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SEASON VARIATIONS IN ELDERLY CARE CENTERS THERMAL COMFORT IN PORTUGAL

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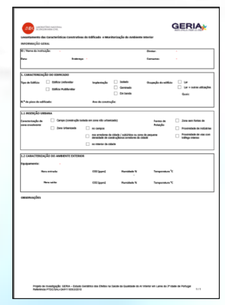
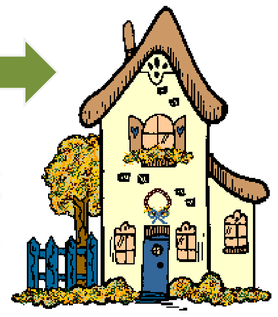
INTRODUCTION AND RESEARCH AIM

Thermal comfort (TC) is one of the indoor environment factors that affect health and human performance, being chiefly determined by temperature, humidity and air velocity. Though thermal environment in homes does not usually cause serious illness, it has a very significant impact on the general well-being and daily performance of its residents. Poor thermal environment can also aggravate the impact of air pollutants on occupant's health. In this sense, this study aim to explore season variations of TC parameters in **12 elderly care centers** (ECCs) located in Porto, including predicted percent of dissatisfied people (PPD) and predicted mean vote (PMV) indexes.

METHODS

- **n = 12 ECCs** in Porto urban area
- Winter & Summer Thermal Comfort Measurements
- **54 rooms assessed** within dining rooms, drawing rooms, medical offices and bedrooms, including the bedridden subgroup
- Building Characterization Questionnaire
- Daytime sampling (starting at 10 am)
- TC parameters following ISO 7730:2005 – air temperature, mean radiant temperature, air humidity & air velocity → determine PMV and PPD indexes





Homogeneous' and steady-state environment tested according ISO 7726:2005 specifications with TSI 8386A-M-GB thermo-anemometer

moderate environments

(class C – comfort standard)

Delta OHM HD32.1

0.60 meters above the floor (sitting - abdomen level);

25 minutes equipment stabilization in each room;

10 minutes measurements;

metabolic rate of **1.0 met** (seated, relaxed);

clothing insulation: 1 *clo* Summer; 1.3 *clo* Winter

→ Software DeltaLog10 version 1.30

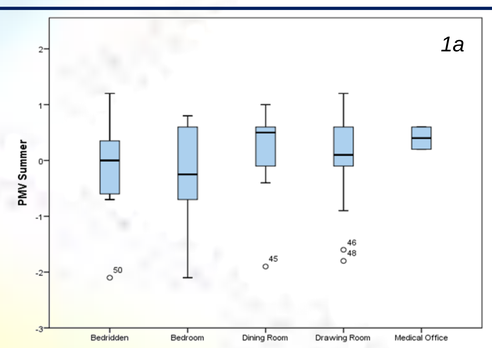
RESULTS

Table 1 ECC building characteristics, expressed as %

Heating systems	
Central	30
Gas and oil heaters	**70**
Indoor conditions	
Condensation	56
Leaks	67
Insulation	**33**
Power supply	
Electricity	56
Gas	67
Single pane glass	**78**
Stone masonry	78
Window frames (Wood)	**67**

Table 2. ECCs main descriptive statistics and variables.

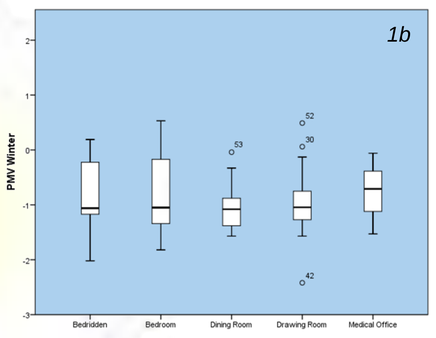
	Minimum	Maximum	Mean	Std. Deviation
Air velocity Summer (m/s)	0.01	0.3	0.03	0.06
Air velocity Winter (m/s)	0.01	1.2	0.06	0.2
Area (m^2)	7.0	150	3.4	33.8
RH Summer (%)	24.0	75.2	53.0	13.5
RH Winter (%)	26.4	77.7	49.2	13.1
Occupation Summer (N.o)	-	21	4	6
Occupation Winter (N.o)	-	30	4	6
PMV Summer	**-0.7**	**1.1**	**0.3**	**0.5**
PMV Winter	**-1.8**	**0.6**	**-0.5**	**0.7**
PPD Summer (%)	**5.1**	**31.6**	**11.7**	**7.1**
PPD Winter (%)	**5.0**	**66.1**	**19.1**	**19.3**
Temperature of air Summer (ºC)	20.0	27.6	23.9	2.0
Temperature of air Winter (ºC)	13.6	23.8	19.3	2.7
Operative temperature Summer (ºC)	20.0	27.5	24.1	2.0
Operative temperature Winter (ºC)	13.6	24.3	19.5	2.8
Mean radiant temperature Summer (ºC)	19.9	29.2	24.3	2.2
Mean radiant temperature Winter (ºC)	13.6	27.9	19.8	3.0



Significant differences by season:

PPD (P = 0.032)

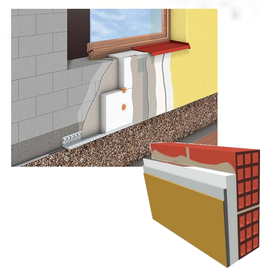
PMV (P = 0.001)



Figures1a. & 1b. PMV distribution by room and season.

CONCLUSIONS

Our study suggests that simple measures could provide health benefits to ECCs residents, such as insulating ceilings, walls and windows, without giving up the natural and passive ventilation solutions that are very common in Portugal due to the advantage of the country's generally mild weather. Further work is needed analyzing the interaction between TC variables within and between buildings, in order to improve the wellbeing of our elderly population.



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