

Changing Decisions by Reframing Risk: How a Local Earthquake Safety Ordinance Motivated One in Five Property Owners to Voluntarily Retrofit

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ABSTRACT

Emphasizing the benefits of taking a recommended action is sometimes more effective than emphasizing the downsides of failing to act or *vice versa*, depending on the decision context. Furthermore, more people seem to respond when the message frame is congruent with their natural self-regulatory goal-orientation, which tends to be dominated by either promotion of desirable outcomes by doing what they could *ideally* do (achievement/attainment) or preventing bad outcomes by doing what they *ought* to do (security/avoidance).

This research investigates how people responded to a local housing safety ordinance in Berkeley, California that targeted 320 owners of a high hazard and socially important building type. The law placed notice on the property title and required owners to inform tenants, post warning signs on site, and have a structural engineer evaluate the property. Even though owners were not required to do a seismic upgrade, over 20 percent voluntarily took that costly extra step. To explore why, I conducted in-depth interviews and used a survey on a stratified sample of affected property owners (N=33) and a small group of similar owners who retrofitted prior to the law (N=5).

I find that the law apparently reversed some owners' earthquake mitigation decision frame from promotion to prevention. Qualitatively, pre-law retrofitters wanted to "make the building better" while post-law retrofitters wanted to "remedy a defect" and "get off the list." Not only did the law inform owners about the hazard and make the costs of failing to retrofit more salient, but it increased the costs of inaction by informing a large group of owners and potential buyers at around the same time. Underscoring these points, the law appeared to motivate retrofits among persons with a different personality profile: post-law retrofitters on average had a more "problem-avoidant" as opposed to "goal-attainment" regulatory orientation than people who retrofit prior to the ordinance. Although the number of study participants does not permit statistical inference, retrofitters and non-retrofitters appear to own similar buildings and otherwise have similar demographic traits and earthquake risk perceptions.

INTRODUCTION

Emphasizing the benefits of taking a recommended action is sometimes more effective than emphasizing the downsides of failing to act or *vice versa*, depending on the decision context [1, 2]. Furthermore, more people seem to respond when the message frame is congruent with their natural self-regulatory goal-orientation, which tends to be dominated by either promotion of desirable outcomes by doing what they could *ideally* do (achievement/attainment) or preventing bad outcomes by doing what they *ought* to do (security/avoidance) [3].

Experimental evidence suggests that gain-loss framing can be influential to the outcomes of policy intervention designs in the areas of risk communication and health [1, 2]. In general, such studies find that loss-framed appeals (emphasizing the downsides of not taking a recommended action) generally elicit greater progress towards behaviors that are seen as risky and that relate to screening for and detection of exposure or extant risk. In contrast, gain-framed appeals (emphasizing the upsides of taking a “relatively certain to be helpful” recommended action) generally elicit greater progress toward behaviors that relate to preventing harm.

A review of research into the mechanisms and potential power of message framing shows more nuance and applications since the initial forced choice laboratory experiments of Kahnemann and Tversky. Early on, use of a wide variety of research designs, risk topics, and decision tasks led to a confusing mix of null and positive effect findings [4, 5]. More recent studies have focused on potential moderating factors and interactions among features of the message, the recipient, the threat context, and the response behavior being advocated [6-8]. For instance, a gain-framed message frame might be more influential than a loss-framed one only for individuals with low prior awareness of the threat or minimal prior intentions to do anything about it [9].

Current theoretical research on message framing is dominated by discussions of the possible roles for degree of “fit” between the message frame and the recipient’s general regulatory focus. Messages that are congruent with the receiver’s activated goals and motives appear to carry more influence on behavior intentions according to studies related to skin cancer detection [10], dental flossing [11], and vaccination [12]. In other words, a loss-framed message might be more effective than a gain-framed message – but only among subjects who rate high in avoidance motivations.

Regulatory focus theory addresses how people attempt to bring their own situation and goals into alignment [3]. At any given moment, someone is thought to be either interested in a: (a) preventing bad outcomes by doing what they *ought* to do, or (b) promoting desired ones by doing what they could *ideally* do. Regulatory Focus can be operationalized either as a trait (chronic regulatory focus) or be situationally-induced.

Chronic Regulatory Focus is a measure of a person’s natural overall goal orientation, which in theory will be dominated by either seeking of positive outcomes or avoidance of negative ones. A person’s regulatory focus score (RF) is computed by totaling their Promotion pride strength and subtracting their Prevention pride strength based on an eleven question set that contains both straightforward and reversed-scaled items [13, 14] (the full questionnaire is given in appendix A). The Promotion score reflects the extent to which the respondent is prideful about their past ability to actively achieve positive end states, while the Prevention score reflects the extent to which the respondent is prideful about their past ability to avoid negative end states. Most people have slightly stronger Promotion pride strength, so RF values typically range from around zero to one.

These insights complicate and make more ambiguous the predicted impact of message framing for more complex multi-stage and multi-level risk decisions. Consider for example the case of an owner deciding whether to retrofit a building. If a property owner thinks of mitigation as a *preventative* behavior, it would imply that a gain-frame message might be most effective. In contrast, a recent study involving message framing and earthquakes found the most effective message frame for motivating earthquake preparedness intentions emphasized avoidance of negative consequences [15].

This setting brings up the potential importance of perceptions of the first “screening” step. Assuming an owner does not have perfect information about their building’s actual risk, the person faces first a decision of whether to search for more information and also how much information (at what cost) to acquire. Only then might they decide whether, and to what degree, to remedy an identified threat. A problem-avoidant person might be particularly risk-seeking regarding engagement in information search, but be highly likely to invest in mitigation if and when a problem is detected. Goal-promoting individuals might be more likely to initiate the first step, but only if they *already* feel assured that mitigation will prove cost-beneficial.

This paper uses two types of retrospective field evidence – the psychometric measure of RF and qualitative interview responses – in a quasi-experimental format to assess the effect of a new law on people who own seismically vulnerable rental property in a region of high earthquake hazard. In 2005, the Berkeley City Council amended its Municipal Code (Chapter 19.39) to establish an Inventory of Potentially Hazardous Buildings due to a Soft, Weak, or Open-Front first story condition.

I first introduce readers to the general problem of under-investment in earthquake safety and to the specific policy implemented by the City of Berkeley, California. I then describe the study population, data collection, and analysis methods employed. Approximately 320 owners of this high hazard and socially important building type in Berkeley had a notice placed on the property title and owners were required to inform tenants, post warning signs on site, and have a structural engineer evaluate the property. Even though owners were not required to do a seismic upgrade, over 20 percent voluntarily took that costly extra step. To explore why, I conducted in-depth interviews and used a survey on a stratified sample of affected property owners (N=33) and a small group of similar owners who retrofitted prior to the law (N=5).

Finally, I present the relationship between study participant RF scores and their retrofit status at time of interview, and discuss overall how the presence of new legal requirements appears to have shifted the frame of reference from the aspiration of obtaining a reward to avoiding a penalty.

TOO LITTLE EARTHQUAKE PREPAREDNESS: A BEHAVIORAL PUZZLE WITH LARGE SOCIETAL CONSEQUENCES

Even though large earthquakes pose a serious threat to many regions of the United States (US) – a fact of which nearly everyone is aware – policy indifference and personal inaction are the rule. Facts on the ground in California exemplify the situation: only a fraction of people take basic survival and preparedness actions [16, 17] or purchase insurance where it is available [18].

Investment in structural mitigation is particularly rare, which is a problem because it is buildings – not earthquakes – that kill people [19]. Most property owners do not understand or spend money to assess – much less correct – the potential seismic safety deficiencies of their

properties. For residential single family structures in California’s highest hazard areas that do not meeting modern building code standards (built prior to 1990), rates of structural mitigation (seismic retrofit) are at most five to ten percent.¹

From a societal standpoint, earthquake damage to residential buildings can have consequences that far exceed the private losses experienced directly by building owners. This is particularly true with so-called “soft-story” apartment buildings. “Soft-story” refers to a condition where one of the stories in a multi-story building, usually a parking level that doesn’t require partitions for functionality, is weaker than the one or more stories above it. During strong ground shaking, the lower resistance to shear forces in the “soft” level can significantly increase the chance of collapse or damage sufficient to render the building unusable after the event. Most of this type of construction can be found in apartment buildings built in the 1960s and 1970s, when the safety risks of soft-stories were not yet fully understood, much less addressed in common building codes. Vast numbers of these buildings exist in California communities that grew substantially during that time span. Soft-story buildings constituted about half (7,700) of the 16,000 housing units rendered uninhabitable by the 1989 Loma Prieta earthquake and over 34,000 of the housing units rendered uninhabitable by the Northridge earthquake in 1994 [20].

Consequently, soft-story buildings are a particularly dangerous and socially-important building type for high earthquake hazard regions like the San Francisco Bay Area. The chance of a major earthquake (magnitude 6.7 or greater on the Richter scale) on the Hayward fault that runs through Alameda County is 31 percent in the next 30 years [21]. Such a quake could destroy more than a quarter of the East Bay building stock, leaving thousands injured and over one hundred thousand homeless. The Association of Bay Area Governments (ABAG) estimates that soft-story buildings would account for two thirds of the some 160,000 units that might be affected by a major Hayward Fault quake [20]. That magnitude of loss in the local housing stock could cripple the local economy for a decade or more, devastate the tourism sector, and irrevocably change the character and affordability of the region. Soft-story buildings not only pose a serious risk of injury or death to the occupants, but hundreds of thousands of residents would likely be displaced for four to six months or longer in a major Bay Area earthquake. A recent analysis by the City of San Francisco estimated that one in five of its soft-story buildings will likely collapse and another three out of five would be uninhabitable [22].

Despite all this, retrofit rates for multifamily buildings with more than four units remain very low at under one percent, which is approximately one fourth of the rate for single-family homes or small multifamily buildings of two to four units [20]. A handful of Bay Area cities have taken action to identify and promote retrofit of soft-story buildings. But for the most part, short of forcing or paying owners to retrofit, local governments have struggled to find viable policy options.

¹ Consistent, recent, and representative data on earthquake adjustment behaviors is remarkably scarce. Single-family structural improvement rates in a *high risk* area of California (Zone 4) are on average less than 10%, basic preparedness actions like having stored water or even owning a flashlight are around 60%, and insured rates are around 10 to 30% (Nguyen et al., 2006). Rates are also known to vary over time and by community. (Shoaf & Peek-Asa, 2000) compared preparedness data collected in California found that around 38 percent in 1987 and 54 percent in 1999 had stored food for earthquakes or for earthquakes and other reasons. California earthquake insurance coverage rates fluctuated from 5% in 1973 to 50% in 1993 and are now back down to around 12%.

POLICY CONTEXT

The full text of Berkeley's Soft-Story Ordinance text is given in Appendix A. The BSSO targeted all existing wood frame multi-unit residential buildings in the city or portions thereof that contain five or more dwelling units that were designed prior to adoption of the 1997 Uniform Building Code. Under the law, soft-story is defined as a building where:

- 1. The ground floor, whether itself constructed of wood or other materials, of the wood frame structure contains parking or other similar open floor or basement space that causes Soft, Weak, or Open Front Wall (SWOF) Lines and there exists one or more levels above, or;*
- 2. The walls of any story or basement of wood construction are laterally braced with Nonconforming Structural Materials as defined in the Chapter and there exist two or more Levels above.*

Between February and October 2006, the City of Berkeley sent notices to 321 buildings that were suspected of meeting these criteria, as identified in a comprehensive review of public records and a street-by-street visual assessment conducted by two city employees back in 1996. The typical building affected by the BSSO is a small to medium sized mid-century multi-family apartment building; the average number of units is eleven and the average year built is 1965. In total, the final Inventory covers about 3,500 dwelling units or about 10 percent of Berkeley's total multifamily housing stock. Less than five percent of these properties have some type of commercial use on the first floor. Figure 1 is a photo of an example Berkeley soft-story property with eight units.



Figure 1. Photo of an example soft-story property in Berkeley.
Photo credit: Sharyl Rabinovici, May 2010.

The BSSO required owners of all residential buildings on the Inventory to obtain an engineering study of the property according to provided guidelines within two years from date of notification plus a six month appeal period. The BSSO also required owners to inform tenants in writing in perpetuity of the “listed” status of the building, with signed copies of each tenant notification to be held on file by the city government (with the tenants’ names blacked out for privacy reasons). Additionally, owners must display at all entrances to the building a clearly visible warning sign not less than eight inches by ten inches with the following statement: *“Earthquake Warning. This is a soft story building with a soft, weak, or open front ground floor. You may not be safe inside or near such buildings during an earthquake.”* Figures 2a & 2b show, respectively, the content and positioning of the soft-story warning sign near the tenant mail boxes on the building seen in Figure 1.

On a practical level, the City of Berkeley’s Building Inspection Division (BID) manages the program. BID is organizationally housed within the Department of Planning. BID staff delivered the initial notification to each owner along with a technical guidance document and general educational materials designed to promote retrofitting. The BSSO also established an administrative process for removal from the Inventory by either demonstrating that the building was either exempt or did not have a soft-story weakness, or by verifying that the soft-story weakness had been resolved to the level specified in the law. Buildings that are removed from the Inventory following a retrofit are exempt from being placed on any other hazardous building inventory for 15 years (BMC 19.39.100). Importantly, the choice to complete any recommended retrofit work was left to individual building owners.

The ordinance included penalties for non-compliance via the city’s general public nuisance provisions that allow for up to \$5,000 per cited violation (each day can be considered a separate violation) and up to \$10,000 per injury-related incident. In practice, enforcement is handled at the discretion of BID staff in consultation with the City Attorney.



Figure 2. (a) Exemplar warning sign on the Berkeley soft-story property depicted in Figure 1, and (b) the location of that warning sign on the building.

Five Years Out: Overview of Owner Responses to the Law

The initial two-year period for compliance ended between October of 2008 and February of 2009, depending on when the owner first received their notification. An initial wave of letters urging non-compliers to act was sent out in spring of 2009. A second wave of non-compliance letters was sent out in spring of 2010, along with materials reminding owners of the signage and tenant notification requirements. No citations or penalties have been issued to date.

Error! Reference source not found. shows the status of the 321 buildings originally listed on the Inventory as of April 2010. At that time, BID officially regarded 252 (79%) of the buildings as in compliance with the engineering report requirement, including 127 buildings with approved reports. Forty-six properties had been officially removed from the Inventory for reasons such as having fewer than five dwelling units or verified lack of soft-story condition, representing a false positive rate of around five percent. Most interestingly, 79 buildings had voluntarily applied for permits to retrofit their buildings in lieu of or addition to producing the required engineering report. As of April 2010, about half of those planned retrofit projects were officially completed (i.e., the building permit had been “finaled”).

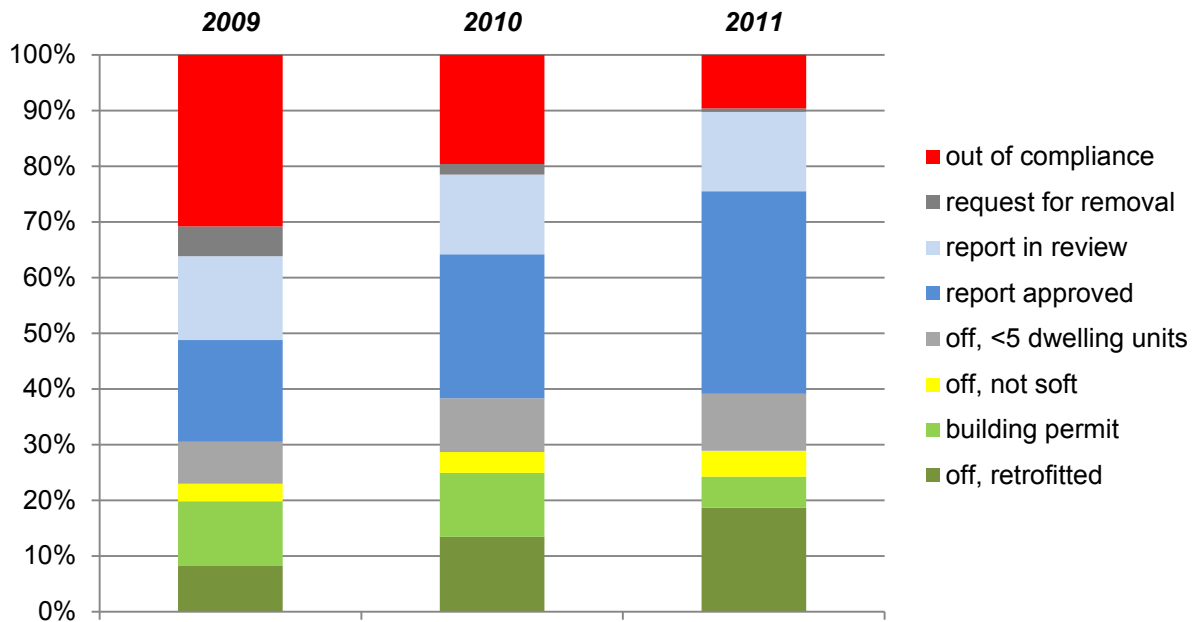


Figure 3. Compliance status with the seismic evaluation report aspect of Berkeley’s Soft-Story Ordinance as of April, 2010. N=321.²

To put this information in context, there are about 3,500 housing units in the 321 soft-story buildings that were on the original BSSO Inventory³, representing about 18 percent of the 18,855 total registered rental housing units in the city as of April 2009. The voluntary retrofits

² Source: Compiled from public data available online, City of Berkeley, <http://www.ci.berkeley.ca.us/contentdisplay.aspx?id=622>, Accessed: May 2011.

³ A precise total cannot be determined because unit data is missing from some of the properties. The estimate was generated by multiplying the number of buildings for which the unit total is missing by the average number of units for all buildings.

done after the law affected at least 976 units, or about five percent of Berkeley's total multifamily housing stock.

RESEARCH APPROACH, METHODS, & DATA

As part of a larger research project to document and evaluate the overall history, policy strategy, implementation, and outcomes of the BSSO [23], I investigated of the relationship between Regulatory Focus and owner retrofit status and timing. Additionally, it became evident that some of the qualitative data collected in the larger study was relevant to the *reference point* from which Berkeley soft-story owners may be making their mitigation decisions.

The full study involved in-depth interviews and a survey on a stratified sample of property owners directly affected by the BSSO (N=37) and a small group of similar owners who retrofitted prior to the law (N=6). The research design involved the following steps (in approximate sequence):

- random selection of potential subjects by stratum from the target population;
- procurement of names, addresses, and phone numbers for those subjects from public information sources;
- recruitment of a sample of subjects using mail, email, and phone contacts;
- semi-structured, audio-taped interviews that include both open-ended verbal and written questionnaire aspects and production of field notes;
- transcription of interview recordings;
- data consolidation, coding and qualitative and quantitative analyses; and,
- writing of a summary and interpretive report.

The initial target population and sampling frame consisted of 334 entities representing two distinct groups: (1) all owners of noticed properties on the City of Berkeley's official Inventory of Potentially Soft-Story Residential Buildings (N=321), and (2) owners of all identified *previously* soft-story properties in Berkeley (as determined by a retroactive building permit search conducted in 2007 by BID staff using the terms "seismic" or "earthquake"). The second group are properties that would likely have met the criteria to be listed but were not because a retrofit had been done in the decade prior to the law (N=13).

Figure 4 shows the breakdown of the target population by behavior outcome strata, the assumed and actual response rates, and the final number of completed interviews and surveys in each stratum.

	Compliers			Non-Compliers (No Retrofit)	Mistakenly Notified (Removed or Active Removal Request)	Row Totals
	Pre-Law Retrofits	Post-Law Retrofits	Comply-Only (No Retrofit)			
<i>Population Totals*</i>	13	63	106	98	51	331
<i>Contacts Initiated</i>	12 (92%)	25 (40%)	35 (33%)	33 (34%)	26 (51%)	131 (35%)
<i>Interview-Phone</i>	0	4	4	1	4	13
<i>Interview-In Person</i>	4	8	1	10	5	28
<i>Total Interviews</i>	4	12	5	11	9	41
<i>Actual Contact to Completion Ratio</i>	3.0	2.3	6.8	3.0	2.9	3.3
<i>Actual Response %</i>	33%	44%	15%	33%	35%	31%
<i>Survey-Paper</i>	0	0	1	1	1	3
<i>Survey-Online</i>	3	11	6	9	9	38
<i>Total Surveys</i>	3	11	7	10	10	41

Figure 4. Research design sampling size targets and assumptions.

Figure 5 reveals that the resulting set of study participants included not just “owners” but also institutional representatives and property managers acting on behalf of the owner. Therefore, for aspects of this study relating to personality measures, institutional representative and manager responses are dropped, leaving a total of 31 subjects. Further, not all individual participants completed all personality questions. The final total for which data analyses are presented below is 27 – eight non-retrofiters and 19 retrofiters, two whom retrofit prior to the law.

Retrofit Status (None versus Permit OR Completed)			Group as Identified at Interview				Total
			"Pre-Law Retrofits"	"Post-Law Retrofits"	"Comply Only"	"Mistakenly Notified"	
No Retrofit	Interviewee Type	Individuals			9	2	11
		Institutional Reps			1	2	3
		Managers			1	0	1
	Total				11	4	15
Retrofit Permit or Completed	Interviewee Type	Individuals	3	17			20
		Institutional Reps	3	1			4
		Managers	0	4			4
	Total		6	22			28

Figure 5. Breakdown of study participants by ownership types.

RESULTS

Retrofitting and Chronic Regulatory Focus

Figure 6 reports the reliability scores (Cronbach's Alpha⁴) for the regulatory focus items in the survey. The Alpha scores in this study reflect a reasonably high reliability (consistency) among all question items in the scale that are designed to measure the same construct.

	Cronbach's Alpha (this study)	Valid N	# of Items
Prevention	0.78	27	5
Promotion	0.72	27	6

Figure 6. Reliability statistics for the Promotion and Prevention sub-scales.

Retrofitters in the study appear to have a slightly higher Prevention goal-orientation on average but similar Prevention tendencies to retrofitters, leading to a slightly lower average RF score (Figure 7). As can be seen using the error bars (which show one standard deviation both above and below the mean), these are not statically significant differences.

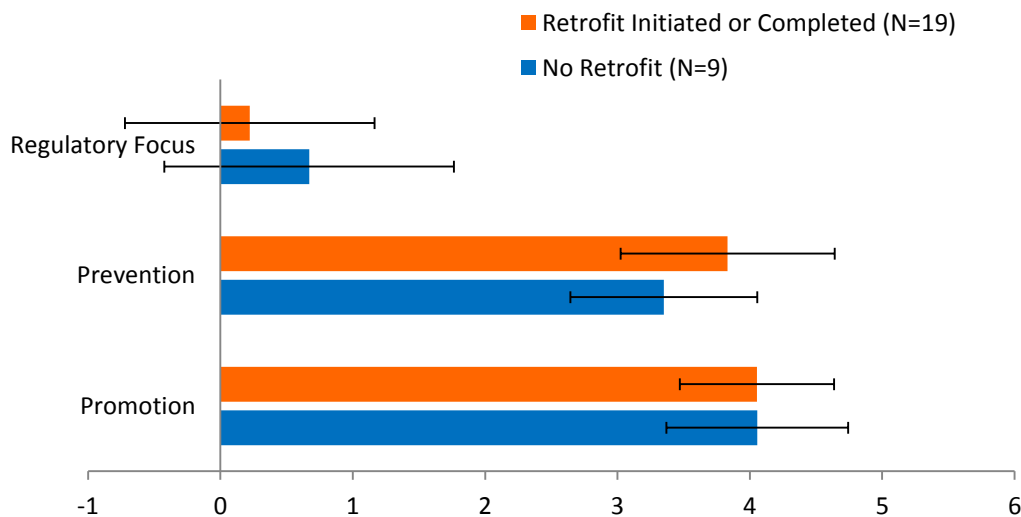


Figure 7. Average Prevention, Promotion, and Regulatory Focus (RF) scales among 27 individual soft-story buildings owners by retrofit status.

When the scale averages are presented *with consideration of retrofit timing*, the results shift in a meaningful way. Although the number of pre-law retrofitters in the study is quite small, separating out just those two data points hints at distinctions in average RF score based on retrofit timing (Figure 7). In particular, pre-law retrofitters appear to have a higher Promotion tendency and a lower Prevention tendency, leading to the highest overall average RF score.

⁴ Cronbach's Alpha is a coefficient (a number between 0 and 1) commonly used to rate the internal consistency (homogeneity) or correlation between all the items intended to measure the same trait on a psychometric test.

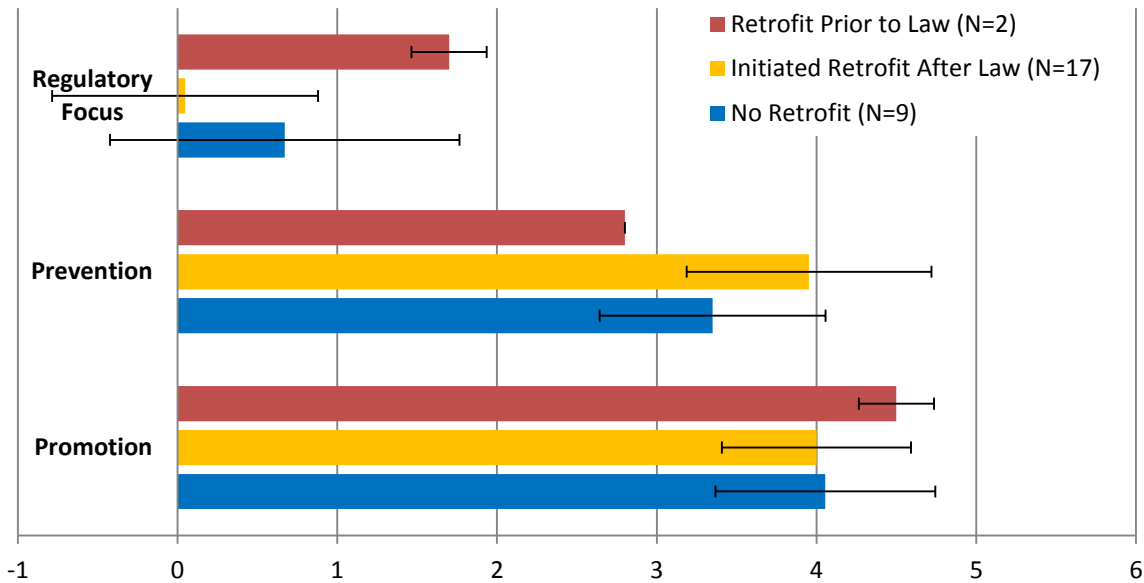


Figure 8. Mean Promotion, Prevention, and chronic Regulatory Focus (RF) scores by retrofit status and timing for all individual study participants.

Post-law retrofitters and non-retrofiters appear to be indistinguishable on the Promotion scale, but the post-law retrofitters had higher Prevention score on average. Thus, post-law retrofitters were the closest on average to having a Prevention-dominated goal focus. In other words, post-law retrofitters were the most sensitive among study participants to avoiding negative end states. This could have played a role in why they chose to retrofit while other owners impacted by the law did not. This comparison suggests a mechanism by which the law managed to convince people who otherwise would not have retrofit to do so. However, it also points to potential barriers, breakdowns in the program theory, and natural limits in terms of how to motivate retrofits.

The distinctions between pre- and post-law retrofitters are also of interest. They indicate that the Berkeley law managed to motivate retrofits among members of the target population that may have a different personality profile than persons who spontaneously retrofit on their own. This means that the law also had an effect on the decision process of retrofitters. All Berkeley soft-story owners became informed about the risk, but only some took action and personality differences might help explain why. Although the number of study participants does not permit statistical inference, retrofitters and non-retrofiters appear to own similar buildings and otherwise have similar demographic traits and earthquake risk perceptions.

What are other possible relevant distinctions between post-law retrofitters and non-retrofiters? One possibility is that non-retrofiters are relatively similar to retrofitters in terms of personality and goals but are simply less convinced of the benefits of mitigation. I addressed this possibility in the large study, and found that retrofitters were modestly more optimistic about the benefits of mitigation, but this could easily be a result of confirmatory biases [23].

Another possibility is that non-retrofiters somehow faced more financial and other obstacles than pre-law retrofitters, and adapted their beliefs about mitigation to be more consistent with what they viewed as their feasible action set. I was not able to collect data about

the financial conditions of each property and owner to be able to assess this possibility. But in either case, the BSSO's adding of short term downsides to not retrofitting did get many *prevention-oriented people who could afford it* to take action.

These quantitative results, although not statistically testable or stable given the sample size of this study, are still noteworthy and warrant further investigation. There may be *interaction* between a person's regulatory focus and their responses to new risk information and other policies that are attempting to re-align the social and economic consequences involved. This may be important to designing more effective future risk reduction interventions, as well as to our level of realism about the actual behavior change outcomes that can result from them.

Qualitative Evidence That the BSSO Shifted the Decision Reference Point

Data from the qualitative aspect of this study also highlight the role of the law in re-framing Berkeley soft-story landlords' circumstances and option set. When asked open-ended questions during an in-depth interview about the criteria they used or would use in making decisions about whether to retrofit, study participants offered a range of potential and influences motivations and barriers to retrofit. Not one interviewee had a *single* reason they did or did not retrofit, suggesting that multiple criteria are at work in this decision setting.

In general, the Berkeley landlords I spoke with view structural mitigation as one potential part of an overall strategy for protecting their financial interests in a property. This is the dominant perspective from which study participants view the decision to retrofit. If a building can be made less likely to collapse, that reduces a risk to what is undoubtedly a major asset and/or income source for the owner or institution. Similarly, some of the Managers felt that advising their clients about whether to retrofit was part of their role of keeping the property in sound financial condition on behalf of the owner.

Owners also expressed that seismic vulnerability, or even the credible appearance of it, can threaten the market value of an investment and its financial operations in a number of ways – some of which are independent of an actual earthquake event and damage (as will be discussed further below). Retrofitters feared disrupted or lost income generation after a quake. This rationale was particularly strong among the pre-law retrofitters. As one put it:

“If you take a big picture look, ten years prior there was a huge earthquake. What’s going to happen here? We’re putting a lot of money into this property and if it just has any kind of damage at all, then we can’t rent it out and what good is that?” [OB17:64]

For post-law retrofitters, the quotes below reflect a genuine *new* concern for the performance of their property in an earthquake. These owners seem to have believed and internalized the negative assessments of the city and their own engineers.

“If there’s an earthquake, I don’t want the city to red-tag the building. It generates...the most income for me, so I want to do the work...Because I know what it would take to just redo the building if there was major damage to it...I have a self-interest [to] make sure that doesn’t happen. [OB36:25-26]

*“It’s like I’m buying insurance to protect my property.”
[OB18:23]*

*“For me personally it was [about] protecting the building.
There’s a lot of money wrapped up in that building and I didn’t
want it to roll over and fall down.” [OB19:26]*

Both pre- and post-law retrofitters mentioned benefits other than direct damage-prevention. One pre-law retrofitter saw the seismic strengthening repair, along with other capital improvements made at the same time, as a crucial aspect of being able to refinance the property’s mortgage.

*“I’d been with a real sleazy [mortgage] company up to then, with
an interest rate that was through the roof. So, as a result of doing
all that work and then, if you know everything was legal,
everything was on the up and up. I was able to get a mortgage
which was infinitely lower mortgage rate with [a mainstream
reputable bank].” [OB11:39]*

Several connected the behavior of completing a retrofit with fulfilling a moral duty, reducing worry, avoiding potential guilt or regrets in the future, or satisfying the urge to take control of the situation. For example:

*“I did this project to make me feel better, not because I gained a
competitive advantage over any...other buildings around where we
are.” [OB19:24]*

*“It was for the people’s safety and it protects us from liability and
it’s the right thing to do...” [OB18:25, first half]*

Note that these owners indirectly mention emotions and values other than money. They also involve “framing,” both the desire to relieve or avoid negative ones or to restore, maintain, or attain positive ones. Emotional effects can be enjoyed immediately and recalled at will, regardless of whether or when an earthquake happens. As one pre-law retrofitter expressed it:

*“I was just lucky [to inherit enough money to do it]. Otherwise, I
can’t imagine why [someone] wouldn’t...If you’re thinking about it
long-term, I can’t imagine not wanting to. But that’s me. I mean, I
also still have whopping earthquake insurance on it...And that’s
just...maybe that’s I’m insecure or something. I just don’t want to
go to bed every night going, “Oh, my God. Oh, my God.” So,
peace of mind is big with me.” [OB11:45-46]*

This same pre-law retrofitter also related their decision to a sense of tradition, values, and pride of ownership:

“I love buildings a lot. I really do. I’m from a long family history of people fixing up buildings. So knowing that there’s something solid under there actually makes me very happy.” [OB11:32]

Study participants who were directly impacted by the BSSO universally felt that having a building listed on the city’s Inventory was bad news. In discussing it, they perceived a long list of negative implications that went well beyond the direct implications of owning a potentially at-risk building. First of all, compliance the law imposed a series of immediate costs and hassles, some of which would linger in perpetuity such as the tenant notification and signage requirements. Second, being listed on the BSSO Inventory is a matter of public record on the property title, so owners must disclose that fact to potential buyers and anyone who inquires with the County about the property will see it. Additionally, some owners found credible the city’s threat to adopt a mandatory retrofit ordinance (with potentially even more stringent retrofit requirements) in the future.

The net effect of this was a sense of stigma and devaluation. Owners came to feel that their building is now less valuable, more difficult to sell, and possibly harder to obtain financing for (both as an owner who wanted to refinance and for potential buyers) – unless and until they complete a retrofit. Thus, the idea of “getting off the list” became linked to and reinforced the asset protection and intangible motivations already discussed above.

Below are a series of quotes that exemplify the sense of stigma and other perceived problems associated with remaining on the Inventory.

“You’ve [got] the Scarlet Letter “A” on your building.” [OB14:51]

“I call it “The Leper’s List” because that’s essentially what the city is trying to do...they’re trying to get you to do the work because you want to get off of this list.” [OB 19:62]

“Anybody who would buy [a listed property] knows they’re going to deal with this crazy Berkeley thing. So, it’s very hard to sell a building who’s now up on that list.” [OB 5:59]

“It makes the house not sellable at this point...If you do sell it, you have to sell it for significantly less.” [OB 6:76-77]

“Do [owners] want to do some upgrades? Yes, but they only want to spend the money if they can get themselves off the stupid list ‘cause it’s devaluing their building.” [OB23:34, excerpt]

Interestingly, the main source of stigma and devaluation did *not* seem to be because tenants care about and are deterred from renting in an at-risk building⁵. While some owners I

⁵ The flip side of tenant disinterest in earthquake safety is that units in retrofit buildings cannot be rented at a premium. Therefore, in owners’ minds, a retrofit cannot increase the value of building as much as other types of capital improvements.

spoke with were at first concerned about the signage and notification requirements (and many expressed annoyance with them), the majority now agree that those requirements had little if any observable impact on the ease, speed, or price of renting out units. Only one interviewee stated directly that the BSSO was making it harder to rent out units or affecting the unit rental price.

Rather, the stigma seemed to arise mostly because *other owners and potential buyers* now know and care about the regulatory hassle and other costs of owning a property on the Inventory, and see the issue as a potential business liability.

“Yes, [being on the Inventory] will get priced into it to a degree...The thing buyers would be worried about is whether ... the city may come back and require that the work gets done...I just don’t see how the [city] can do that. But this is the City of Berkeley and they have been known to do all kinds of crazy things.” [OB19:68-69]

DISCUSSION

Overall, I interpret these data as supporting the idea that message framing and valence might interact with both social setting and personality factors. A clear policy implication from this is that intervention designers would be wise to incorporate variability in personality into their projections of potential program effectiveness. Solving information problems in a market cannot address inherent difference in risk beliefs and attitudes that might present barriers to action-taking.

This speaks to a need for appropriate timing and varied valences in the messaging relative to the decision status of the targeted populations that risk communication or managers want to influence. Even though negative threat appeals (assertions about threats and their consequences) are increasingly viewed as ineffective at motivating precautionary action, negative messaging and perceived losses relative to the status quo might still be important in persuading individuals in *later stages* of multi-step behaviors, in behavior settings where outcomes are highly tied to social norms, or among members of the target audience that have a more Prevention-oriented regulatory focus.

The BSSO was also a powerful motivator of behavior change because it shifted the social context surrounding owner decisions about retrofitting. The new social context, in turn, added new perceived costs to leaving the building as is, giving owners several new immediate reasons to retrofit. On top of that, the BSSO kept on nudging soft-story owners with multiple reminders and prompts to action, including continued public discussion about a future mandatory retrofit law. Ultimately, over the five year period after the law was passed, even owners that are not inclined to do a retrofit came to believe that doing retrofit would be advantageous and possibly inevitable. The owners I talked to felt there had been a 180 degree shift from the previous status quo.

“[People did] not do something like this retrofit ten years ago. If somebody now is coming to buy a property like this, OK, he knows what he is going to face. But when you bought it, nobody ever talked about it.” [OB15:41]

By very publicly forcing revelation of the seismic weaknesses of a large group of similar properties in one locality and all around the same time, the BSSO effectively established a new reference point for owner retrofit decisionmaking. Owners had no choice but to shift their decision frame from *whether to make an acceptable quality property even better* to whether to *restore* a property to acceptable quality by remedying a known defect. Pre-law retrofitters may have asked themselves, “Do I want to gain the benefits of retrofitting this building?” Owners affected by the BSSO were facing an importantly different decision context: “Do I want to gain the benefits of retrofitting and avoid the numerous negative side effects of being on this Inventory?”

There exist at least three judgmental heuristics that might have made this effect even more powerful. First, if owners still felt “endowed” with the previous value they ascribed to the property, a reference point shift may have greatly magnified the perceived value of avoiding the negative consequences imposed by the law. Second, the new “avoided costs” associated with retrofitting to get off the list involve removal of possibly emotionally aggravating states. These might feel more immediate and certain than the direct benefits of structural mitigation that are only realized when a future earthquake hits. Therefore, they could be less distorted by present-biased preferences [25] or myopic discounting [26].

On a final cautionary note, the results that the City of Berkeley was able to achieve using a mandatory evaluation, voluntary retrofit approach are highly contextual and probably non-representative of the results that other cities would be able to achieve. Berkeley proved a ripe setting for rapid change in social perceptions about retrofitting, in part because of well-organized opposition to rent control, concentrated ownership of rental properties, and being a University town where rental market is much more stable than in other locations. That being said, the establishment of this precedent has led to policy replication in four other San Francisco Bay Area cities, so it will soon be possible to compare outcomes from highly similar approaches in other localities.

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