Reddit to Reality: Identifying Homeowner Misconceptions About Residential HVAC Filtration to Inform Evidence-Based Community Education

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Background

- Americans spend approximately 90% of their time indoors, making exposure to indoor particulate matter a significant environmental health concern[1]
- Exposure to fine particulate matter ($PM_{2.5}$) has been associated with adverse health effects involving the respiratory, cardiovascular, nervous, and endocrine systems[2,3,4]
- Residential HVAC filtration is a strategy for reducing indoor exposure to airborne particles, but its effectiveness depends on a variety of factors[5]
- Homeowners frequently seek advice about HVAC systems and IAQ through online discussion forums such as Reddit, where information quality and technical accuracy can vary[6]

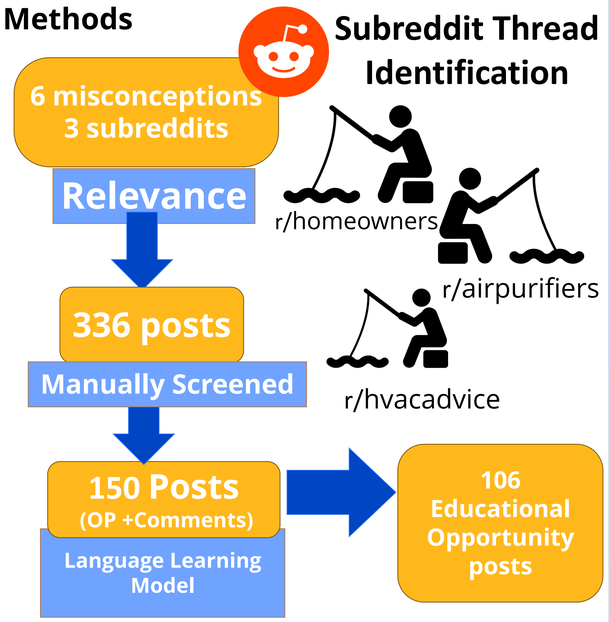
Project Goals

- Examine how homeowners discuss residential HVAC filtration on Reddit and identify misconceptions that can be addressed through community outreach and education to promote effective residential HVAC filtration practices

Key Deliverables

- Developed keyword search strategies related to HVAC filtration, thermostat settings, MERV ratings, fan runtime, and indoor air quality
- Screened exported Reddit data for relevance, removing duplicate and off-topic discussions using R and machine learning

Methods



Reddit discussions of residential HVAC filtration reveal where evidence-based guidance is needed most

Fig 1. Indoor & Outdoor Particle Interactions

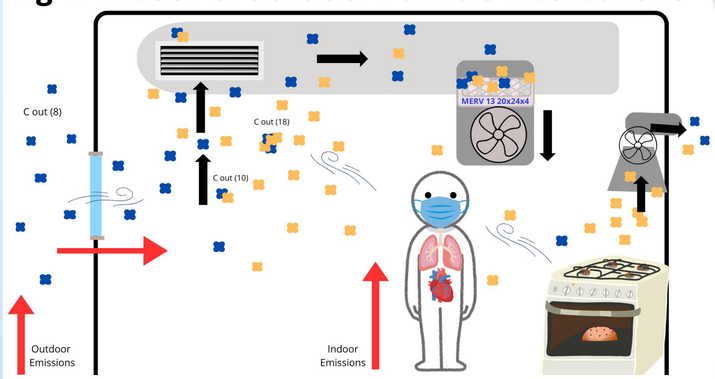


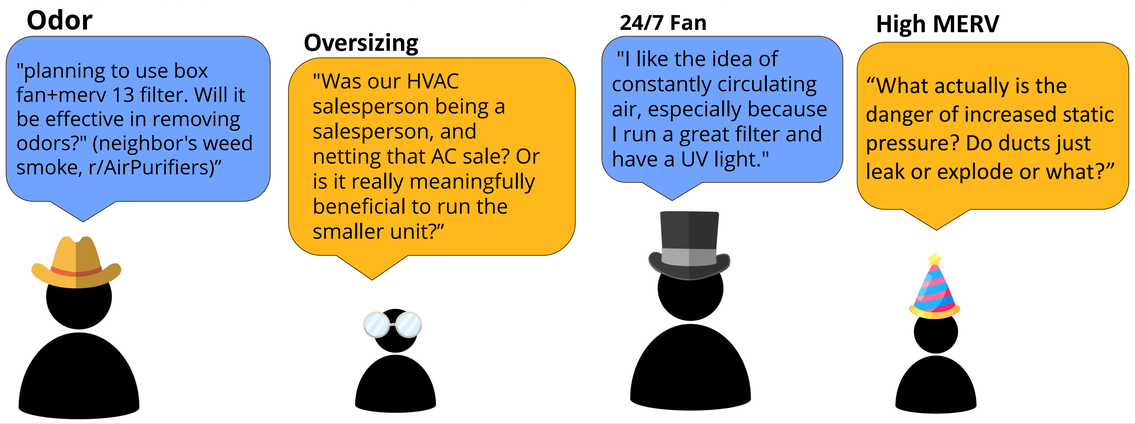


Fig 2. Contractor Training on Impact of Filters on HVAC System Performance

Fig 3. Results & Category Definitions

Misconception Category* N=161	Yes	Unsure	No	E.O**	Misconception Belief
Thermostat Runtime (N=62)	0	0	99	44	Belief that the thermostat's "auto" fan setting alone provides all the filtration a house needs.
High MERV (N=84)	0	0	77	61	Belief that the highest available MERV rating may be best, with no acknowledgment of airflow/restriction tradeoffs. 1 inch vs thicker filter.
Commissioning Gap (N=59)	6	0	102	47	Belief that a professional install alone guarantees correct performance, with no need to verify afterward.
24/7 fan (N=28)	1	0	133	21	Belief that running the air handler continuously will definitely improve indoor air quality, with no downsides. (e.g. energy use outside duct leakage
Odor (N=33)	1	0	128	20	Belief that particle filtration (MERV/HEPA) removes odors, smoke smell, or VOCs.
Oversizing (N=50)	1	0	111	46	Belief that a bigger HVAC system is straightforwardly better.
Conflicting Advice (N=66)	1	9	86	65	When two or more commenters (or a commenter and a professional/contractor quoted in the OP) give mutually exclusive recommendations on the same specific sub-question.

***Misconception category topics overlapped throughout posts**
**** Educational Opportunity (O.P) = when the thread shows open uncertainty, an unanswered factual question, or advice that's incomplete/incorrect/unverified**



Discussion

- Discussions related to residential HVAC filtration were common across Reddit, but explicit misconceptions were relatively uncommon under the project's coding framework
- MERV ratings, thermostat runtime, and contractor recommendations had the greatest discussion and educational opportunity, suggesting topics are priorities for homeowner education
- Oversized HVAC system discussions focused on comfort and performance issues rather than explicitly identifying system sizing as the underlying cause

Limitations

- Due to Reddit API restrictions limited automated comment retrieval, only original posts and the first five comments were manually screened and extracted

Next Steps

- Refine misconception messaging into concise point–counterpoint educational materials supported by current evidence
- Develop a dedicated ROCIS webpage addressing common HVAC filtration misconceptions and asked questions

Public Health Significance

- Identifying conflicting advice and educational opportunities within online homeowner discussions can guide evidence-based environmental health education that supports informed decisions about residential HVAC filtration and indoor air quality

Conclusions

- **Reddit discussions provide a valuable source for understanding homeowner perceptions, questions, and decision-making related to residential HVAC filtration. rather than widespread misinformation**
- **Discussions frequently revealed educational opportunities where evidence-based guidance could improve homeowner understanding**

References & Resources

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