighting', and 'Visual/tactile stimulation', while they are below the benchmark in 'Familiarity/homelike'. In this comparison, it is necessary to consider that countries (US vs. Italy) have different rules in NHs accreditation criteria allowing to function and that during the time elapsed from the first evaluation of Sloane et al. (15) performed at the beginning of 2000, several improvements in evidence-based design have occurred (13, 14). However, in the case of the 'Familiarity' dimension, more efforts should be undertaken aimed at also creating a homelike environment among Italian NHs, which still reflect an institutional context, rather that the home of older people.

Seven units reported poor scores ($\leq$ 113) while another seven reported high scores, satisfying the large number of items, suggesting that across public NHs following the same regional policies and rules, differences can be found in the therapeutic properties at the environment level; moreover, as emerged from the findings, scores were homogeneous among units located in the same NH, thus suggesting that the environment is affected mainly by policies and actions undertaken at the NH level, and not only to that at regional level. Therefore, strategies

aimed at improving the quality of the environment should be undertaken also at NH levels.

Limitations

The final version of the back translation and that approved by the experts was not pre-tested on the target setting before its implementation: however, the full process evaluating the cross-cultural and the conceptual equivalence of the tool was established by following the World Health Organization recommendations (25).

The face and the content validity were assessed by expert nurses in the field; however, given the complexity of the environment quality measurement, the increased literature in the context of care for individuals with cognitive decline, accompanied by the increased establishment of the evidence-based design (12), a multidisciplinary reconsideration of the items included in the tool is suggested. Moreover, according to the purpose of the study, the total score was calculated by adding the absolute values obtained in each of the 84 items with the intent of providing an overall evaluation of all dimensions and to assess the NH unit's distribution with regards to their therapeutic properties. Although not advised by the authors (15), total scores have been suggested in check list development and used by adding the unweighted or weighted items scores (32) with the intent of transforming the evaluation in appreciable and concrete measures. In this manner, the total scores can be interpreted by comparing them and to establish a judgment, by identifying for example from very poor, to poor, good, very good or excellent NH's environments.

Furthermore, no residents and/or family carers have been involved in the evaluation of the environment by using the tool, a limitation that should be addressed in the future, given that their perceptions and suggestions can be valuable.

Conclusions

According to the validity measures that emerged, the TESS-NH tool can be used as a checklist in Italian NH settings, with the aim of detecting the presence and the degree of therapeutic properties of the environment and diagnose areas for improvements. The tool is easy to use, reliable, requires little time to be completed and minimal training. Moreover, it provides an evaluation of specific dimensions affecting the QoL and well-being of NH's residents with cognitive decline. Thus, it can be considered a reference point in evaluating the therapeutic properties of the environment instead of a simple global evaluation based upon subjective perceptions.

By applying the tool to the 31 units of 13 NHs approached, the therapeutic properties of environments were diagnosed as ranging from poor to excellent, thus suggesting areas for improvements. Moreover, given that these NHs were located in the same region and so influenced by the same policies, findings suggest that the facility environments are not affected by policies at the macro-level, but mainly from those developed at the NH level.

Riassunto

Le proprietà terapeutiche degli ambienti delle case di riposo nel contesto italiano: risultati di uno studio di validazione e descrittivo

Introduzione. Le caratteristiche ambientali delle Case di Riposo (CdR) possono offrire un supporto terapeutico capace di massimizzare le abilità funzionali e cognitive dei residenti. Al momento sono disponibili 23 strumenti per valutare le proprietà terapeutiche delle CdR; tra questi il più recente e utilizzato è il Therapeutic Environment Screening Survey for Nursing Homes (TESS-NH), composto da 13 domini e 84 item: valori più elevati per ogni dominio indicano elevata presenza di principi terapeutici. Obiettivi del presente studio erano: validare la versione italiana della TESS-NH e descrivere le proprietà terapeutiche delle CdR nel contesto italiano.

Disegno di studio. Studio di validazione e descrittivo, condotto nel 2017.

Metodo. Dopo aver validato la scala TESS-NH a livello culturale e ricercato la validità di facciata e contenuto, 13 CdR con 1,161 posti letto suddivisi in 31 unità sono state valutate tramite osservazione diretta da due ricercatori formati. Sono stati misurati l'affidabilità inter-valutatore, la stabilità della misura nel tempo, la validità di criterio, le correlazioni tra le dimensioni di cui si compone lo strumento e la sua consistenza interna. Sono state quindi condotte analisi statistiche descrittive.

Risultati. L'affidabilità inter-valutatore è risultata avere un valore di Pearson (r) > 0.917 per le variabili continue e valori di kappa (κ) > 0.779 per le variabili non continue; l'affidabilità valutata con il test-retest ha dato valori rispettivamente di $r > 0.848$ e di $\alpha > 0.778$. La validità di criterio è risultata pari a $r > 0.500$ per ogni dimensione e per ogni singolo item della TESS-NH; inoltre, la correlazione tra i domini ha restituito risultati da non a fortemente significativi, mentre la consistenza interna (alpha di Cronbach) è risultata in ogni dimensione > 0.600. Il punteggio totale della TESS-NH, considerando un possibile range da 0 a 149 punti, è stato in media di 122.19 (Intervallo di Confidenza 95% 115.89-128.49). Il 25% delle unità (=7) ha riportato un punteggio totale ≤ 113 punti e un altro 25% valori ≥ 133, suggerendo pertanto ambienti da poveri a eccellenti rispetto alle proprietà terapeutiche.

Conclusioni. La TESS-NH può essere utilizzata anche nei contesti residenziali italiani per supportare i manager e i ricercatori nella valutazione delle proprietà terapeutiche degli ambienti delle CdR. Inoltre, può supportare la valutazione degli effetti degli studi che prevedono interventi o progetti di miglioramento della qualità degli ambienti delle CdR.

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