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Homebuyer Opinions on Home Fire Sprinklers

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Abstract

This research article aims to gather data regarding home buyer attitudes toward home fire sprinkler systems. Specifically, the research article will seek to determine the price threshold where home buyers would be willing to invest in a home fire sprinkler system. To that extent, a survey instrument was developed to understand public opinion on home fire sprinklers, including any demographic differences such as age, gender, and income, as well as preexisting knowledge of home fire sprinkler technology as self-reported by the respondents. Furthermore, it was desired to research whether receiving even minimal education regarding home fire sprinkler technology could change the opinion of the survey participants. The initial nine-question survey collected demographic data and baseline opinions on home fire sprinkler systems. After answering the initial nine questions, survey respondents were directed to watch a four-minute, 22-second education video from the Ontario Association of Fire Chiefs. After watching the video, two follow-up questions were asked to determine if the respondents' opinions had changed. Before watching the video, a minority (44.5%) indicated that they would spend 1% or more on home fire sprinklers. After watching the video, nearly three-quarters (73.3%) stated they would spend 1% or more, reflecting a 28.8% swing in opinion. The study revealed some demographic differences related to age, gender, and income that warrant further study. Recommendations made as a result of this study include prioritizing home fire sprinkler education as a component of fire departments' Community Risk Reduction (CRR) programs, creating home fire sprinkler educational messaging that targets specific populations, and continuing to research ways to make home fire sprinkler technology more affordable.

Keywords: sprinklers, fire service, fire protection systems, fire suppression technology, home fire safety

1. Homebuyer Opinions on Home Fire Sprinklers

Historically, the United States has experienced a higher fire death rate than most industrialized countries (U.S. Fire Administration, 2011). Since 1980, the U.S. has seen a significant decrease in fires and fire-related deaths thanks partly to increased fire prevention efforts. These efforts have included improved building codes, enhanced fire suppression systems, increased awareness, and better fire prevention strategies (McKelvey, 2023). While the fire safety standing of the United States has dramatically improved over the past several decades, it remains in the upper half of industrialized countries in terms of fire death rate, with the tenth highest fire death rate per million people (U.S. Fire Administration, 2011). Furthermore, recent research suggests that most of the gains were made more than a decade ago, suggesting that the trend of fire loss reduction in the U.S. may have stagnated (Hall & Everts, 2022). Indeed, the rate of death per 1,000 fires was 35% higher in 2021 than it was in 1980 despite a 54% reduction in home fires and a 44% decrease in overall deaths in the same timeframe. This data suggests that there is still much work to be done to reduce both property and life loss due to fire in the U.S.

A significant change in fire behavior has occurred in recent decades due to changes in home construction and household materials. The synthetic components commonly being used in today's home furnishings burn more readily than legacy materials, while the open floor plans and engineering construction techniques favored in modern homes have increased the potential for early flashover and structural collapse (Gately, 2017). Traditionally, the fire service has focused its fire safety messaging on proven solutions such as smoke alarms and fire escape planning. However, the synergistic effects of modern home construction and synthetic furnishings have dramatically reduced the occupants' window of escape, even in homes with properly installed and working smoke detectors (Avsec, 2015). Home fire sprinklers have been advocated as a potential solution to contain fires in the incipient stage and protect structural integrity, preventing flashover and improving the chances for occupants to escape or be evacuated (Figueroa, 2011).

The advantages of residential fire sprinkler systems are well-known to the fire service; they have been proven to give residents time to escape and contain fire close to the point of origin, or at least greatly slow its progress (Avsec, 2015). Statistically, fire sprinklers are an outstanding measure to prevent death and injury in residential fires. Silvia (2023) analyzed five years of data provided by the California Office of the State Fire Marshal, which showed that sprinklered homes reduced property loss by an average of 43%. The study also found that civilian fire injuries and deaths were practically non-existent in fires involving sprinklered homes, and firefighter injuries were also substantially reduced. Despite the substantial evidence that home fire sprinklers have a positive life safety and property conservation benefit, significant opposition to their more widespread adoption remains. The National Association of Homebuilders (NAHB) believes that home fire sprinkler systems constructed per current industry standards are significantly more expensive to install and maintain and are not as cost-effective in improving the life safety of residential building occupants as smoke alarms (NAHB, 2006). The NAHB also states that home buyers, when given the option, "overwhelmingly

choose not to install fire sprinklers in their homes due to the high cost of installation and maintenance (NAHB, 2006).”

The purpose of this research article is to gather data regarding home buyer attitudes toward home fire sprinkler systems. Specifically, the research article will seek to determine the price threshold where home buyers would be willing to invest in a home fire sprinkler system. The problem is that there have been significantly disparate results from surveys conducted by opponents and supporters of home fire sprinkler systems. This research article will attempt to review the existing data and measure current home buyer opinions to formulate a more robust understanding of the subject.

2. Background and Significance

Despite their proven effectiveness as a life safety tool, fire sprinklers remain a controversial option for residential homes, with the debate centering mostly on the cost-effectiveness of home fire sprinkler systems as they are currently outlined under NFPA 13D. Opponents of the proliferation of home fire sprinklers cite the chilling effect that the cost of these systems could have on the new home market. The NAHB states that thousands of dollars of extra cost is “more than many home builders’ customers can bear” and even a \$1,000 increase in home prices could keep more than 200,000 households out of the market nationally (NAHB, n.d.). The NAHB claims that “undeniable economics” dictates that increased cost for a product lowers demand, and a higher cost of housing at any level will remove people from the marketplace (NAHB, n.d.). Furthermore, the NAHB states that most home buyers see sprinklers as a liability rather than a benefit and are less likely to purchase a home with sprinklers installed (NAHB, n.d.).

In an opposing viewpoint, Dewar (2001) conducted a review of available economic literature, focusing on the price elasticity of demand, which is defined as the percentage change in new home sales divided by the percentage change in price. The research found that the housing market is price-inelastic, meaning that a change in price will have a small impact on the quantity sold (Dewar, 2001). The study argues that the commonly cited 1% increase in the cost of the construction of a new home caused by installing a fire sprinkler system will not price a potential homebuyer out of a home. Dewar indicates that housing is both an investment good and a consumption good; therefore, the cause and effects of the price of housing are more complex than a consumption good alone. The study argues that available income for housing and the current mortgage interest rate are the decisive factors that dictate the home a potential homebuyer can purchase (Dewar, 2001). This conclusion is supported by more recent research into the housing market by Clayton, Miller, & Peng (2008), Albouy, Ehrlich, & Lin (2016), Orlando & Redfearn (2018), and Howard, Liebersohn, & Ozimek (2022). These studies do not specifically address the topic of home fire sprinklers but support the idea that the housing market is not dictated by the cost of homes in a vacuum; rather, it ebbs and flows based on more complex socioeconomic factors.

In a study on six municipalities in Bucks County, PA that have adopted residential fire sprinkler ordinances, Jakubowski (2011) found that there was little or no impact on residential development in those communities. In fact, home building accelerated in some of these

communities since the sprinkler ordinances were adopted, with homebuilders investing almost \$815 million in construction and buyers purchasing almost 7,000 sprinklered homes (Jakubowski, 2011). The study also evaluated two similar townhouse developments constructed adjacent to each other in the same municipality, finding that there was little difference in market price despite one being sprinklered and the other not. Further study by Bowles (2018) found no evidence of a negative impact on the housing market in California after the adoption of home fire sprinkler requirements, and Ford (1997) found that the City of Scottsdale, AZ experienced no negative impact on its positive growth cycle in the ten years since its residential sprinkler ordinance was adopted.

Despite the lack of evidence that the cost of home fire sprinklers has any impact at all on the affordability of housing, the narrative that home fire sprinklers present an unnecessary burden to home buyers has garnered a significant amount of credibility in the court of public opinion. Although all model building codes in the U.S. require fire sprinklers in one-and-two-family homes, only Maryland, California, and the District of Columbia have kept that requirement in place as of today (Silvia, 2023). The NAHB (2019) touts the fact that almost all states have removed the requirement from their residential building codes, and Pennsylvania State Representative Garth Everett called the repeal of the state's residential fire sprinkler requirement "a victory for all Pennsylvanians seeking to build and buy new homes (Roulo, 2011)." Research by Dell'Orfano (2012) indicates resistance to residential sprinklers comes on both technical and philosophical grounds and is not limited to homebuilders, but also the public and even members of the fire service. Understanding the concerns and perceptions of the public on home fire sprinklers is necessary to craft effective education on the topic.

3. Literature Review

The NAHB (2006) conducted a survey of 800 "likely voters" to determine their opinions regarding residential fire sprinklers. When asked how much they would be willing to pay to install fire sprinklers, 28% of the survey respondents said that they would not have sprinklers installed regardless of cost; 25% stated they would pay \$1,200, 23% stated they would pay \$4,800, and 3% stated they would pay \$9,600 or more. When offered a theoretical free incentive to purchase an available option, 34% of the survey respondents stated they would purchase a fire sprinkler system; the remaining respondents selected other options such as granite kitchen countertops, a finished basement, or upgraded carpet and flooring (NAHB, 2006). The survey found that 89% of respondents believed that smoke detectors do an adequate job of protecting their families in a house fire, and 65% of respondents believed that fire sprinkler systems should be optional rather than required for new homes.

Dell'Orfano (2012) utilized surveys and focus groups to analyze opinions on home fire sprinklers from both citizens and firefighters within the South Metro Fire Rescue Authority, which is located south of Denver, Colorado, and serves an area of approximately 178 square miles, including seven cities and portions of two counties. The study found that the general population and firefighters held similar opinions on home fire sprinklers; both groups had significant concerns regarding system maintenance and the potential for water damage. Both

groups also indicated a general lack of knowledge regarding the function of home fire sprinklers, and some participants in the focus groups admitted that their opinions were shaped by previous experience with commercial-type sprinkler systems (Dell'Orfano, 2012). 49% of citizens and 61% of firefighters indicated that they were opposed to home fire sprinkler mandates. On the other hand, the study found that homeowners with previously mandated sprinkler systems were much more in favor of mandates, with 67% being somewhat or strongly in favor. The study showed that citizens living in sprinklered homes "were much more knowledgeable about sprinklers compared to the general population, more aware of their home fire risk compared to all other populations, and much more accepting of sprinklers by appreciating their benefits, wanting them for their next home, and agreeing that sprinklers should be a minimum level of safety for all new homes (Dell'Orfano, 2012)."

Frattaroli et al (2015) sampled 1,357 homeowners of one-and two-family homes without residential fire sprinkler systems and 976 homeowners with residential fire sprinkler systems. The study found that current owners of homes with residential fire sprinkler systems were more likely than owners of non-sprinklered homes to buy a home with sprinklers in the future (75% versus 35%). Current owners of sprinklered homes also more often indicated a willingness to pay for sprinklers (70% versus 40% for owners of non-sprinklered homes) and expressed a higher level of support for sprinkler mandates in new one- and two-family homes (48% versus 19% for owners of non-sprinklered homes). The survey found that owners of sprinklered homes generally lived in newer and larger homes and reported higher incomes, higher educational achievement, and more disabilities than those living in homes without sprinkler systems (Frattaroli et al, 2015).

Bowles, Barbour, & Mazza (2016) surveyed stakeholders in California and Maryland, the two U.S. states that mandate fire sprinklers in all new one- and two-family homes. The stakeholders surveyed included homeowners, local government officials, and water purveyors. There was a total of 50 homeowner survey respondents (25 in each state) representing a mix of townhouses and single-family detached homes as well as those on public water and well systems. The homeowners surveyed had an overwhelmingly positive view of home fire sprinklers, responding that fire sprinklers provide them with a sense of improved life safety (94% of respondents) as well as decreased home insurance costs (68%) and increased home values (68%). 88% of respondents indicated that they would include home fire sprinklers in their next home. However, the survey also noted a knowledge gap regarding home fire sprinkler systems, with respondents being less knowledgeable about specific details such as additional features, inspections, or sprinkler requirements (Bowles, Barbour, & Mazza, 2016).

4. Research Procedure

To gain original data to support the research article, an opinion survey was conducted utilizing Google Forms. The purpose of the survey was to gain an understanding of public opinion on home fire sprinklers, including any demographic differences such as age, gender, and income, as well as pre-existing knowledge of home fire sprinkler technology as self-reported by the respondents. Furthermore, it was desired to research whether receiving even minimal education

regarding home fire sprinkler technology could change the opinion of the survey participants. To that extent, a nine-question survey instrument was developed that collected data on the following questions:

- Do you currently own your own home?
- Are you likely to purchase a new home or make significant renovations to your existing home (\$10,000 or more) in the next five years?
- What is your age?
- What is your gender?
- What is your total annual household income?
- If you currently own a home, is it equipped with home fire sprinklers?
- How would you rate your current knowledge of home fire sprinkler technology?
- What is your main concern regarding home fire sprinkler technology?
- How much would you be willing to spend for home fire sprinklers as a percentage of the cost of a new home?

After answering the above questions, the survey participants were directed to watch a four-minute, 22-second education video from the Ontario Association of Fire Chiefs. This video included a demonstration of a home fire sprinkler system working to suppress a fire, information on the function of home fire sprinklers, statistics regarding fire deaths in sprinkled homes versus non-sprinklered homes, and a discussion of common concerns regarding home fire sprinklers (Ontario Association of Fire Chiefs, 2020). After watching the video, the survey participants were asked two follow-up questions:

- After watching the video, has your opinion on home fire sprinkler technology changed?
- After considering what you learned in the video, how much would you be willing to spend for home fire sprinklers as a percentage of the cost of a new home?

The survey was distributed organically via social media avenues, specifically Facebook, Instagram, and LinkedIn, as well as the Capitol Technology University e-mail list. The survey was run for six weeks from October 10 to November 14, 2023, and received 146 responses. No personally identifiable information was collected in the survey and participants were completely anonymous.

5. Results

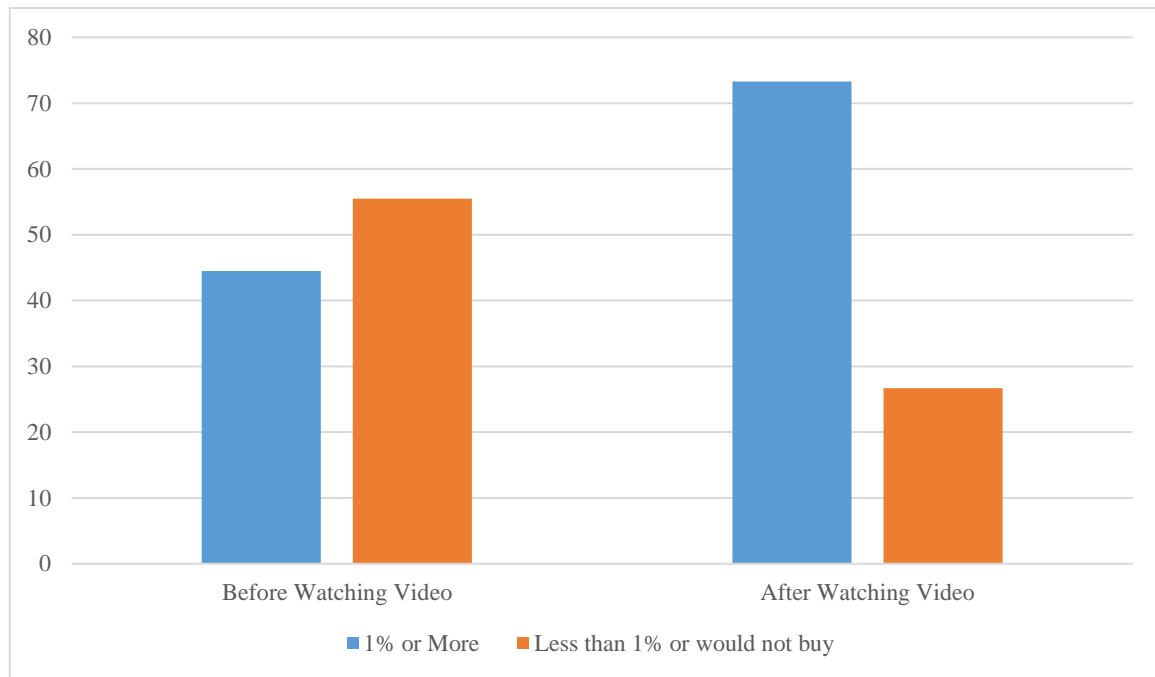
The 146 survey respondents answered the 11 survey questions as follows:

- 88.4% responded that they currently owned their own home.
- 54.8% responded that they were likely to purchase a new home or make significant renovations to their existing home (\$10,000 or more) in the next five years.
 - Of the respondents who did not own their own home, 35.29% answered that they were likely to purchase a home in the next five years.
- 6.8% of respondents stated that they were between the ages of 18 and 24; 17.8% responded that they were between 24 and 34, 29.5% stated that they were between 35 and 44, 20.5% stated that they were between 44 and 54, 18.5% were between 55 and 65, and 6.8% were 65 and over.

- 67.8% of respondents selected male as their gender. 31.5% selected female and 0.8% (one respondent) selected other/prefer not to say.
- 51% of respondents selected more than \$150,000 as their total household income. This was followed by \$100,000 - \$150,000 (25.2%), \$50,000 - \$100,000 (18.9%), and less than \$50,000 (4.9%).
- 88.8% of respondents stated that their current home was not equipped with home fire sprinklers. 7% selected not sure/not applicable, and 4.2% stated that their current home was equipped with home fire sprinklers.
- 33.8% stated they were very unfamiliar with home fire sprinkler technology; 31.7% stated they were somewhat familiar, 17.9% stated they were very familiar, and 16.6% stated that they were somewhat unfamiliar.
- 39.3% of respondents stated that cost of installation was their main concern regarding home fire sprinkler technology. This was followed by potential for water damage or leaks (31%), other concern (9%), cost of maintenance (4.1%), and potential for freezing (2.8%). 16.6% of respondents stated that they had no major concerns.
- When asked how much they would be willing to spend for home fire sprinklers as a percentage of the cost of a new home, 29.9% of the respondents stated they would spend between 1-2%, while 28.5% stated that they would not purchase home fire sprinklers. This was followed by less than 1% (27.1%), 2-3% (10.4%), and more than 3% (4.2%).
- After watching the educational video, 58.9% of respondents stated they had a more positive opinion of home fire sprinklers, while 41.1% stated that the video did not change their opinion. No respondents stated that their opinion of home fire sprinklers was more negative after watching the video.
- After considering what they learned in the video, 36.3% of respondents stated that would pay 1-2% for home fire sprinklers as a percentage of the cost of a new home. This was followed by 2-3% (19.2%), less than 1% (17.8%), and more than 3% (8.9%). 17.8% of respondents stated that they would not purchase home fire sprinklers even after watching the educational video.
 - Overall, the number of people who stated that they would spend 1% or more on home fire sprinklers as a percentage of the cost of a new home increased by 28.8%. Before watching the video, a minority (44.5%) indicated that they would spend 1% or more on home fire sprinklers. After watching the video, nearly three-quarters (73.3%) stated they would spend 1% or more (Fig. 1).

Figure 1

Respondent's Willingness to Pay for Home Fire Sprinklers as a Percentage of the Cost of a New Home



6. Discussion

The main purpose of this research survey was to determine the price threshold that homeowners would be willing to invest in a home fire sprinkler system, and whether education regarding home fire sprinklers could play a role in affecting that threshold. Ray & Pritchett (2009) cite a lack of understanding and knowledge as an impediment to greater acceptance of fire sprinklers, as misinformation spreads mistrust and false perceptions of these systems. Carli (2009) relates that home fire sprinklers are rarely if ever at the forefront of people's minds when they are buying a new home, telling a personal story where the contractor building her new home presented numerous options, including faucet handles, toilet seats, and lawn sprinklers. However, the contractor never told her about home fire sprinklers, and she never thought to ask. This lack of public knowledge about home fire sprinklers is reflected in the survey results, with 50.4% of respondents self-reporting that they were either somewhat or completely unfamiliar with home fire sprinkler technology.

A plurality of respondents (39.3%) indicated that cost of installation was their primary concern regarding home fire sprinklers. Unsurprisingly, respondents were also unprepared to invest a significant amount of money in an unfamiliar technology. A minority of respondents (44.5%) indicated that they were willing to pay 1% or more for home fire sprinklers as a percentage of the cost of a new home. 27.1% indicated that they would only purchase home fire sprinklers if they added less than 1% to the cost of a new home, and 28.5% stated that they would not purchase home fire sprinklers at all. This supports previous research by the NAHB (2006) and Dell'Orfano (2012) indicating that homeowners are not particularly willing to pay for home features that do not have a clearly understood benefit.

After the survey respondents watched the provided educational video, a substantial positive shift in opinion was noted. 58.9% of the respondents stated that their opinion on home fire

sprinklers was more positive after watching the video, and 73.3% stated they would spend 1% or more on home fire sprinklers as a percentage of the cost of a new home. Specifically, a plurality (36.3%) stated that they would be willing to pay 1-2% of the cost of a new home on fire sprinklers. This is significant because many available sources use the range of 1-2% as the typical cost of installation of an NFPA 13D sprinkler system in a new home (Dewar, 2001, Jakubowski, 2011, National Fire Sprinkler Association, 2020). The overall results of the survey support previous research by Gately (2017), who also found a significant positive swing in public opinion once education regarding home fire sprinklers was introduced.

Cross-analysis of the survey results reveals some interesting demographic trends. Females were initially less likely than males to be supportive of home fire sprinklers (Fig. 2) but were more likely to record a positive shift in opinion after viewing the educational video (Fig. 3).

Figure 2

Willingness to Pay for Home Fire Sprinklers as a Percentage of the Cost of a New Home by Gender – Before Educational Video

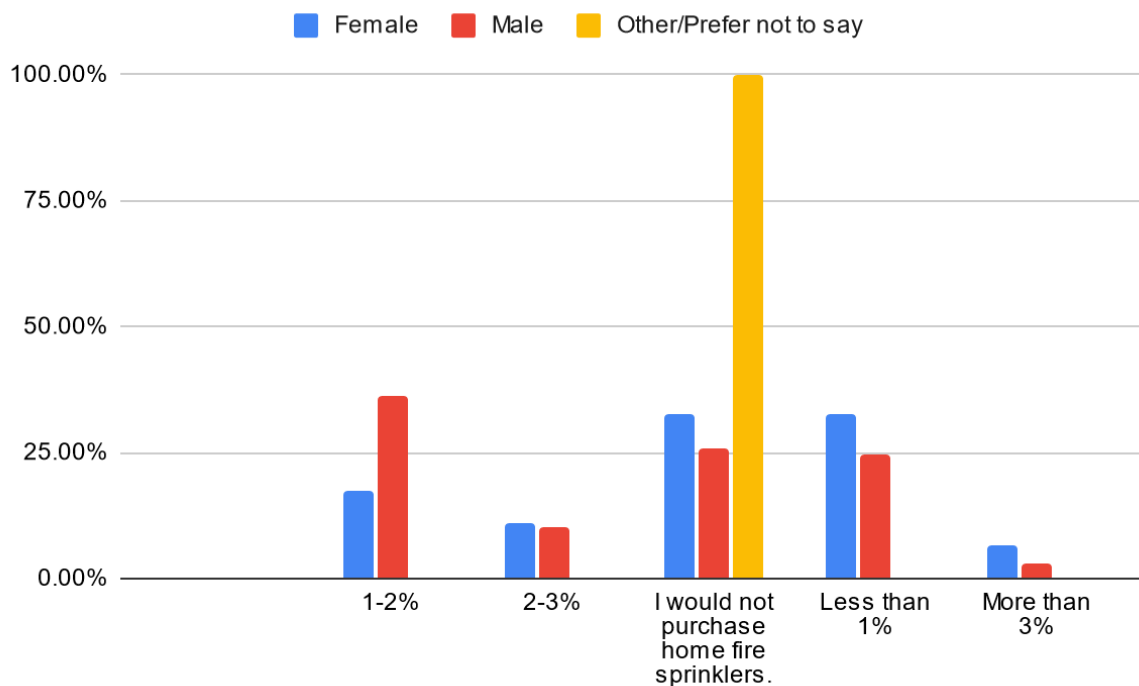
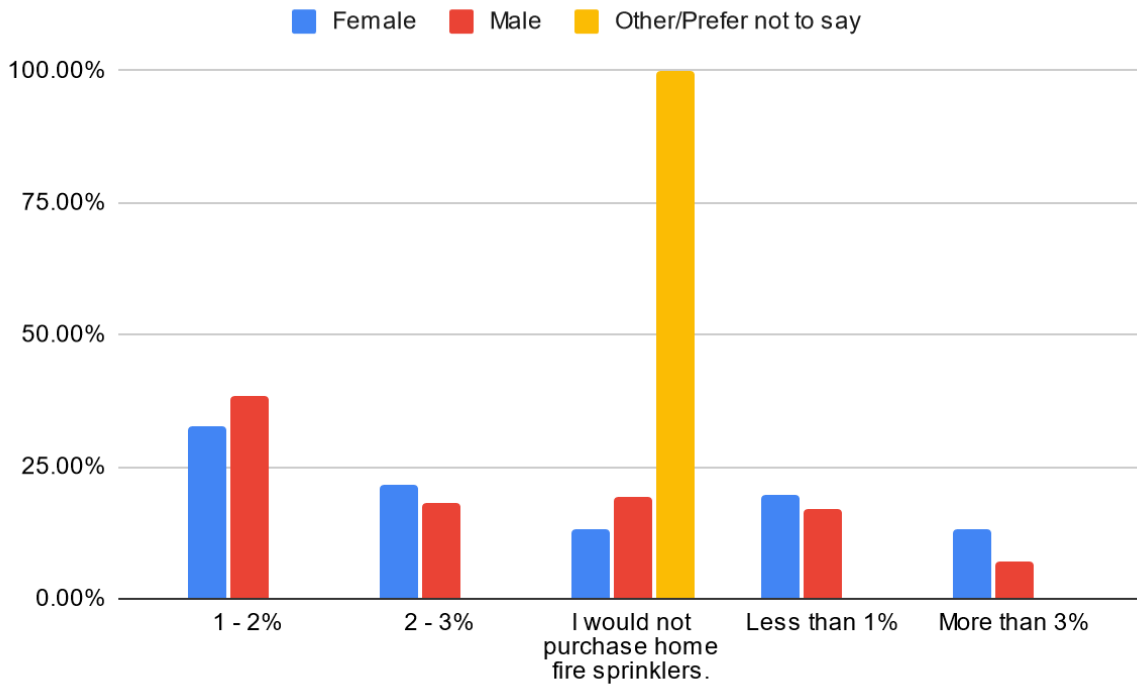


Figure 3

Willingness to Pay for Home Fire Sprinklers as a Percentage of the Cost of a New Home by Gender – After Educational Video



Before watching the educational video, survey participants from the lowest annual household income bracket (Less than \$50,000 per year) were more likely to be willing to spend at least 1% of the cost of a new home on fire sprinklers as compared to those from higher income brackets (Fig. 4). This remained true after watching the educational video. However, the differences across all income brackets were significantly less (Fig. 5). Survey participants in the \$50,000 - \$100,000 income bracket were the least likely to say that they would be willing to pay 1% or more for home fire sprinklers before watching the video but experienced the most significant positive swing after watching the video, becoming 28.2% more likely to pay 1% or more.

Figure 4

Willingness to Pay for Home Fire Sprinklers as a Percentage of the Cost of a New Home by Income – Before Educational Video

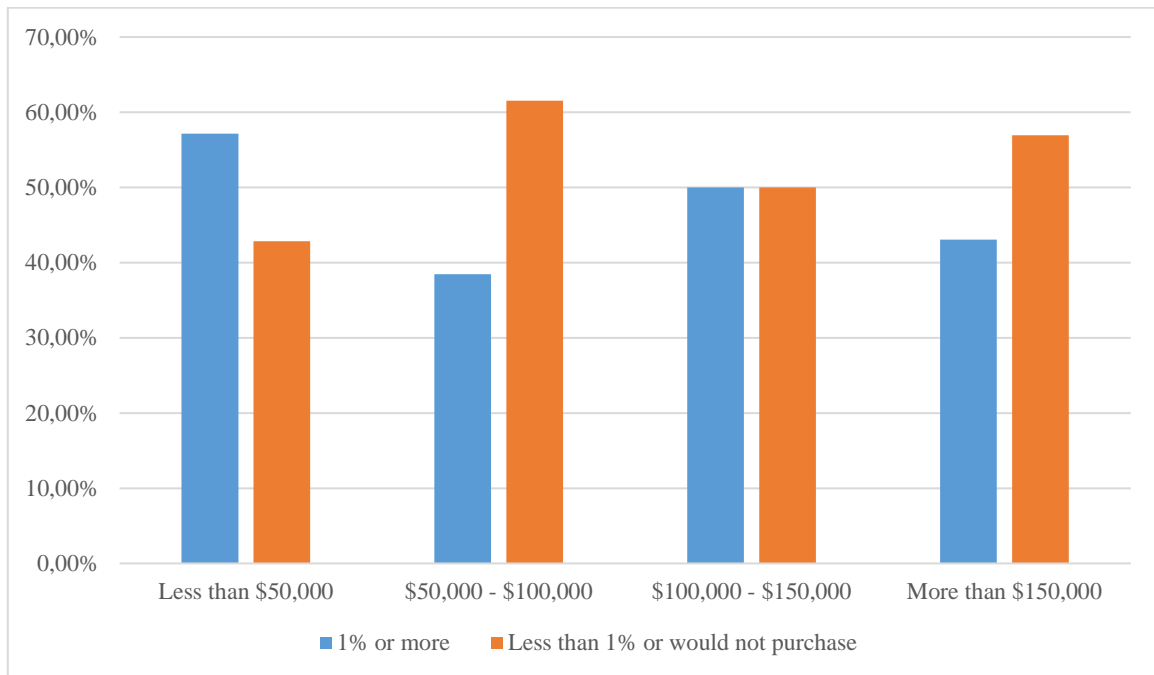
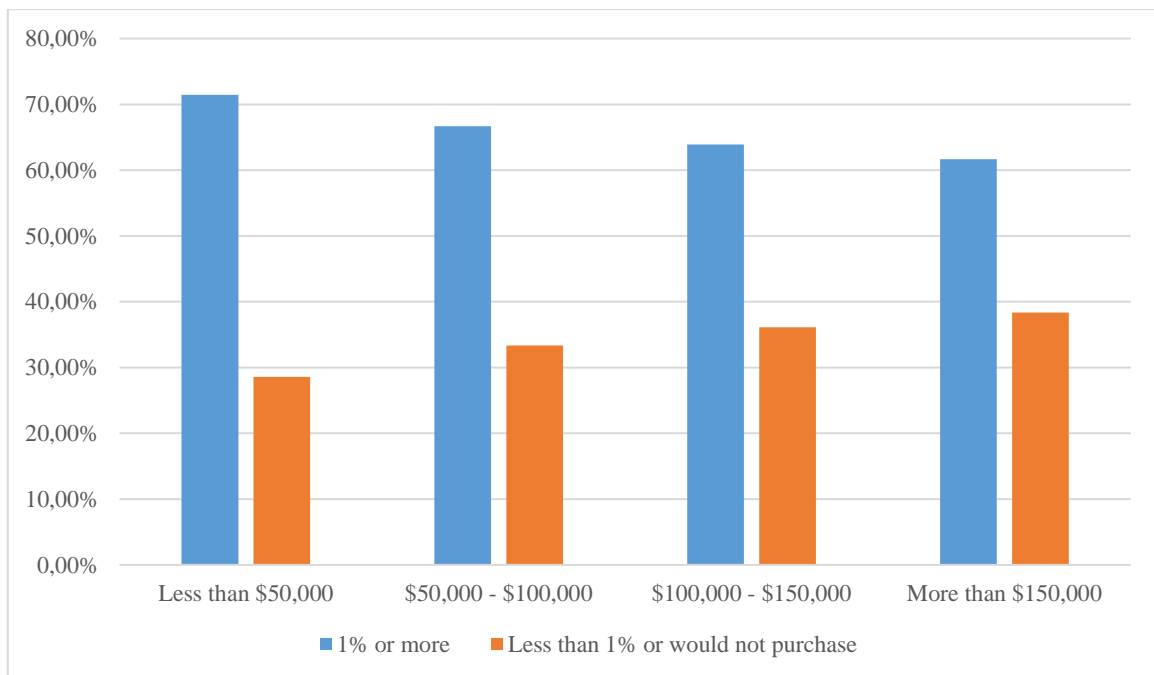


Figure 5

Willingness to Pay for Home Fire Sprinklers as a Percentage of the Cost of a New Home by Income – After Educational Video



Before watching the educational video, respondents who indicated that they were in the 18-24 and 55-64 age brackets were the most supportive of home fire sprinklers, with 55.55% of each stating they would pay 1% or more for fire sprinklers as a percentage of the cost of a new home (Fig. 6). The least supportive was the 35-44 age group, with only 37.22% stating that they would pay 1% or more. After viewing the educational video, support across all age groups increased significantly, with the 18-24 and 55-64 age groups once again being the most supportive overall (Fig. 7). The only age group to exhibit less than 60% support for spending 1% or more for home fire sprinklers after watching the educational video was the 25-34 age group with 58%, although this still represented an 18% increase in support for this group. Notably, research from the National Association of Realtors (NAR) indicates that the average age for first-time homebuyers in the United States is 35 (NAR, 2023). Therefore, those in the 25-34 age group are likely to be looking closely at the market as they plan for their first home purchase.

Figure 6

Willingness to Pay for Home Fire Sprinklers as a Percentage of the Cost of a New Home by Age – Before Educational Video

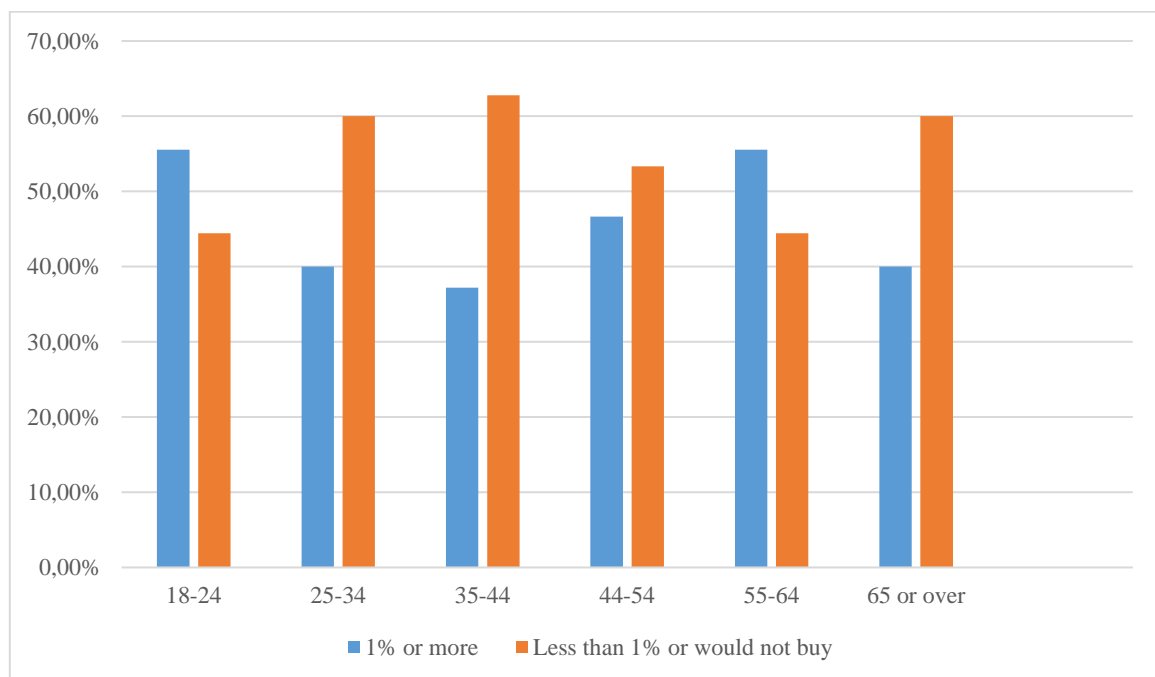
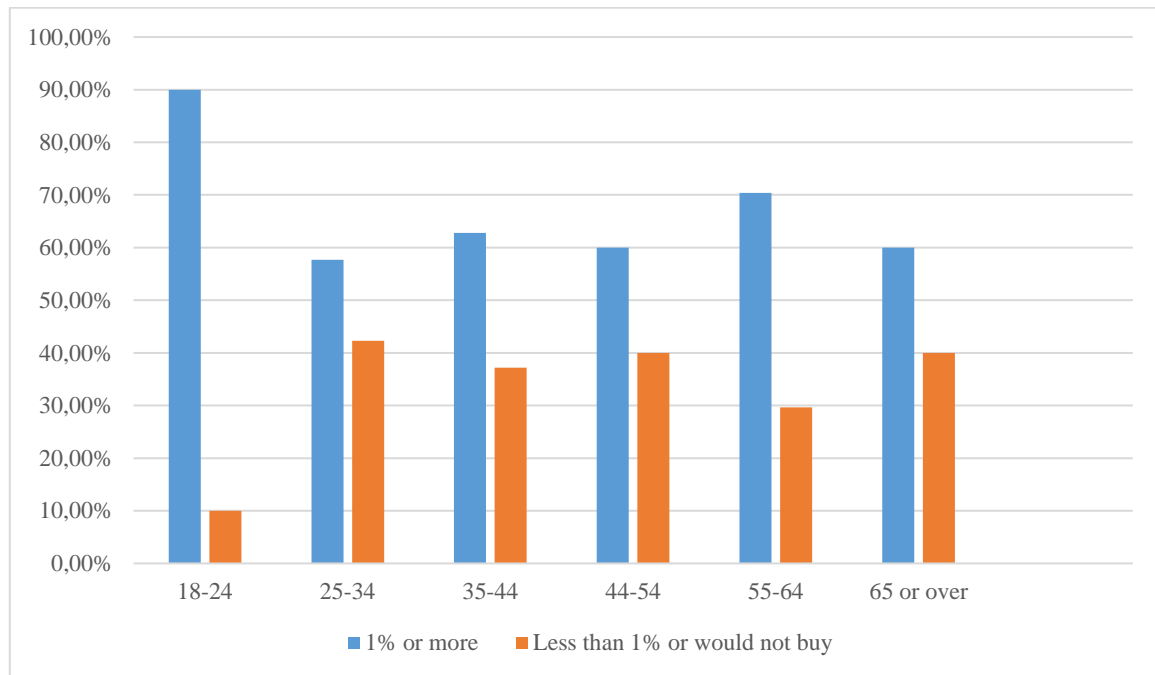


Figure 7

Willingness to Pay for Home Fire Sprinklers as a Percentage of the Cost of a New Home by Age – After Educational Video



The data collected by this survey highlights the overwhelming power of education when it comes to increasing acceptance of home fire sprinkler technology. A simple educational video found on YouTube caused a significant positive swing in the opinions of the survey participants whose feelings had previously been lukewarm at best toward home fire sprinkler technology. A comparison can be made between the current level of prevalence of home fire sprinklers and the prevalence of smoke alarms in residential homes in the 1970s. In 1977, less than one-quarter of all households in the United States had smoke alarms (Ahrens, 2021). By 2000, 96-97% of American households reported that they had at least one smoke alarm. Home smoke alarm usage increased rapidly in the late 1970s and 1980s, buoyed by the 1973 *America Burning* report which urged Americans to install smoke alarms in their homes and highlighted the need to promulgate regulations for the installation of smoke alarms (Roberts, 2015). By 1976, smoke alarms were required in one and two-family dwellings by the NFPA 101 Life Safety Code standard. This was followed by three additional regional code organizations in 1979 (Roberts, 2015).

As previously discussed, home fire sprinklers are also currently required by model building codes in the U.S., but unlike smoke detectors, most jurisdictions have excluded this requirement. The research conducted in this article indicates that public familiarity with home fire sprinklers is lower than that of smoke alarms, and this lack of familiarity affects acceptance of the technology. Concurrently, fire departments in the U.S. spend significant time and resources highlighting the importance of smoke alarms. A study by Johns Hopkins University found that long-life battery smoke alarms are the most common safety product promoted by the fire service, and 85% of fire departments stated that they conducted advocacy on the topic of smoke alarms (McDonald et al, 2023). However, the same study found that only 8.9% of fire

departments conducted educational presentations or activities on home fire sprinklers in 2019, and only 30% reported that they conducted any sort of advocacy on the topic. Whether public opinion on home fire sprinklers could be swayed if fire departments advocated for home fire sprinklers with the same vigor that they advocate for smoke alarms is a reasonable question.

7. Study Limitations

The survey data referenced in this study is based on the respondent's self-reported knowledge. Therefore, there is a level of subjectiveness in some of the data; for example, a person who self-reports that they are "somewhat unfamiliar" with home fire sprinkler technology may be objectively more knowledgeable than another person who self-reports that they are "somewhat familiar." Because the survey was anonymous, it is impossible to independently verify responses to some demographic questions, such as age, whether the respondent owns their own home, or whether their home is equipped with fire sprinklers. It is also likely that those with higher incomes were over-represented in this survey; 51% of respondents indicated that their annual household income was more than \$150,000 per year, whereas the average household income of all homebuyers in the U.S. is \$107,000 (Lautz, 2023). Also, although the survey measured a good sample of relevant demographic data, there are still other demographics such as race and marital status that are relevant to home ownership but not collected in this survey. These areas would be ripe for a future study expanding on the results of this article.

8. Conclusion and Recommendations

The overarching objective of this research study was to determine the price threshold where home buyers would be willing to invest in a home fire sprinkler system, and whether education could change that threshold. It was also hoped that the research could help resolve the significantly disparate results from previous surveys conducted by opponents and supporters of home fire sprinkler systems. The research conducted in this article found that a homebuyer's willingness to pay for fire sprinklers depends significantly on their knowledge of the technology. A significant public knowledge gap exists regarding home fire sprinkler technology, and homeowners who fall into this gap are less likely to invest in a technology that they are unfamiliar with. However, homeowners who are educated on the function and benefits of home fire sprinklers demonstrate significant support for the technology.

As a result of the research performed in this article, the following recommendations are made:

- Fire departments should prioritize home fire sprinkler education as a component of their Community Risk Reduction (CRR) program. Most major reports about the fire service have touted the role of local fire departments as a key strategy to reduce the overall fire burden (McDonald et al, 2023). Although national organizations such as the USFA have increased their educational messaging regarding home fire sprinklers in recent years, surveys consistently show that Americans favor local rather than national actors, and firefighters in particular are among the most trusted professionals (Jackson & Morris, 2023). Public education efforts by local fire departments have undoubtedly made an

impact on the prevention of fires in the United States through messaging on subjects such as smoke alarms, home fire escape plans, and many others. However, few fire departments spend time or resources on home fire sprinkler education. Changing this would likely go a long way toward promoting increased education and buy-in for the technology among the public.

- Stakeholder organizations should endeavor to create home fire sprinkler educational messaging that targets specific populations. The research performed in this article indicates that there are differences in willingness to pay for home fire sprinkler technology in certain demographic groups. Although advocacy groups such as the Home Fire Sprinkler Coalition do promote some messaging to at-risk populations such as the elderly and those with physical disabilities, the research in this article indicates that there could be some benefit to targeting populations that may be more skeptical about home fire sprinklers, such as women and first-time homebuyers. Additional research should be conducted into the reasons behind any demographic differences in willingness to pay for home fire sprinklers to craft more effective messaging for these populations.
- Stakeholder organizations should continue to look for ways to make home fire sprinklers more affordable. The research conducted in this article indicates that a large majority of homebuyers supported paying 1% or more for home fire sprinklers as a percentage of the cost of the new home once they were educated in the technology. However, a substantial number of respondents still indicated a low willingness to pay for home fire sprinklers even after watching the educational video, with 17.8% indicating that would still only pay less than 1% of the total cost of a new home and another 17.8% stating that they still would not purchase home fire sprinklers at all. These findings indicate that there is still some work to be done to make the cost/benefit of home fire sprinklers more appealing to some members of the public. It is possible that some or even most of these people could be swayed by bringing the average cost of home fire sprinkler installation down to less than 1% of the cost of a new home. This could be accomplished through incentives to homebuilders or developers such as financial tradeoffs or increased design flexibility, incentives to homeowners such as property tax breaks or homeowners' insurance discounts, or by leveraging technology to reduce the cost of the home fire sprinkler system itself without sacrificing its life safety capabilities. Additional research on financial incentives and emerging technologies should be a priority to determine the incentives or products that offer worthwhile financial benefits.

Ultimately, the research conducted in this article supports the idea that homebuyers' opinions regarding home fire sprinklers are shaped significantly by their understanding of how the technology benefits them. People unfamiliar with the concept are unlikely to invest a significant amount of money for an unclear benefit; however, people who are educated regarding the substantial life safety and property conservation benefits of home fire sprinklers are largely supportive of the technology and willing to pay a reasonable price for it. The idea that home buyers are unwilling to invest money in home fire sprinklers – a belief propagated by opponents of the proliferation of the technology - is only true if they continue to remain ignorant of the concept. However, advocates for home fire sprinklers have a lot of work to do to overcome the knowledge gap that exists among the public if they wish to see a greater proliferation of this technology. The recommendations discussed here are intended to assist with prioritizing

continued research into solving this knowledge gap and making home fire sprinkler technology more accessible.

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