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StreetTalk: exploring energy insecurity in New York City using a novel street intercept interview and social media dissemination method

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This study introduces StreetTalk, an original qualitative research methodology inspired by social media influencers, to investigate perceptions and experiences of energy insecurity among New York City (NYC) residents. Briefly, energy insecurity is defined as difficulty meeting household energy needs due to affordability, housing quality, outages and coping strategies. This present study employs dynamic short-form interviews with 34 participants from all five NYC boroughs of diverse economic, and racial/ethnic backgrounds. Thematic analysis of video-recorded interviews revealed six major energy insecurity-related categories: (1) conservation and trade-offs, (2) physical inefficiencies, (3) thermal agency, (4) response to the bill, (5) disappointment and distrust in energy-related authorities, and (6) desire for and barriers to clean energy adoption. These themes provide insight into NYC residents' experiences with energy insecurity and are consistent with prior research. Beyond new scholarly insights, this study introduces StreetTalk, an innovative qualitative research methodology emphasizing rapid data collection and dissemination through social media platforms, including TikTok, Instagram, Facebook, and YouTube (@hotandcold_nyc). Taking advantage of modern technology and modes of communication, the research team was able to effectively break down barriers to academic research consumption as the videos achieved substantial engagement, with almost 200,000 views and impressions within the first year of launching this novel street-based data collection and social media dissemination campaign.

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Introduction

Social media has revolutionized all aspects of society. Social media has altered social dynamics, communication patterns, and human relationships, allowing for connection and cultural exchange across geopolitical boundaries (Turkle, 2011). Additionally, social media has created a platform for individuals to express their opinions, experiences, and thoughts in a way that has never been seen before (Marwick and Boyd, 2014). However, social media has also been linked to negative changes in human behavior, such as reduced in-person interactions, increased feelings of loneliness, reduced physical activity, and reduced attention span (Aboujaoude, 2010; Goodyear et al. 2019; Kross et al. 2013). Unfortunately, social media platforms are also outlets for the spread of both misinformation and propaganda (Guess and Lyons, 2020). That said, social media has also reshaped the landscape of scientific research. For example, social media has facilitated unprecedented opportunities for collaboration, knowledge dissemination, and public engagement with research. Social media platforms, such as X (previously named Twitter) and LinkedIn, have become virtual meeting places for researchers across fields, allowing for both interdisciplinary and international collaborations and discussions that would not have occurred otherwise (Zimba and Gasparyan, 2021). These platforms also allow for increased visibility and accessibility of scientific findings to a wider audience (Haustein et al. 2016).

Social media has also been utilized as a valuable tool within the research process. Studies have utilized social media to recruit cost-effectively study participants (Russomanno et al. 2019) and for data analysis purposes (Dong and Lian, 2021; Ekenga et al. 2018). Despite social media changing the way individuals interact, the speed at which individuals can attain information, and demonstrating its utility in the research process, academic research has yet to embrace the full potential of a social media-based approach to advance and modernize qualitative research methods.

StreetTalk: an innovative qualitative method designed for social media. To date, qualitative research methods still focus primarily on long form, in-depth interviews with a small sample size of research participants (Morse, 2015; Silverman, 2020). Classic long-form in-depth interviews are vital for providing depth of understanding, exploration of various themes, understanding of interrelated themes, and to develop localized understanding for implementation science (Nevedal et al. 2021). However, these traditional qualitative methods also have numerous shortcomings, including time burden to participants, condensing participants' stories to themes, and long lag time of dissemination (Nevedal et al. 2021; Queirós et al. 2017). As such, we developed the StreetTalk qualitative method, a short-form social media-style interview method, to address some of the mentioned shortcomings in traditional qualitative methods.

The StreetTalk method is heavily inspired by social media influencers who have garnered millions of views by engaging people on the street and immediately asking them questions on a specific topic, such as how a participant met their partner or how much a participant earns or pays in rent. The person provides a spontaneous and dynamic response. Then, the video content is edited and posted to social media platforms, allowing for widespread dissemination of the recorded interactions.

The StreetTalk method addresses the current state of large lag times between research inception to its public dissemination. Delays occur due to the complexity of the research process, lengthy (albeit essential) peer-review process, and journal production and formatting (Bornmann, 2011; Siler et al. 2015). Further, once published, journal articles are often not easily

accessible to the public due to academic jargon and journal paywalls (Van Noorden, 2013). Moreover, due to human subjects research protections regarding confidentiality and since interview interactions are mostly captured in audio form, participants' accounts are often reduced to anonymized quotes. This leaves little opportunity for anyone other than the interviewers to visualize the participants and the context in which the data was collected. We therefore developed the StreetTalk qualitative research method to collect data on a timely topics in a public format, share participant accounts using their likeness (with permission), and disseminate insights quickly via platforms with greater reach. This approach aims to advance modalities of generating relevant, people-based, in-field information while cultivating new audiences for the consumption of research findings and scientific concepts.

Using StreetTalk to explore energy insecurity in New York City. Energy insecurity has been described as a hidden hardship, although this phenomenon impacts almost a third of households in the United States (Hernández, 2023). As living expenses, climate change, housing concerns are commonly discussed topics, the focus of the StreetTalk method centered on questions surrounding energy and energy insecurity. Briefly, energy insecurity is a multidimensional concept encompassing the challenges related to energy access, affordability, and quality, which result in the inability to meet basic household energy needs (Hernández, 2016; Hernández and Siegel, 2019). While research on household-level energy insecurity (and related topics such as energy poverty and fuel poverty) has been ongoing for decades internationally (Boateng et al. 2020; Bouzarovski, 2014; Healy and Clinch, 2002; Reddy and Nathan, 2013; Sovacool, 2013), there is a dearth of studies and public discourse related to energy insecurity in the United States (Yoon and Hernandez, 2021). This has resulted in a significant gap in understanding the unique challenges and dynamics of energy access and affordability and how this permeates everyday life (Siksnyte-Butkiene et al. 2021; Yoon and Hernández, 2021).

A handful of scholars have begun to address the issue of energy insecurity within the United States, shedding light on its complexities and implications for American society (Hernández, 2016; Bednar and Reames, 2020; Chen et al. 2022; Cong et al. 2022; Friedman, 2022; Siegel et al. 2024; Wang et al. 2021). A recent study concluded that the amount of academic literature on energy and energy insecurity-related issues in the United States is limited when compared to the amount of coverage by media outlets and journalists (Yoon and Hernández, 2021). By choosing this subject matter, we not only aimed to align qualitative research methods with the current media landscape, but also to contribute to the growing evidence base on energy insecurity in the United States.

Energy is a basic need and a prerequisite for good health (Rehfuess, 2006). Nevertheless, the cost of residential energy (used for heating, cooling, lighting, refrigeration, and cooking) has consistently increased and therefore accounts for a larger and growing percentage of household expenses (Hernández, 2023; Power, 2012). Moreover, increasing temperature extremes and the integration of technology has resulted in greater dependencies on energy to carry out daily functions. As such, the burden of increasing energy costs and demands has increased susceptibility among individuals and households to become energy insecure.

Energy insecurity is pervasive globally; however, focusing on the experience of energy insecurity in New York City (NYC) offered the opportunity to gain valuable insights into the localized

experience and the particularities of place and population dynamics. NYC's dense population, large multiunit buildings, and distinct housing dynamics present unique challenges in terms of energy access, affordability, and control (Siegel et al. 2024). In NYC, there is a range of control over heating and cooling of residential units, with many residents lacking the ability to manage indoor temperatures, as they are regulated by building management. Additionally, many NYC apartments lack central cooling systems, forcing residents to purchase window air conditioning units, which increases energy expenses. The aged housing stock and vast social inequalities uniquely contribute to the risk of energy insecurity among NYC residents.

A recent study on energy insecurity in NYC revealed a citywide prevalence of 28 percent (Siegel et al. 2024), with similar prevalence's to the national and hyperlocal levels reported in other studies (Cook et al. 2008; Debs et al. 2021; Hernández and Siegel, 2019; 2024). Siegel et al. also found that energy insecurity was associated with health vulnerabilities, including mental health conditions, respiratory issues, cardiovascular diseases and use of electronic medical device use, particularly among disadvantaged populations (Siegel et al. 2024). Black and Latine residents, low-income households, renters, households with children, long-term neighborhood residents, households with poor building conditions, and foreign-born individuals have also been identified as communities with heightened vulnerabilities to energy insecurity (Hernández and Laird, 2022; Hernández and Siegel, 2019; Siegel et al. 2024). While qualitative research has examined energy insecurity among low-income households in targeted locations including in the Bronx, New York (Hernández and Phillips, 2015), New Haven, Connecticut (Mashke et al. 2022), the southeast region (Kelley and Bryan, 2023) and in various parts of the country (Hernández and Laird, *Forthcoming*), no prior study has investigated the issue of energy insecurity in the public domain across a spectrum of demographic characteristics and shared the insights in public-facing, non-academic outlets in video format. Therefore, we developed StreetTalk to address a methodological gap in conducting qualitative research, to fill substantive gaps in the energy insecurity literature and demonstrate new potentials in research dissemination.

In this article, we introduce StreetTalk, a novel ground-truthing street intercept interview method and social media dissemination strategy. Inspired by the approach of numerous social media influencers, we have developed a formalized research methodology for probing passersby in public places on a specific topic. These short-form interviews allow researchers to get a pulse on the public opinion surrounding a given topic. Further, the StreetTalk interview video recordings can easily be edited to be published on social media platforms, thus providing easily digestible and accessible information to the public. In this paper, through the novel StreetTalk research method, we examine public perceptions among NYC residents on issues related to energy insecurity. Below we describe our methodological procedures and the results of our thematic analysis.

Methods

The motivation behind the present project was to humanize and publicize the issue of energy insecurity and develop new methods by which to collect and disseminate interview-based data that highlight the lived experiences of this highly prevalent phenomenon.

Research team. This research was conducted by a racially, ethnically, and socioeconomically diverse team of students and trainees from multiple disciplines spanning epidemiology, environmental science, anthropology, sociology, statistics, global/

public health, Africana studies, economics, health policy, and medicine. The principal investigator, (Hernández, 2024), a Latina sociologist and public health researcher who is also a NYC-native from the South Bronx, has conducted foundational research related to energy insecurity in the United States for over a decade using both qualitative and quantitative methods (Hernández, 2024). All authors have lived in NYC and experienced some form of energy insecurity in their lives. Each team member was interviewed by a peer using the interview protocol for both training purposes and to further relate to participants and the issue at hand. Data collection and analyses were completed by all authors of the study. The principal investigator designed the study, supervised the project, and provided guidance and constructive feedback throughout every stage of the research process.

Human subjects. This study was approved by the Institutional Review Board at the Columbia University's Irving Medical Center [IRB AAAU3071]. The study team supplemented the standard informed consent process with a media release form, employing university-approved language and modifying existing forms to fit this study. Participants were given a \$10 gift certificate as compensation for their participation in the study.

StreetTalk data collection. The team identified locations within the five boroughs of NYC that were both representative of the city's diverse populations and locations that would be recognizable when the videos are posted to social media (such as Yankee Stadium, 125th street, Prospect Park, and the Staten Island Ferry). The selected neighborhoods included Washington Heights, Harlem, Upper East Side, and Hamilton Heights in the borough of Manhattan; Fordham Heights and Morrisania in the Bronx; Prospect Heights and Red Hook in Brooklyn; St. George in Staten Island; and Jackson Heights and Flushing in Queens.

During April 2023, team members went into the field in groups of two to three to recruit and interview individuals to participate in this study. Team members approached potential participants on sidewalks, bus stops, parks, and other public outdoor locations to ask if they would be interested in participating in the study. Upon an individual's demonstration of interest in the study, potential participants were screened into the study if they currently lived in one of the five NYC boroughs and have experienced at least one of several indicators of energy insecurity (Siegel et al. 2024). Team members then reviewed and explained the consent and media release forms with the potential participant, while also highlighting the social media nature of the project. Individuals who agreed to participate then signed both the consent and media release forms. Participants were allowed to opt out of the study at any timepoint or redact statements made during the interview. After receiving signed consent and media releases, participants were audio and/or video recorded according to their preference. Interviews were conducted in English and Spanish by fluent speakers from the research team based on participant preference. Interviews ranged from 10–15 min on average. The questions and associated probes used in the StreetTalk interviews are presented in Table 1.

StreetTalk thematic analysis. After all recordings were transcribed, we used the interpretivism paradigm (Goldkuhl, 2012) to conduct a qualitative thematic analysis that aimed to understand and characterize individuals' experiences with energy insecurity through the codebook approach (Braun and Clarke, 2023). We followed Braun and Clarke's six phases to thematic analysis. Briefly, the six phases consist of the research team (1) becoming familiar with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing potential themes, (5) defining

Table 1 Questions and Probes for StreetTalk Interviews.	
Main Question	Probe
What do you think about when you think about your household energy?	
We're just coming out of winter. Tell me a little bit about the temperature in your home.	Is it too hot, too cold, or just right?
We're headed into the summertime. Tell me a bit about the cooling in your home.	Is it too hot, too cold, or just right?
What does it feel like to get your utility bill?	Have you had any problems paying your utility bills? Have you ever been without electricity or gas for any amount of time?
Do you have any tips for your fellow New Yorkers on how to save energy based on what you do?	
If you had the ability to change anything about your energy story, what would you change?	Energy story meaning your current situation or relationship with energy and energy consumption

Table 2 Themes and Subthemes from StreetTalk Qualitative Analysis.	
Theme	Explanation and subthemes
Conservation and Trade-offs	Balancing thermal comfort with financial security Personal responsibility to conserve and save
Housing Deficiencies and Inefficiencies	Poorly performing appliances and building systems
Thermal agency	Ability to control temperature setting Satisfaction based on ability to temperature Unresponsive landlords
Response to the bill	Emotional response Perception of inappropriate and inconsistent pricing with energy use
Disappointment and distrust in energy-related processes and oversight	Lack of support, trust, and information from utility companies and government
Desire for and barriers to clean energy adoption	Climate change concern Inaccessibility of renewable energy

and naming themes, and (6) producing a report (Clarke et al. 2015).

Six trained team members conducted the initial thematic analysis. The review team conducted the first three phases of thematic analysis on eight randomly selected interview recordings. Then, the group of reviewers met to discuss and calibrate their coding methodology. After the initial meeting, phases 1 to 3 were conducted on every interview recording by a minimum of two reviewers for consistency and validity. Once phases 1 through 3 were complete, reviewers of the same interviews met individually to review their codes and potential themes and reach a consensus. Then, all six reviewers met to discuss, evaluate, select, and name themes (phases 4 and 5) across the data set. These themes were presented to the entire research team and then finalized.

StreetTalk social media dissemination. A team led by co-author I.B.F met twice a week to oversee the social media dissemination aspect of this project. The social media dissemination team oversaw the production and all dissemination efforts utilizing the @hotandcold_nyc handle on TikTok, Instagram, Facebook, and YouTube. The team produced video shorts from the StreetTalk interviews that highlighted the themes discovered in the analysis. Team members drafted captions to accompany the video shorts on the social media platforms. Based on a social media calendar developed by the team, video shorts were posted across the various platforms. The team tracked post engagement and analytics, adapting the video production style and content to maximize engagement.

Results

From April 10th to 28th 2023, a total of 31 ground-truthing StreetTalk interviews were recorded, with 34 participants

interviewed (some videos had multiple participants). An additional 3 interviews were conducted, but not recorded and therefore excluded from the analysis. Of the 31 StreetTalk interviews, 5 were recorded in Brooklyn, 15 in Manhattan, 4 in the Bronx, 5 in Queens, and 2 in Staten Island. Five of the 31 interviews were conducted in Spanish, with the others being conducted in English. While information on age, race, ethnicity, gender and income were not collected, the video recordings feature a diverse group of individuals across various sociodemographic domains.

Participants shared a wide range of experiences related to energy insecurity based on the interview questions. Subsequent data analysis helped us identify the emergence of a clear set of themes. Table 2 presents the finalized list of themes and subthemes from the qualitative analysis. The six thematic categories were: (1) conservation and trade-offs, (2) housing deficiencies and inefficiencies, (3) thermal agency, (4) response to the bill, (5) disappointment and distrust in energy-related authorities, and (6) desire for and barriers to clean energy adoption.

StreetTalk thematic analysis

Conservation and trade-offs. Participants employed different strategies to balance thermal comfort and financial security. For instance, some chose to limit their energy usage to save money. As one Staten Island participant warned, “Don’t mess with the AC unless you really feel hot.” Another participant in Brooklyn stated that “you have to limit yourself” when referring to using air conditioning units to avoid excessive expenses. In fact, one Manhattan participant refrained from using air conditioning with one exception, “not unless I have company.”

Other participants found alternative ways to reduce energy bills and remain thermally comfortable by “spend[ing] a lot of time out of our apartment.” For other individuals, thermal comfort took

precedence over financial security. When a Manhattan resident's landlord refused to turn on the heat in their apartment building, an additional financial burden fell on the participants to furnish their own heat. The participant shared that they purchased "*space heaters when cold in house as the landlord is unresponsive*" thus further compounding the economic hardship and risks of this alternative heating strategy.

Participants further described the dilemmas over choosing between affordable energy bills and maintaining comfortable temperatures in their homes. One Manhattan participant, who initially prioritized thermal comfort, shared their struggle to then manage the resultant high costs had to switch gears on their approach when he faced crisis. The participant said, "*I couldn't keep up with the bills. So, they [the energy company] stopped everything.*" To avoid another disconnection due to unpaid bills, this participant decided to then limit their use of heating and cooling, causing them to face uncomfortable and potentially dangerous indoor temperatures in their apartment in the winter and summer.

These quotes collectively highlight the conscious decisions many New Yorkers make when deciding between being thermally comfortable and living within their financial means. The struggle to find the right balance was evident in the accounts of trade-offs and forgoing comfort, underscoring the significance of addressing the issue of energy insecurity for residents' comfort and well-being from an economic perspective.

Personal responsibility to conserve and save: The personal responsibility to conserve and save subtheme refers to participants' recognition of their personal responsibility in managing energy usage and their deliberate efforts to minimize costs. Individuals were conscious of the need to be diligent in their energy consumption to reduce the impact on their bills and sometimes blamed themselves for unexpected spikes. One participant emphasized the need to "*be careful with your light bill,*" while another revealed how they proactively "*switch all the lights off. No lights on. No TV on when we leave the room*" to reduce electricity expenses. This heightened awareness of the relationship between energy usage and billing led participants to take measures to be more mindful of their consumption habits and vigilantly conserve energy (Simes et al. 2023).

Housing deficiencies and inefficiencies. Physical deficiencies and inefficiencies was characterized by energy related challenges associated with features inside and outside of their homes, including outdated appliances, poor insulation, and lack of temperature control. Many participants discussed the subpar performance of their appliances, as one Manhattan participant noted, "*The stuff that we use are probably not the best, probably not energy efficient*" Some noted that they were unable to afford more energy efficient appliances or, as renters, unable to upgrade them on their own accord.

Some of the concern had to do with the aged housing stock of the building or the fact that the infrastructure was outdated. Participants also linked living on higher floors to having more uncomfortably hot apartments, as one participant described, "*I'm on the 6th floor and... it seems to get extremely hot in there.*" Often summertime and the use of air conditioning units exposed these fault lines in residential buildings. For instance, one participant from the Bronx was unable to support the basic use of an air conditioner. They shared that: "*During summertime it is extremely hot. When I provide myself with an air conditioner it 'outshortaged' the rest of the house.*" The electrical capacity was not enough to accommodate the air conditioning unit and when this happened the participant had to reset the circuit breaker and unplug other devices to free up capacity to run the air

conditioner. Participants also shared that their air conditioning units did not have sufficient capacity to properly cool their apartments. Still others noted that the size, type and functionality of building windows restricted their ability to properly run air conditioning window units despite that being among their only cooling option besides a fan.

During the winter months, examples of physical energy inefficiencies included the inability to control heat in the apartment, poor insulation, and nonworking heaters. When primary heating systems were not functional, residents resorted to buying their own space heaters and, in some instances, using their stovetops or ovens to heat up their apartments. As one participant in the Bronx shared, "*I've struggled for many years, I was in a shelter with my kids and plenty of times we did not have water or gas and were forced to use electric stoves, which took hours to heat our home.*" Additionally, participants were aware of the importance of insulation in their homes, as one observed: "*We have an old house and there's lots of leaks. The first thing we had to do is get new windows, but still insulation is a big help because we ... put some insulating materials in the ceiling and now the kitchen that was our coldest room has become our warmest.*" Physical deficiencies and energy inefficiencies posed a significant challenge to participants and contributed to uncomfortable temperatures and higher energy costs.

Thermal agency. Thermal agency refers to respondents' ability to control the temperature in their homes. Residents' ability to control heating or cooling in their apartment varied drastically from total control to complete lack of control. One Manhattan resident explained that they were able to partially control their home's heating "*through the radiator.*" They continued, "*I can turn [it] on and off but in terms of the energy coming through I can't control that.*" Two additional sub-themes emerged from New Yorkers' wide variation in thermal agency: (1) satisfaction based on ability to control indoor temperature and (2) unresponsive landlords.

Satisfaction based on ability to control indoor temperature: Residents' satisfaction with their apartment temperature was strongly correlated with their ability to control it. Many New Yorkers complained about not being able to control their apartments' heating during winter. One respondent in Brooklyn stated of the indoor temperature: "*It's controlled by my landlord, so I don't have much autonomy with it... In the winter it gets pretty hot.*" This New Yorker was frustrated that their apartment became uncomfortably hot in the wintertime and expressed frustration over the inability to reduce the amount of heat entering their apartment. Respondents wished that they could control the timing of their heat as well. One participant spoke of a desire to "*put the heat on faster when it's about to be winter.*" New York City heating laws are seasonally driven and cover all of winter and some of fall and spring. There are also guidelines for the minimum temperature set points and mechanisms to enforce inadequate heating complaints (*Heat and Hot Water*). There is no equivalent mandate for maximum temperatures. Therefore, New Yorkers, especially those that reside in apartment buildings where the property owner has central control of the heating system, have little say about when the heat comes on or off and how hot it gets. The same is true for hot water. The aspect of control was often a sore point for participants, many of whom would prefer more agency in determining the indoor temperature conditions year-round. Residents who were able to control their apartments' temperature appeared to be more satisfied. For example, one participant stated, "*I have central AC. I think it's just fine!*" Technologies such as heat pumps indeed have thermal agency benefits; however, the control also comes with a shift in

responsibility for covering the costs such that the tenants would assume the costs of heating and cooling, which could also be burdensome.

Unresponsive landlords: The second sub-theme, unresponsive landlords, revealed the frustration and concern expressed by participants regarding their interactions with landlords surrounding temperature control. Many respondents shared experiences of unresponsive landlords who failed to address heating issues during the cold winter months, leaving them feeling helpless in creating comfortable living conditions. For example, one participant in Queens shared that, *"wintertime [is] very cold, [I] complain about fixing heat, and they never do."* Multiple participants shared similar stories and despite the participants taking steps to improve the heating situation by filing a complaint, their landlord remained unresponsive, and the issue persisted. Many participants feel powerless regarding their ability to control home temperatures in the face of an unresponsive landlord. As one participant in Brooklyn shared: *"Our neighbors—we call each other. We can't do anything. We complain. They (the landlords) will just say, 'I'm listening,' but won't do anything. Not responding, but you have to pay the rent anyways."* This participant highlights the vexing power imbalance between tenants and landlords; landlords can repeatedly fail in their responsibility to maintain safe temperatures and perform repairs, while tenants are still expected to pay rent or face consequences. Other participants attempted to act further on these heating issues and circumvent their landlord. As one respondent in Staten Island said that to finally get their heating fixed they, *"had to call 311 (a hotline for non-emergency city services) at one time."* The subtheme of unresponsive landlords underscores the need for clearer communication and accountability from landlords to ensure more reliable energy services, particularly for renters who have little control, access, or knowledge about building energy systems.

Response to bill. The response to bill theme was characterized by respondents' reactions to receiving energy bills. Participants often expressed a wide range of negative reactions (i.e., surprise, anger, disappointment, stress, etc.) to either high energy bills or unexpected spikes in energy bills. A common sentiment among participants was that their bills were, *"more expensive than I want it to be"* (Brooklyn) and were disappointed by the high costs: *"[we] spend a lot, like, for electricity and stuff"* (Queens). Others discussed how their energy bill had increased recently, as noted by one participant, *"It's gone up significantly over the last year. My bill went from like 90 a month to almost like 200 something a month."* The way in which individuals responded to energy bills generally fell into one of three subthemes: (1) emotional response, (2) personal responsibility to conserve and save, and (3) perceptions of inappropriate or inconsistent pricing with energy use.

Emotional response: Participants shared a wide range of negative emotions towards increasing energy bills, such as *"getting a little peeved," "feeling upset," "not happy with the price," "feel [ing] horrible,"* and stating that, *"it is stressful."* One participant even likened paying the utility bills to *"a disaster."* A Manhattan respondent explained that such negative emotional responses to the bill are linked to the financial strain of paying, sharing: *"I think a lot of New Yorkers are living paycheck to paycheck. I think a lot of New Yorkers especially... are struggling financially. I'm one of them, and so I think it's hard when you see that bill that you weren't necessarily expecting."* The unexpectedly high bills place strains on many New Yorkers and add additional, unanticipated stress in a high cost city. Moreover, many New Yorkers also knew the consequences of not paying utility bills—being shutoff— and

therefore stress not only about the financial difficulty of paying but about the deleterious consequences of missing a payment. As one participant remarked, *"It worries me. I got to pay for the month and if not, they will cut your lights."* The emotional response subtheme highlights the significant negative impact that increasing energy bills has on participants' well-being, evoking feelings of stress, anxiety, and discontent.

Perception of inappropriate and inconsistent pricing with energy use: The perception of inappropriate and inconsistent pricing with energy use is characterized by participants expressing their dissatisfaction and confusion over erratic and unpredictable energy pricing. Respondents shared instances where energy bills unexpectedly spiked, leaving them unable to comprehend and justify the substantial increases. Many participants voiced frustration with the lack of consistency in billing, as they expected bills to remain stable or decrease due to efforts to reduce energy use. One participant shared their frustrations with the inconsistent pricing by stating, *"It's getting more expensive, and the bill isn't always the same. And I'm expecting it's always the same. We're not using the TV, and we use a small light during the night."* These comments revealed a sense of skepticism towards utility providers, with participants questioning the justification for the steep costs, especially considering the service provided.

Many participants expressed their dissatisfaction with pricing, deeming it excessive for the services rendered by corporate utilities, namely Con Edison and National Grid. One Manhattan participant thought their bill seemed unreasonably high and insisted that they wanted further justification, *"I would like to know where all the money we pay to it [ConEd] is going to."* Along the same lines, another Manhattan participant shared, *"I was gone for two months. It didn't really show on my bill. I unplugged just about everything except for the Wi-Fi, and I should have had a lower bill at least a month after or something. I wrote them [ConEd] a letter just months ago, and I have not heard anything. I just wanted to know why that is. Am I just paying for it to come into the house? And I hardly use anything?"* The perception of impropriety and inconsistency in pricing reflects participants' sense that energy costs were not always commensurate with their actual usage, leading to a lack of confidence in the billing process, and a feeling of frustration and powerlessness in not being able to do much to reduce costs despite vigilant conservation efforts.

Disappointment and distrust in energy-related processes and oversight. Many residents that were interviewed on the streets of NYC expressed a strong desire for increased transparency, easily accessible and responsive support, effective communication and greater assistance from utility companies and the government. Participants felt unsupported by utility companies and government agencies. One Brooklyn participant explained the lack of support they received from the government when they called the city's housing department for help with energy issues that their landlord was neglecting. This participant argued for greater enforcement: *"The housing department needs to have more people checking [the energy conditions of apartment buildings]... When you call, they say that they will contact the landlord. And even if they do, and they put it on, the heat, it's just for short 45 min and then that's it."* This participant expressed disappointment in NYC governments lack of enforcing their own heating requirements. The participants followed the appropriate protocols and still did not receive the proper heating that their landlord is required to provide. The participant wished that the housing department took a more active role in addressing tenants' complaints and ensuring landlord compliance.

Many participants expressed interest in the government and energy providers offering greater access and resources related to

energy assistance programs, especially for low-income residents. One Brooklyn participant shared their call for help for the most vulnerable, *“I just keep asking the government for help [and] support, especially for the lowest income families.”* Another Manhattan participant hoped for more affordable rates across the board, *“I would ask ConEd to make the bill lower for everyone.”* Participants felt that energy bills were too high, and there was a need for better assistance programs from the utility companies or the government. However, participants also demonstrated a lack of knowledge regarding existing energy assistance programs. One Bronx participant shared that the lack of visibility precluded their participation in energy assistance programs, *“I don’t really [know] any of kind of those things. I don’t see any programs.”* This common sentiment among participants highlighted the need for more accessible information and enrollment in existing energy affordability programs.

Desire for and barriers to renewable energy adoption. Participants were hopeful and interested in renewable energy resources as alternatives to fossil fuels and unknown energy sources. One Brooklyn participant highlighted their disappointment in current energy sources, sharing: *“I know it’s not coming from sustainable sources, so that kinda bums me out.”* They wanted renewable energy options, particularly solar power, as expressed by a Manhattan participant, *“I would like to get solar!”* However, in NYC there are many barriers to accessing renewable energy, such as living in multiple unit housing or financing the installation of solar panels. Climate change concerns served as a motivator for clean energy adoption. Anxieties about the role of energy in exacerbating climate change was a critical inspiration for upgrading energy sources to renewables. One Brooklyn participant urged: *“Change the source of the energy itself. It’s really bad for public health and obviously climate change.”* There was a palpable longing for clean energy among participants due to their desires to prevent and mitigate further deleterious effects of climate change. Still, there were also many perceived barriers to renewable energy uptake.

Financial constraints and practical challenges including the limitations associated with renting stood as impediments to acquiring renewable energy, despite recognition of the associated benefits. Participants voiced frustration over the inaccessibility of solar energy programs. One Bronx participant hoped to benefit from the potential financial savings of renewable energy stating, *“If the city of New York will allow us to have solar panels, maybe life will be a little bit easier. You know, the majority of [us] are paying light and gas and living from paycheck to paycheck.”* This comment also expressed a desire for the government to take steps to make renewable energy more accessible.

A participant in Queens expressed their wish for apartment buildings to integrate solar energy solutions, while acknowledging the challenges of a slow return on investment and high upfront costs: *“I wish I had more control over sources of energy but with solar panels it does not pay quickly; it is about 30 years to get money back.”* Additionally, a Staten Island participant living in a single-family home shared concerns over renewable energy not being reliable by stating, *“I’ve always thought about, like, getting solar but I’ve heard it’s just unreliable. It’s expensive to put in and then after that it doesn’t hold enough, or it doesn’t provide enough energy.”* With more assurances on the reliability of solar to meet the household’s energy demand, this participant would opt to invest in solar energy, but the substantial doubts were a hurdle.

Participants discussed the economic disparity between renewable and non-renewable energy options from utility companies, with one Manhattan participant noting the higher costs of opting for energy sourced from clean energy: *“ConEd has this thing where you can sign up for renewable energy, right? But it’s a lot more expensive than it [is] for regular energy.”*

In New York City, participants shared that the ability to use sustainable energy is only attainable at high costs and therefore individuals who are struggling financially are unable to take on the associated financial burdens of switching to renewable energy sources despite strong interest. This highlights the need for more practical, accessible, and economically feasible options for New Yorkers, many of whom are otherwise ready to make the switch to clean energy.

StreetTalk social media dissemination. Within the first year of launching the @hotandcold_nyc social media channels, they have amassed nearly 200,000 views and impressions. Figures 1–4 are sample screenshots of social media pages and engagement analytics from YouTube, Instagram, TikTok, and Facebook, respectively. The engagement of videos differed by social media platform. To date, YouTube is our most successful platform, with over 88,795 views. Instagram is our second most successful platform with 41,730 views, closely followed by TikTok with over 47,285 views, and then Facebook with over 1,225 views as of July 28, 2024. There are also several thousand likes and comments across the platforms.

Discussion

This study utilized a novel, ground-truthing, StreetTalk qualitative research methodology to understand public perceptions among NYC residents on issues of energy insecurity. The qualitative analysis revealed six major themes: (1) conservation and trade-offs, (2) housing deficiencies and inefficiencies, (3) thermal agency, (4) response to the bill, (5) disappointment and distrust in energy-related processes and oversight, and (6) desire for and barriers to renewable energy adoption. These themes summarize how energy insecurity impacts the lives of NYC residents and are congruent with prior quantitative and qualitative findings (Siegel et al. 2024; Hernández et al. 2016). Our results demonstrated the commonality of trade-offs, energy limiting behavior, and vigilant conservation (Cong et al. 2023; Hernández, 2016; Simes et al. 2023). Siegel et al. (2024) found that 39 percent of NYC residents report reducing energy to save on their bills, which was the most common energy insecurity indicator reported in a represented survey. Rather than being wasteful, participants tended to be extremely mindful of their energy consumption and did as much as possible to restrict use, primarily to manage costs. Yet, participants also found the physical inefficiencies and capacity limitations encumbered use of appliances and the ability to achieve comfort, which is consistent with prior research on housing quality as a core component of the energy insecurity experience (Bednar et al. 2017; Goldstein et al. 2022; Hernández, 2016).

In addition to confirming and further substantiating prior findings related to the energy insecurity phenomenon, the StreetTalk interviews also offered novel insights. Findings related to thermal agency, emotional responses to bills, perceptions of procedural injustices and oversight gaps, and interest in clean energy adoption among everyday people who are not affiliated with programs or larger movements extend the literature in important ways. While the concept of thermal agency is under-explored in the current literature on energy insecurity and related topics, there is well-established evidence base in the field of occupational health that indicates that thermal agency in the workplace increases productivity, workers’ health, and workers’ wellbeing (Cheong et al. 2003; Seppanen et al. 2004; Seppanen et al. 2006). Future studies should explore thermal agency further as a manifestation of household energy insecurity to understand, for instance, how decisions about heat provision by others activate coping strategies, such as using stoves, ovens, or space

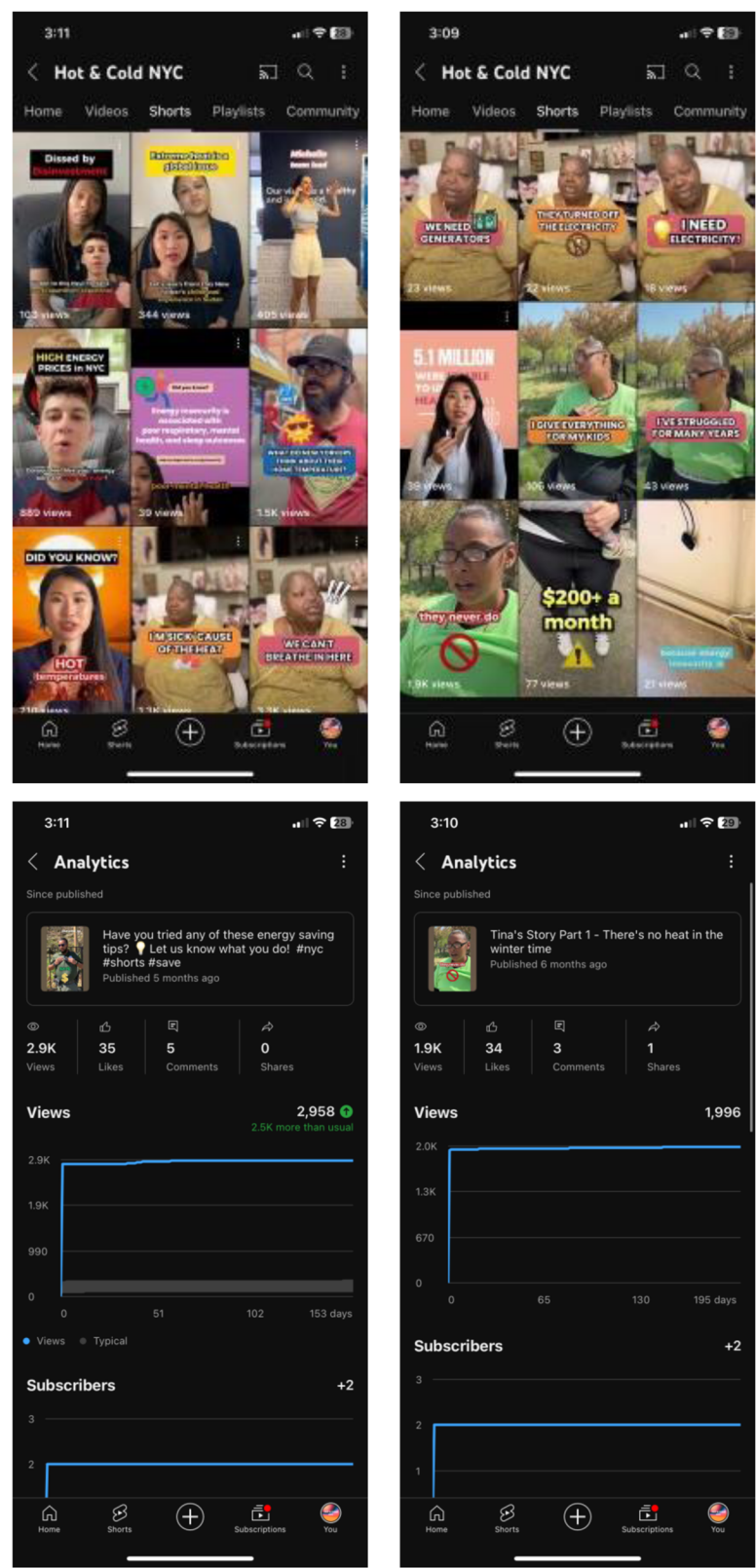


Fig. 1 YouTube. Sample screenshots of Hot & Cold NYC’s YouTube channel and engagement analytics.

heaters, to compensate for the lack of control over thermal conditions. This could also be an outcome of interest in studies on the impacts of heating/cooling upgrades such as the installation of heat pumps which offer more thermal control, albeit often assuming additional costs in tandem.

Participants described themselves as feeling “impotent” vis-à-vis landlords, utility providers, governmental agencies, inflation and the rising cost of living. Having limited domain over their energy realities played a vital role in influencing indoor temperatures, home energy inefficiencies, utility rates, access to relief

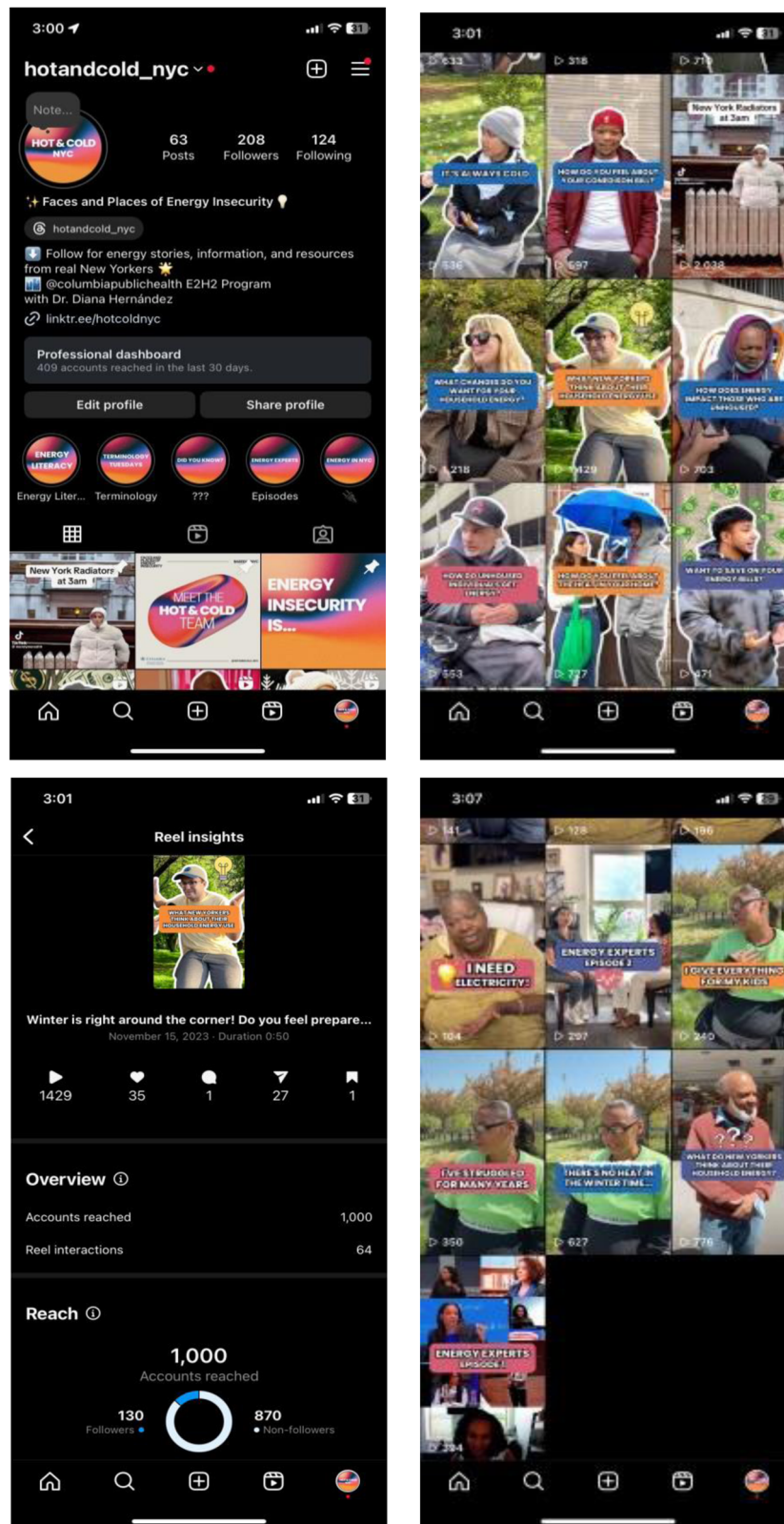


Fig. 2 Instagram. Sample screenshots of Hot & Cold NYC's Instagram page and engagement analytics.

resources, mechanisms of enforcement and ability to keep up with expenses. Appreciating these nuanced power dynamics across domains and how some groups are rendered more powerless than others is another area worthy of further exploration. Moreover, our findings point to the emotionality of this

experience including participants' reactions to their bills which were often marked by frustration and a sense of hopelessness and resignation. While there was awareness and interest in renewable energy technologies and energy assistance programs, many participants described barriers that reduced the likelihood of uptake.

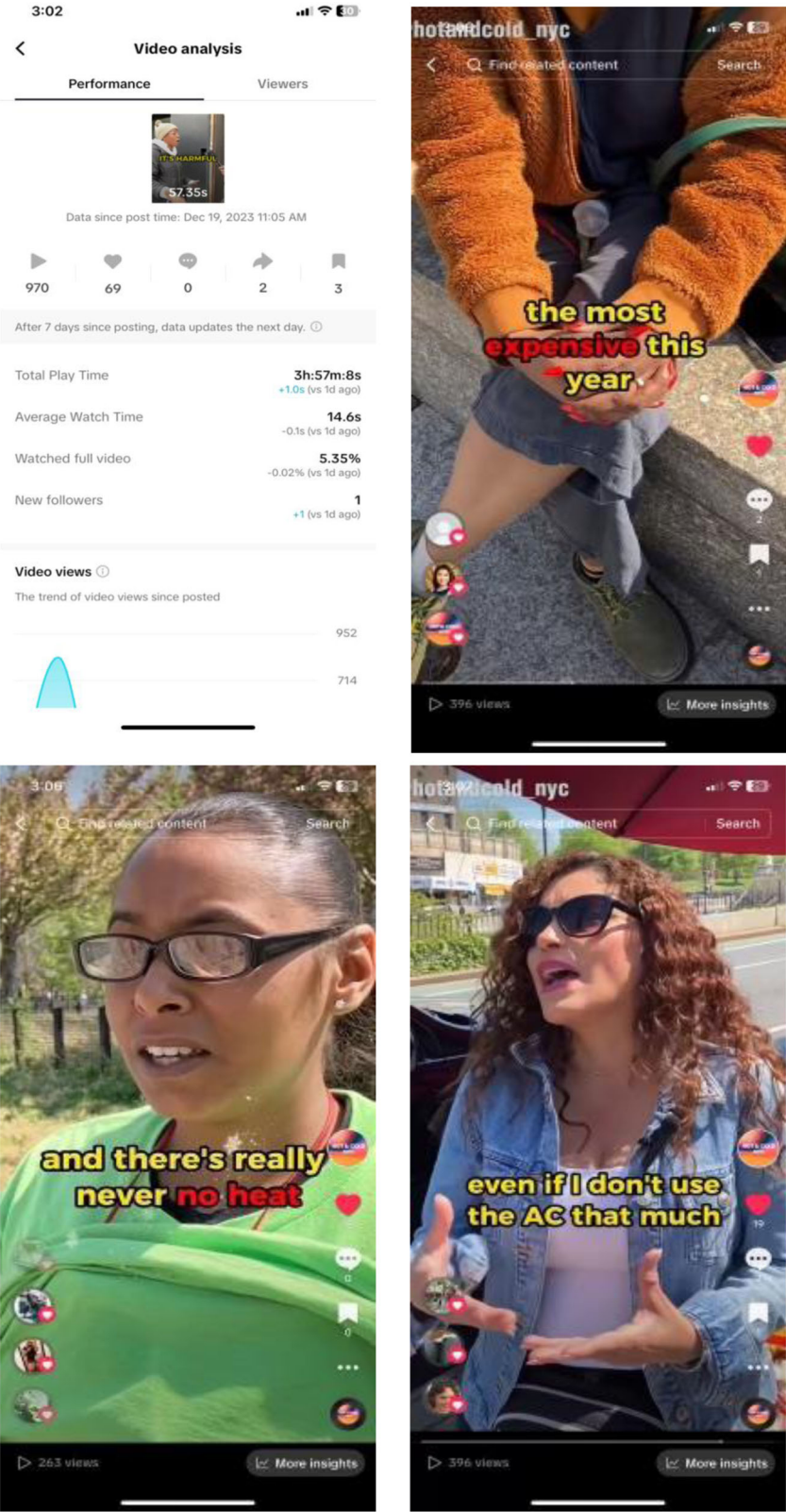


Fig. 3 TikTok. Sample screenshots of Hot & Cold NYC’s TikTok videos and engagement analytics.

These findings add to existing literature, but they also point to addressable issues that can alleviate the burdens of energy insecurity via greater supports.

The study’s findings shed light on respondents’ experiences of unexpected bill spikes and perceived lack of transparency in

pricing, reflecting broader concerns within the energy sector. Previous research has explored the complexities of pricing transparency, energy literacy, and tariff structures, offering valuable insights into these challenges (Brounen et al. 2013; Numminen et al. 2022; Trotta et al. 2017). Studies focusing on

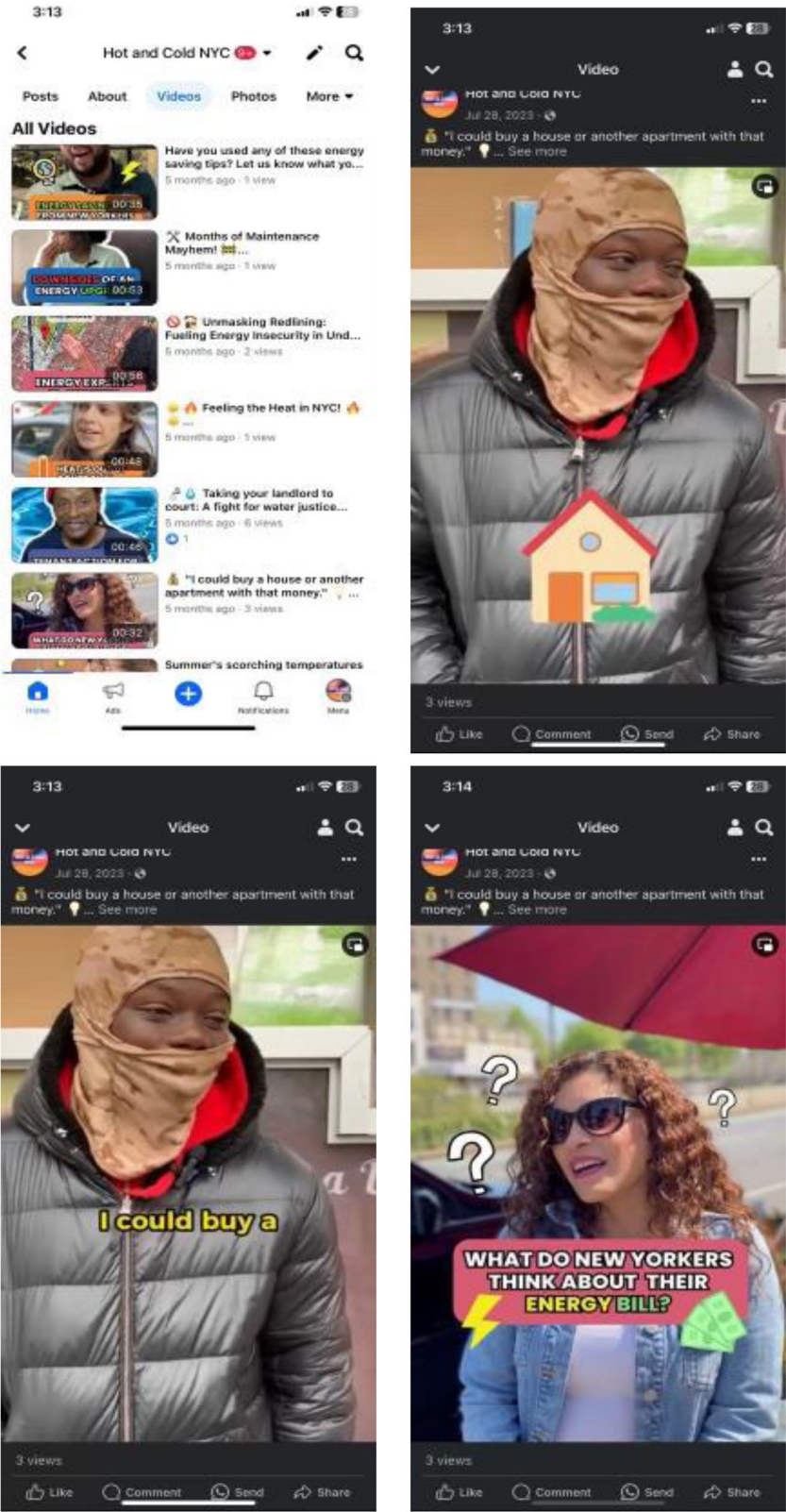


Fig. 4 Facebook. Sample screenshots of Hot & Cold NYC’s Facebook page and engagement analytics.

pricing transparency have highlighted the importance of clear and accessible information for empowering consumers and promoting trust in energy providers (Kowalska-Pyzalska, 2018; Lavrijssen, 2017). Additionally, research on energy literacy has emphasized the need for educational initiatives to enhance

consumers’ understanding of energy-related concepts and mitigate misconceptions (Abrahamse et al. 2005; Iweka et al. 2019). Energy literacy interventions and educational initiatives are essential, especially since we observed that some participants made statements that were based on incomplete or wrong

information and misconceptions. For example, in NYC, rooftop solar panels do not typically affect the reliability of a home's energy capabilities, unless that home has been fully islanded from the electricity grid, a practice that is not commonly utilized. Another example of misconceptions among NYC StreetTalk participants was the outdated belief that there is a 30-year payback period for solar installations. However, according to a systematic review published almost a decade ago, the payback time for rooftop solar ranges from one to four years, and given advancements since then, it is reasonable to assume that payback period is even shorter now particularly when factoring in incentives at the local, state and federal levels (Bhandari et al. 2015). Identifying and understanding these misconceptions is essential for advancing public education initiatives and policy decisions aimed at promoting accurate understanding of energy issues including the adoption of renewable energy technologies.

In this article, we introduce StreetTalk, a novel qualitative research method and ground-truthing process inspired by social media that allows for rapid data collection and timely, accessible dissemination of findings. Based on the numerous social media influencers who have conducted informal streetside interviews, we have developed a formalized research methodology for probing members of the public on a specific topic. In our case, we did so on a topic that affects almost everyone—household energy—and explored dimensions of this issue that affect people across the social and economic spectrum. These short form interviews allowed our research team to quickly gain a pulse of the public opinion on this given topic. Furthermore, the StreetTalk interview video recordings were easily edited for publication to social media platforms, thus providing easily digestible information to the public with a quick turnaround time between data collection and dissemination. In addition to a traditional research team (principal investigator, interviewers, data analyzers, etc.), the StreetTalk methodology requires training in the development of a social media campaign as well as content creation to populate and manage the social media component for broad-based dissemination. Doing this type of research also requires harmonizing efforts between human subjects and communications protections with informed consent and media release forms both being necessary to comply with legal and ethical protocols.

The StreetTalk method has potential to create a paradigm shift in how research is conducted and disseminated. The street intercept approach provides a mechanism to engage a broad swath of participants identified in public places, including those for whom energy insecurity is not an immediate threat or concern, offering a unique perspective often missing from similar energy insecurity research. We were able to obtain multiple perspectives from people across various racial/ethnic and socioeconomic strata. Other street intercept recruitment and survey methodologies have been employed to target hard-to-reach populations and explore subversive topics in prior studies (Graham et al. 2014; Miller et al. 1997; Ompad et al. 2008; Rotheram-Borus et al. 2001), however, these approaches have not been previously used for academic research on emergent environmental issues. Therefore, the StreetTalk street intercept interviewing methods is innovative and promising in its potential to reach varied participant pools and larger, more diverse audiences. As such, the StreetTalk qualitative research method allows for rapid data collection and timely dissemination—having the potential to alter scientific research accessibility and communication to the public, while maintaining rigorous standards in data analysis and reporting of findings.

Unlike traditional qualitative interview methods, the StreetTalk method was developed for community embedded data collection and timely and engaging dissemination of data via social media. After following established protocols for deciphering core themes

of the interviews, the research team conducted multiple meetings to also decide on a strategy and approach to creating short-form videos appropriate for social media sites. The videos most often featured compilations of answers to interview questions or responses that clustered around themes that arose during the thematic analysis process. Within one month of completing the interview recordings, our team began sharing videos on social media platforms including TikTok, Instagram, Facebook, and YouTube under the handle @hotandcold_nyc. Our research team continued sharing new videos every week and engaged with similar accounts to enhance exposure. The team also continuously studied and experimented with various social media styles to identify ways to hone video production and editing to increase engagement and viewership.

While the need to communicate science to the public is widely agreed upon, in practice, scientific findings are often siloed within industry and research institutions (Brownell et al. 2013). Most scientific findings are only published and disseminated in peer-reviewed academic journal articles. In addition to many journals having a paywall to access these articles, journal articles are often crowded by academic jargon that is difficult for the general public to understand (Bullock et al. 2019; Day et al. 2020). As such, both financial and educational barriers prevent the general public from accessing scientific information that resonates with their lived experience. Furthermore, academic research is often criticized for its lag time from data collection to research publication to public understanding and ultimately to policy change (Morris et al. 2011). As such, the StreetTalk qualitative research methodology was developed to both address these barriers to scientific knowledge access and to reduce the scientific lag time. Dissemination through social media is significantly faster than traditional academic means, as evident through our videos reaching hundreds of thousands of viewers in only a few months. And not only does StreetTalk allow for near immediate dissemination of findings, but it also allows for these findings to be shared on social media where the majority of the general public already receives information (Liedke and Wang, 2022).

Often overlooked within the public discourse, energy insecurity remains America's hidden hardship (Hernández et al. 2022; Yoon and Hernandez, 2021). Normalizing conversations about this critical issue is essential to enhancing public understanding and engagement. By utilizing social media platforms, StreetTalk aims to bridge the gap between academic research and public discourse, making scientific findings more accessible and relatable to the public. The speed and reach of social media dissemination allow for near-immediate access to information that resonates with people's lived experiences, breaking down both financial and educational barriers to scientific knowledge. Our social media channels have already reached almost 200,000 views and likes within a ten-month timeframe, a significant achievement in expanding the reach of academic research beyond traditional academic outlets. The active engagement we have received, including likes and comments discussing energy insecurity issues, highlights the importance of social media in fostering meaningful dialogue and community involvement. Moving forward, the research team plans on conducting further thematic analysis of user engagement. The analysis will examine factors that may have impacted more views and greater engagement to develop best practices in this approach. This follow-up study will also consider how to best refine this strategy, as well as evaluate whether this method is more effective in stimulating public discourse on the topic compared to traditional methods. For example, through a thematic analysis of comments, we can assess whether the engagement on social media platforms effectively humanizes the issue of energy insecurity by examining the depth and nature of discussions surrounding personal experiences, emotional

responses, and connections made by users. By delving into the nuances of user interactions, we aim to determine the extent to which the study succeeds in humanizing the issue and fostering empathy and understanding among the public. The information gained from this current and the follow-up analyses will drive future research projects, while at the same time existing as a low-effort way for NYC community members to take ownership over and relate to energy insecurity research.

Strengths and limitations

This study has several strengths. As discussed earlier, this novel research methodology allows for rapid data collection and dissemination of findings. Additionally, the research methodology allows for distribution of information that is easily accessible to the public and not siloed within academia. Lastly, while this initial study had a small sample size, the methodology allows for a relatively large sample for qualitative interviews, due in part to its public and short-form format, thus providing a good pulse on the public perception of a specific topic. That said, there are also limitations to this study. StreetTalk interviews are intentionally focused and brief, and therefore responses may not have the depth and exploratory goals of understanding the particularities of their experiences as traditional qualitative research methods. As such, this research methodology is best used as a ground-truthing activity to begin exploring public perceptions and be a jumping off point for more traditional longform interviews, if warranted. The results from a study using StreetTalk can then be used to develop further qualitative approaches that can build on the initial findings in greater focus and depth. This study methodology is prone to selection bias based of who was available to stop and willing to speak to interviewers on camera. This street-based methodology may result in bias toward respondents who are comfortable appearing on social media and excludes individuals who are homebound due to medical or other conditions. This can be mitigated by reassuring participants that their appearance in social media is not required to participate and that techniques can be used to protect their identity such as filming in ways that does not capture their face or using audio only; we employed these tactics as instructed by participants. These participants' responses can still be included in the analysis and included in social media content using various creative techniques such as audio alongside captions. Additionally, this study was conducted in the context of NYC and therefore the results may not be generalizable to other locations, though the methods are highly adaptable and can easily be used in other settings.

Based on the themes identified in the StreetTalk interviews, next steps include conducting more in-depth, home-based interviews in NYC that explore the themes discussed in this paper. Additional next steps include conducting these interviews in other cities and about other topics. For instance, the StreetTalk method can be applied as a ground truthing technique for unforeseen catastrophic events, such as extreme weather events, pandemics, and sociopolitical instability, all of which require rapid data collection and dissemination of findings (Adams et al. 2024).

Conclusion

This study employed an original StreetTalk qualitative research methodology designed to gain insights into perceptions of energy insecurity among NYC residents. Through a thematic analysis, we identified six major themes that shed light on how energy insecurity impacts the lives of local residents. Our findings reinforced prior research (Siegel et al., 2024; Hernández et al. 2016) by highlighting the prevalence of trade-offs, energy conservation,

and the influence of external factors such as landlords, utility providers, and government policies.

The strength of the StreetTalk approach lies in its ability to engage a diverse range of residents, making it a valuable tool for exploring public opinion on various issues. Moreover, this methodology facilitates rapid data collection and dissemination, bridging the gap between scientific research and the general public. Our use of social media platforms to share findings has garnered significant public attention, demonstrating the potential for breaking down barriers to scientific knowledge and processes.

In practice, scientific research often remains locked within academic institutions, with lengthy delays in publication and limited accessibility. StreetTalk addresses these challenges by providing a means for connecting with the public and more swiftly disseminating study-related content to wider audiences on platforms they already frequent for information and engagement. The StreetTalk methodology represents a transformative approach to reducing the lag time between data collection, research publication, public understanding, and policy change.

Data availability

The data underlying this article are available from the corresponding author upon reasonable request.

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Author contributions

Conceptualization: NLS, IBF, MIR, ELS, DH. Methodology: NLS, IBF, MIR, ELS, DH. Software: NLS, IBF, MD, DH. Formal analysis: NLS, IBF, MD, JFHP, JB, DDLS, DH. Data Curation: NLS, IBF, MD, JFHP, JB, DDLS, DH. Writing-Original Draft: NLS. Writing-Reviewing & Editing: NLS, IBF, MD, JFHP, JB, DDLS, MIR, GYM, ELS, DH. Visualization: NLS, JB. Supervision: GYM, ELS, DH. Project administration: IBF, MD, JB, DH. Funding acquisition: DH

Competing interests

The authors declare no competing interests.

Ethical approval

This study was approved by the Institutional Review Board at the Columbia University's Irving Medical Center [IRB AAAU3071]

Informed consent

Team members reviewed and explained the consent and media release forms with the potential participant, while also highlighting the social media nature of the project.

Individuals who agreed to participate then signed both the consent and media release forms prior to enrolling in the study.

Additional information

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