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Enhancing Energy Retrofit Strategies through an integrated comfort approach: Insights from a social housing in London

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Context

UK Social Housing Estates as Heritage:

- Under-recognised living heritage of social housing estates
- Heritage protection the last decade (architectural, historical value)
- Heritage of the welfare state
- A critical component of the contemporary UK's social fabric
- Their adaptation are essential for maintaining social equity

and addressing contemporary environmental challenges

Context

UK Social Housing Retrofit Challenges :

- Leading the retrofit efforts
- Typical retrofit designs are not always suitable for the context of social housing.
- Assumptions about occupancy and indoor environment conditions
- Fuel poverty & cold strain
- Rebound effect as unintended consequence of retrofit
- Importance of thermal comfort in retrofit methodologies

Objectives

- Study the internal drivers behind thermal comfort behaviour and the adaptive practices
- Gather data on the knowledge existing on the communities to inform retrofit strategies
- Contribute to a comprehensive mapping of all relevant factors

in a broader comfort framework.

- The concept of thermal comfort as a decentralised question,

where the specific climate conditions and regional cultural practices play a significant role

Methodology

- Studying the thermal comfort practices in relation with their thermal and general comfort perception
- Survey in paper and online, contacted in person
- 5 parts and 32 questions (general information and comfort, seasonal comfort, every day practices, heating, energy retrofit expectations)
- Survey questions were validated through interviews
- Study Case selection criteria: age and architecture of the buildings, retrofit project, social and cultural diversity of the residents

Study Case: Kingswood Estate

- Kingswood Estate is a social housing estate in Southwark, South London.
- mid-level ‘50s yellow, brown-red brick modern buildings

Fig 1. The characteristic yellow brick mid-rise blocks

Study Case: Kingswood Estate

- 1000 residents
- Ethnic and culture diversity
- Fuel poverty affected area
- Deprived area
- 2022 Retrofit Project

Fig 2. The characteristic red-brown brick mid-rise blocks

Results

- **Tendency to colder sensation and preference for warmer environment**
- **Risk for cold strain**

“No heating is working, no warmer water”

“always cold”

“Large room difficult to get warm”

“ We don’t sleep there in the winter, the sun never comes there, it’s just too cold”

“Not enough sun in the winter, not heated often”

“it’s too cold because is the last apartment on the floor”

Thermal sensation & preference

Thermal sensation	Cold	Cool	Slightly Cool	Neutral	Slightly Warm	Warm	Hot
	12,82%	15.38%	20.51%	30.77%	5.13%	2.56%	0%

Thermal preference	Colder	Cooler	Slightly Cooler	No change	Slightly Warmer	Warmer	Much warmer
Winter	5.13%	2.56%	5.13%	17.95%	15.38%	30.77%	10.26%
Summer	7.69%	20.51%	7.69%	38.46%	7.69%	5.13%	0%

Heating and adaptive strategies

- All participants heat their homes, the months of when they start and stop heating differs (with maximum variation of 3 months)
- Irregular heating patterns (months they heat, hours they heat and which rooms they heat)
- Zoning to keep their home warm while keeping the costs low
- Heating specific rooms, only when needed, mainly bedrooms
- Concern about heating costs (more than 90%)
- Use of heavier clothing (preference & need), carpets, curtains, warm/cold beverages, warm/cold showers

Windows & Ventilation

- Most residents reported practicing daily ventilation

during winter and summer (as a habit)

- 64.10% of participants experienced issues with window operation
- 41.02% of participants reported humidity problems

and mould growth in bedrooms and bathrooms.

Local climate perception

- significant disparity in local climate perception among participants
- 50% of participants perceive winter as cold, while 38% perceive it as mild
- The disparity is even bigger regarding summer climate perception.
- 38.24% of participants experience the local summer climate as mild,

23.53% perceive it as warm, and 29.41% perceive it as hot

Retrofit expectations and challenges

- The vast majority of residents expect some improvement in their thermal comfort as a result of the energy retrofit:

25.64% anticipate a moderate change, 28.20% expect a considerable improvement and 17.95% hope for a massive improvement.

- Concerns regarding the retrofit works mostly regarding safety and privacy
- Concerns about financial viability of the project and maintenance (mould issues)
- Residents not involved in any decision-making process

Conclusions

- **Understanding the complex relationship** between comfort perception, heating, ventilation and occupant behaviour in maintaining comfort
- **Winter comfort** remains a priority, high risk for cold strain
- Summer discomfort due to **overheating** is also an important result
- Irregular and diverse heating patterns, **zoning** and different use of rooms
- Ventilation practice is found to be a **habit**
- Barriers to ventilation can be categorised as social (security reasons but also **problems with window operation**

Conclusions

- **Disparity in local climate perception among residents,** which influences their thermal comfort behaviour and expectations, which also could be linked to the cultural and ethnic diversity on the estate.
- Link between thermal comfort perception and local weather perception
- The **expectations for thermal comfort** improvement post-retrofit are high, with many residents anticipating **moderate to significant improvement.**
- Potential for **rebound effect**

Conclusions

- **Importance of a holistic approach to energy retrofits, one that prioritises occupant comfort and well-being**
- Examining **the diverse aspects of thermal comfort behaviour** pre- retrofitting and assessing how retrofit measures affect the thermal comfort practices of various demographic groups
- Develop retrofit strategies that are more **equitable and effective.**

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THANK YOU!

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