PROCHASKA, URI
DHS COASTAL RESILIENCE CENTER
RESEARCH PROJECT
YEAR 3 PERFORMANCE REPORT
AND
FINAL PROJECT REPORT

Project Title: Communicating risk to motivate individual action

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Co-Principal Investigators and Other Partners/Institutions: Dr. Andrea Paiva, CPRC, URI, Pam Rubinoff, CRC, URI.

Project Start and End Dates: 1/1/2016 – 6/30-2018

Short Project Description ("elevator speech"):

Communicates risk to motivate action by tailoring communication to diverse populations. Participants receive individualized feedback via online coaching based on their readiness to take action and tailored text messages, thereby encouraging them to move forward in the behavior change process to prepare and mitigate impacts of coastal storms.

Summary Abstract:

Efforts to communicate disaster preparedness and risk messages lead to increased public awareness. However, FEMA surveys indicate that the public today is little more prepared to respond to a disaster than it was several years ago. This conundrum reflects the axiom in the science of behavior change that increasing awareness can start the change process, but cannot sustain it; reflecting a disconnect between theory and practice. This project used behavior change psychology to define and include specific achievable actions in tailored feedback delivered both online and through text messages to reach 3,000+ people from coastal states. Despite the very small percentage of our sample who completed the follow-up (9.6%), among those people not yet prepared at baseline, 38% of participants took action by the end of the study. Additionally, 74% of participants who were already prepared at baseline remained prepared at follow-up. These results were 19 times greater (38%) than the secular trends and were comparable to the mean of 42% success rates we have found across 14 different risk behaviors that we treated for the first times with TTM-tailored interventions. Given all of these results, we now predict that our success rates in our proposed preparedness project will be about 20 times greater than secular trends and plan to test this hypothesis in a proof of concept project in the upcoming year.

PROJECT NARRATIVE:

1. Research Need:

This project has supported DHS in improving its national mission to safeguard people, infrastructure, and economies from catastrophic coastal natural disasters. This research met DHS priorities by strengthening national preparedness and improving the resilience of coastal communities in the face of coastal storm hazards; consistent with NOAA's coastal missions and programs as well. As such, this research addresses Presidential Policy Directive 8, which calls for increasing our level of National Preparedness by preventing, mitigating, responding to, and recovering from the hazards that pose the greatest risk. This project is specifically tied to strategic priority 1 of the 2014-2018 DHS strategic plan. More specifically we are responding to objective 1.3 aimed at increasing disaster awareness and action. Additionally, this project addresses QHSR Mission 5 (Strengthen National Preparedness and Resilience), which helps develop tools to enhance citizen preparedness, specifically Goal 5.1, Enhance National Preparedness supports efforts to "Empower individuals and communities to strengthen and sustain their own preparedness…build a collective understanding of their risks, the resources available to assist their preparations, and their roles and responsibilities in the event of a disaster." Hurricanes account for 10 of the top 15 most expensive natural disasters in the United States, including the top 3 (NOAA, 2014).

2. History:

This project began in January 2016 with the development of an online program, including writing tailored feedback and tailored text messages that are delivered to participants based on their responses to an empirically tested and validated disaster preparedness assessment. This phase included meetings with stakeholders and possible end-users, like FEMA. Once the program was developed and tested, we recruited 3,043 participants from five states (RI, MA, CT, AL, and FL). We experienced delays in recruiting due heavily to budget limitations and by generating leveraged funds we were able to resolve the issue. We were able to complete the baseline data collection rapidly and were able to increase our baseline recruitment from 1,000 participants to over 3,000 participants. During this time, due to our close discussions and collaborations with FEMA and with leveraged funds we were able to also have an investigator who spent more time engaging end users. Through 2017, participants received tailored text messages and the project team analyzed the baseline data and presented this in a webinar. Once enough time had passed, the team began the data collection for the follow-up so to be able to evaluate the results of the program and subsequent text messages. All 3,043 participants were contacted by the survey company to participate in the follow-up program and assessment. Very early on in this process, it became apparent that the survey company was struggling to engage participants for the follow-up. Our project team pushed their team to offer more incentives, send more engaging emails to retain participants, and also sent emails from the project email address and offered entry into a large lottery as an incentive to participate. We realized after these efforts did not succeed that the survey company that we ended up choosing, based on their lower cost, did not have experience with engaging their participants at a follow-up time point. They had estimated a 30-35% retention rate, which would have given us 1000 participants at follow-up. Unfortunately, despite our efforts, we ended up with only 9.6% retention at follow-up. Though

results are promising, this has prompted us to change our survey company for a proof of concept project if allowed in Year 4.

3. Results:

The low costs allowed us to generate a large sample of 3,043 for three New England states (Connecticut, Massachusetts and Rhode Island) and two southeast Gulf States (Alabama and Florida). The baseline data were excellent and revealed interesting regional differences in distributions across stages of change. Table 1 shows that the New England region had twice as many people in the Precontemplation stage who were not ready to take action on becoming prepared for natural disasters compared to the Southeast region.

Table 1. Stage of Change by Region

		New England (n= 860)		South East (n= 2,177)		X^2	*p*
		n	%	n	%		
Baseline Stage – Disaster	Precontemplation	164	19.1	187	8.6	140.39	**<.001**
	Contemplation	213	24.8	332	15.3		
	Preparation	206	24	541	24.9		
	Action	145	16.9	636	29.2		
	Maintenance	132	15.3	481	22.1		

The New England region also had 56% more people than the southeast region in the Contemplation stage, who are characterized by deep doubts that taking such actions are worth the costs and efforts. Such doubts could lead the majority of contemplators to delay taking action. In the southeast region, on the other hand, almost 60% of respondents reported they had taken effective action in the past six months (29.2%) or were maintaining that action for more than six months (22.1%). Results on other key behavior change constructs (Pros, Cons and Confidence) support the validity of our stages of change findings. Figure 1 shows that across both regions, people in the pre-action stages evaluated the cons (e.g., time, cost, hassle) as significantly greater than the pros (e.g., increasing the safety to family by preparedness to evacuate and the ability to cope of remaining at home). People in the Action or Maintenance stages (A/M) had the appropriate pattern with the pros outweighing the cons. Those in the A/M had significantly higher pros than those in the pre-action stages and lower cons. Similarly, those in pre-action stages had significantly lower confidence or self-efficacy that they could take action and maintain the action than those in A/M. The practical importance of differences on these TTM constructs is that our computer tailored interventions (CTIs), including tailored digital texting were designed to increase the pros of changing, decrease the cons and increase self-efficacy in people in specific pre-action stages of change.

As discussed in the history section above, the follow-up retention rate was much lower than expected and yielded follow-up data on 293 participants (9.6%). Despite the very small percentage of our sample who completed the follow-up, we were able to analyze the data from both those participants who were in the pre-action stages (no yet prepared) at baseline (N=166) and those who were prepared at baseline (in Action or Maintenance) (N=127).

Pre-action at baseline sample results: Among this sample, 38% of participants moved to the Action or Maintenance stages. In our original proposal, we predicted that our tailored intervention would produce results at least 10 times greater than the national secular trends of 2% action taken per year. Our results were 19 times greater than the secular trends.

Action/Maintenance at baseline sample results: Our hope is that our tailored interventions keep participants prepared. We found that 74% of these participants remained in the Action/Maintenance stages at follow-up.

Results by region: Comparison of these results by region indicated that 47.8% of those in the South East region took action compared to 17% in the New England region. This was expected given that the participants in the Southeast were more prepared at baseline.

4. End Users and Transition Partners:

One major end-user continues to be FEMA's Individual and Community Preparedness Division, working through Senior Advisor Jacqueline Snelling. Our major goal is to help solve the problem that FEMA has of striving to surpass the rate of 2% increases annually in the U.S. population's preparedness for natural disasters. Our initial goal was to produce preparedness rates that are 10 times the current national benchmark of 2% increases per year. Our preliminary outcomes indicate that we are likely to produce 20 times the 2% benchmark. Other target end users are organizations that require staffing during emergencies. These include government emergency response (e.g. FEMA, RIEMA); health-related organizations (e.g., CVS Health); South County Health System serving Rhode Island coastal communities; trade organizations that represent a broad range of companies (e.g., Insurance Institute for Business and Home Safety); and NGOs (e.g., the Red Cross). Such organizations suggest that organizational staff need to have their personal/family preparedness strategies attended to so that they can be relied upon by their organizations when emergency strikes. Tailoring interventions for individual preparedness behavior change in these organizations will increase the effectiveness of staff preparedness as well as organizational effectiveness to support community preparedness.

a. How did you transition your results?
b. Describe how end-users are using the results.

Both of these are in process – during Year 4 – part of the process for transitioning is completing the proof of concept and then we will continue to work with our end users to disseminate the program. Ultimately, our specific tools include reliable content that use valid measures of key constructs that produce progress at each stage of change. These measures are applied to tailor the online and texting communications that can motivate and guide at risk participants through the stages with the goal of taking actions that match FEMA's criterion of household preparedness for severe storm disasters. These evidence based tools and products can be delivered via alternative pathways. A national employer, like CVS Health, home-based in Rhode Island, could deliver it to employees that already receive digital communications for their company. DHS could apply the same approach from their employee population that ironically and reportedly are not adequately prepared for disasters. There is the potential for DHS to model institutes at NIH that make evidence based risk reduction programs available to the public via the Internet. Implementation by end-users will require both the URI developed content and a software delivery platform that includes algorithms for tailored feedback to participants. We

would make our content program available to these organizations and will work with interested end-users to understand their technical capacities and identify options for online delivery of the program. If preferred, we could facilitate collaboration with Pro-Change Behavior Systems Inc., a company that we have contracted with multiple times to provide technical capacity for helping organizations deliver the online program including, texting communications.

5. Project Impact:

This project developed and tested state of-the-science and innovative disaster preparedness communication intervention program. Addressing Topic 2c (Communicating Risk to Motivate Action), it identified and used messages that motivate individuals and groups to prepare in advance for disasters, and to take action when disasters threaten. Participants were linked to key information sources, such as the National Oceanic and Atmospheric Administration (NOAA), FEMA, and the project's recent Waves of Change (RIClimatechange.org) website, which is organized to help visitors move through the stages of behavior change. This project took it one step further and provided information by text messaging in addition to the online program to increase efficacy of behavior change.

This computer tailored intervention identified resident's readiness to prepare for such disasters and provide them with the tools, education, and behavior change strategies that empower them to take action on this important issue. In doing so, we focused on, and worked closely with key members of the community, including governmental agencies, nongovernment organizations, and the private sector. Our innovative reliance on digital communications included texting, is directly related to FEMA Administrator Fugate's interest in the use of texting and other digital modalities to communicate information that can reach at-risk populations and increase their preparedness and mitigation behaviors (Haldeman, 2013).

Based on our Year 03 preliminary results, we expect that our completed Proof of Concept work in Y04 will represent a breakthrough in the percentage of at risk populations that progress through the stages of change and take action that meets FEMA's criteria for household preparedness. We expect that our breakthrough percentage of 38% taking action will be 19 times greater than the 2% that currently take action in a year. These outcomes will support a new best practice of applying digital technologies to deliver tailored online and texting programs for entire at risk populations ranging from those who are not ready to take action (Precontemplation) through those who are ready to take more immediate action to meet FEMA's criteria for household preparedness. Such breakthroughs would represent major advances in both technologies and capabilities.

6. Student involvement and awards:
   One graduate student in year 1

7. Interactions with education projects: None

8. Publications: Mundorf, N., Redding, C.A., Prochaska, J.O., **Paiva, A.L.,** & Rubinoff, P. (2018). Resilience and thriving in spite of disasters: A stages of change approach. In A. Fekete & F. Fiedrich (Eds.), *Urban disaster resilience and security: Addressing risks in societies* (pp. 383–396). Springer International Publishing. doi: 10.1007/978-3-319-68606-6_22

Once the proof of concept project has been completed, the data from both the preliminary and proof of concept projects will be turned into a manuscript for publication.

9. Tables:

Table 1: Documenting CRC Research Project Product Delivery

Product Name	**Product Type** (e.g., software, guidance document)	**Delivery Date**	**Recipient or End User**
Expertise on the FEMA Household Survey	Survey	November 2016 and April 2017	FEMA
Results	Report	My 2018	FEMA and other end users
Intervention Program	Software	Expected Y04	DHS

Table 2A: Documenting External Funding

Title	**PI**	**Total Amount**	**Source**
Rhode Island Science and Technology Advisory Council Collaborative Research Grant	Prochaska	$100,000	NSF

Table 2B: Documenting Leveraged Support

Description	**Estimated Total Value**
Foundation funding for Pro-Change software	$30,000
Indirect funds were used to allow Pam Rubinoff to connect with end users	$9,000
Free support staff office	$7,000

Table 3: Performance Metrics:

PROCHASKA PERFORMANCE METRICS

Metric	Year 1 (1/1/16 – 6/30/16)	Year 2 (7/1/16 – 6/30/17)	Year 3 (7/1/17-6/30/18)
HS-related internships (number)			
Undergraduates provided tuition/fee support (number)			
Undergraduate students provided stipends (number)			
Graduate students provided tuition/fee support (number)	1		
Graduate students provided stipends (number)			
Undergraduates who received HS-related degrees (number)			
Graduate students who received HS-related degrees (number)			
Graduates who obtained HS-related employment (number)			
SUMREX program students hosted (number)			
Lectures/presentations/seminars at Center partners (number)	2	2	
DHS MSI Summer Research Teams hosted (number)			
Journal articles submitted (number)			
Journal articles published (number)			
Conference presentations made (number)			
Other presentations, interviews, etc. (number)			
Patent applications filed (number)			
Patents awarded (number)			
Trademarks/copyrights filed (number)			
Requests for assistance/advice from DHS agencies (number)	2	2	
Requests for assistance/advice from other agencies or governments			
Total milestones for reporting period (number)	4	5	
Accomplished fully (number)	4	3	
Accomplished partially (number)	4	2	
Not accomplished (number)			

10. Year 3 Research Activity and Milestone Achievement:

Research Activities and Milestones: Final Status as of 2018
Reporting Period 7/1/2017 – 6/30/2018

Research Activities	Proposed Completion Date	% Completed	Explanation of why activity/ milestone was not reached
Deliver Internet CTI and first 12 months of text messaging with frequency tailored to stage.	11/30/2017	100%	
Research Milestones			
Analyze and report data on 12 month outcomes of 3,000 coastal residents recruited into the study	12/31/2017	100%	Retention at follow-up was small (see narrative above), but all analyses have been completed

11. Year 3 Transition Activity and Milestone Status:

Transition Activities and Milestones: Final Status as of 2018
Reporting Period 7/1/2017 – 6/30/2018

Transition Activities	Proposed completion date	% completed	Explanation of why activity / milestone was not reached
Ongoing collaborative conference calls with End-user Team	7/1/2017 – 6/30/2018	100%	
Analyze and report data on 12 month outcomes of 3000 coastal residents	7/1/2017 – 6/30/2018	100%	
Webinar/presentation at meeting (e.g. ASFPM meeting) of results and application to future efforts using CTI as a communication tool for disaster preparedness.	7/1/2017 – 6/30/2018	100%	
Transition Milestones			
Completed one collaborative conference call with End-user Team	10/31/17	100%	
Webinar completed with representation from local, state, federal agencies in emergency management and coastal planning	12/31/2017	100%	
Dissemination to networks of emergency managers and coastal planners.	6/30/2018	0%	Due to the unanticipated issues with recruiting the follow-up data, we

			have not yet begun dissemination. This is expected to be completed during Y04/Y05 if accepted.
Having an organization or community actually adopt use of the tool	12/31/2017	0%	Due to the unanticipated issues with recruiting the follow-up data, we have not yet begun dissemination. This is expected to be completed during Y04/Y05 if accepted.