

MFR 03010363
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MEMORANDUM FOR THE RECORD

Event: Meeting at Columbia U.

Type of event: Briefing

Date: Oct. 21, 2002

Special Access Issues: NA

Prepared by: Emily Walker

Team Number: 8

Location: Columbia U.

Participants - Non-Commission: Dr. Robyn Gershon, Dr. Elizabeth Smailes, Dr. Kristine Qureshi, Erin Hogan of The World Trade Center Evacuation Study; Sally Regenhard and Monica Gabrielle – Skyscraper Safety Campaign

Participants - Commission: Emily Walker, Sam Caspersen, Cate Taylor, George Delgrosso, Ellie Hartz

At the invitation of Sally Regenhard and Monica Gabrielle of the Skyscraper Safety Campaign, Team 8 set up a meeting with the Columbia University Study for the World Trade Center Evacuation in order to be briefed on the results of their study thus far. The study began in 2002 and expects to finish in 2004. Dr. Robyn Gershon led the discussion. Following an introduction of the participants, including some description of the 9-11 Private Sector Preparedness hearing and issues we have uncovered including the need for more preparedness, Dr. Gershon presented the attached PowerPoint slides which described the nature of their study and the results obtained by the 30 interviews they have conducted thus far. The purpose of the study is “to identify the individual, organizational and structural factors that affected evacuation from the WTC on 9/11/01”. The pieces of the study that were of most interest to the Commission included the sections on structure factors and preparedness. In addition, the goal of the study is to provide a basis for policy makers to use to “improve the evacuation of high rise structures under extreme conditions”. Dr. Gershon highlighted the following issues:

1. They were cooperating with NIST and expected to get the list of employees at the WTC as of April 2001 from NIST so that they could select a sample of 5000 to participate in a

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study. NIST has changed its mind and will not give them the list due to privacy laws and they are struggling as to how to get there sample now.

2. They are half way through the study and expect to complete by COY 2004. They are at the questionnaire stage.
3. They are following a theoretical model which appears to hold up in most cases.
4. They are covering only WTC 1 and 2.
5. There is some dispute about the number of people who made it out from below the of the planes impact.
6. There are many questions on the timeline which makes it difficult for them when interviewing to pinpoint the exact time people evacuated.
7. There appear to be contradictions to the data the USA Today reporter, Dennis Couchon, supplied as to where some of the survivors came from. For example, from their interviews, it appears that some people in Tower 1 were on the lower floors and when Tower 2 collapsed, the debris from that Tower impeded their departure from Tower 1.
8. Sally Regenhard interjected that if the firefighters had been given proper communication, they could have gotten more people out rather than heading upstairs.
9. There was some discussion on the issues related to handicapped employees evacuation and how this slowed down the process and what steps could be taken to help these people in the future.
10. Dr. Gershon said that data currently points to the fact that the WTC towers were terribly lacking in readiness. Some fire wardens did not know where the stairwells were. Employees had not practiced evacuation and did not know where the stairwells were. Stairwells were not labeled. Doors were locked between floors. Elevators were not marked so people did not know which of the two doors opened to the floor and which opened to the wall on particular floors. Construction for certain floors re-arranged the floors and blocked off certain fire exits etc. People did not know where evacuation chairs were placed for the handicapped (which had been installed after the '93 bombing). Stairwells were not large enough to evacuate the building at the same time. No one ever calculated the amount of space needed for a full building evacuation. Also, the fact that the interior of the building had all the equipment, elevators etc made the plane impact even greater.

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11. Sally Regenhard interjected that the Port Authority did not follow NY fire code. She feels that even though they state that they exceeded the NY Code, this is a false statement. She feels that the PA should not be above the law and that they should have accountability. In addition, she is concerned over the fact that the new WTC 7 building is following the same path as the previous buildings in terms of not applying the NYC fire code. She felt this should be pointed out.
12. Dr. Gershon felt that OSHA standards were usable but they were not enforceable. They did call for an evacuation plan. They feel that different regulations are needed for buildings above 10 stories which could cover over 700 buildings in NYC. She does NOT feel that skyscrapers are safe places to work.
13. Dr. Smailes spoke about the interviews and the kind of data they have found from their focus groups. She said that older people who had previously been in events, particularly the military and National Guard, showed evacuation leadership and galvanized people.

Background:

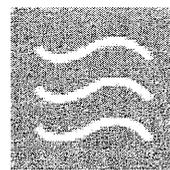
Attachment 1: Agenda of Meeting

Attachment 2: PowerPoint Presentation

Attachment 3: Assessing the Impact of Research on Disaster Survivors

Attachment 4: Support Services Brochure

[Unclassified]



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Factors Associate with Evacuation from the World Trade Center: Preliminary Findings

Robyn R.M. Gershon, MHS, DrPH
Principal Investigator

October 21, 2003
Presentation for the 9-11 Commission



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Center for Public
Health Preparedness
Columbia University

NCDP
National Center for
Disaster Preparedness
Columbia University

ASPH
ASSOCIATION OF
SCHOOLS OF
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Study

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Research Team

Dr. Kristine Qureshi

Dr. Stephen Morse

Ms. Erin Hogan

Dr. Elizabeth Smailes

Dr. Tracy Durrah

Dr. Allan Fleischman

Ms. Bridgette Murphy

Dr. Fred Matzner

Dr. Mark Franklin Peyrot

Dr. Martin Sherman

Dr. Victoria Raveis



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Goals

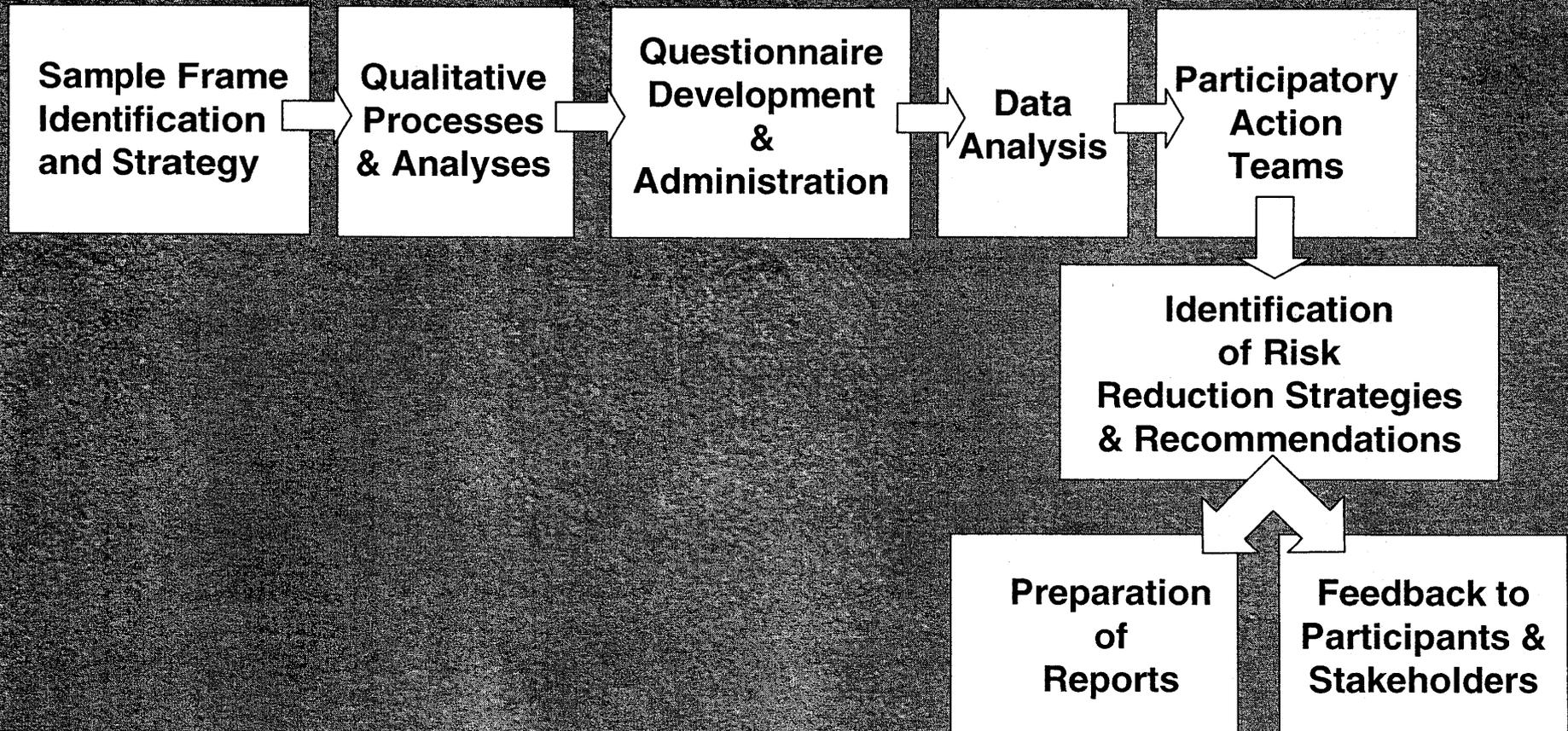
- To identify the individual, organizational, and structural factors that affected evacuation from the WTC on 9/11/01
- To inform policy and practice in order to improve the safe evacuation of high rise structures under extreme conditions



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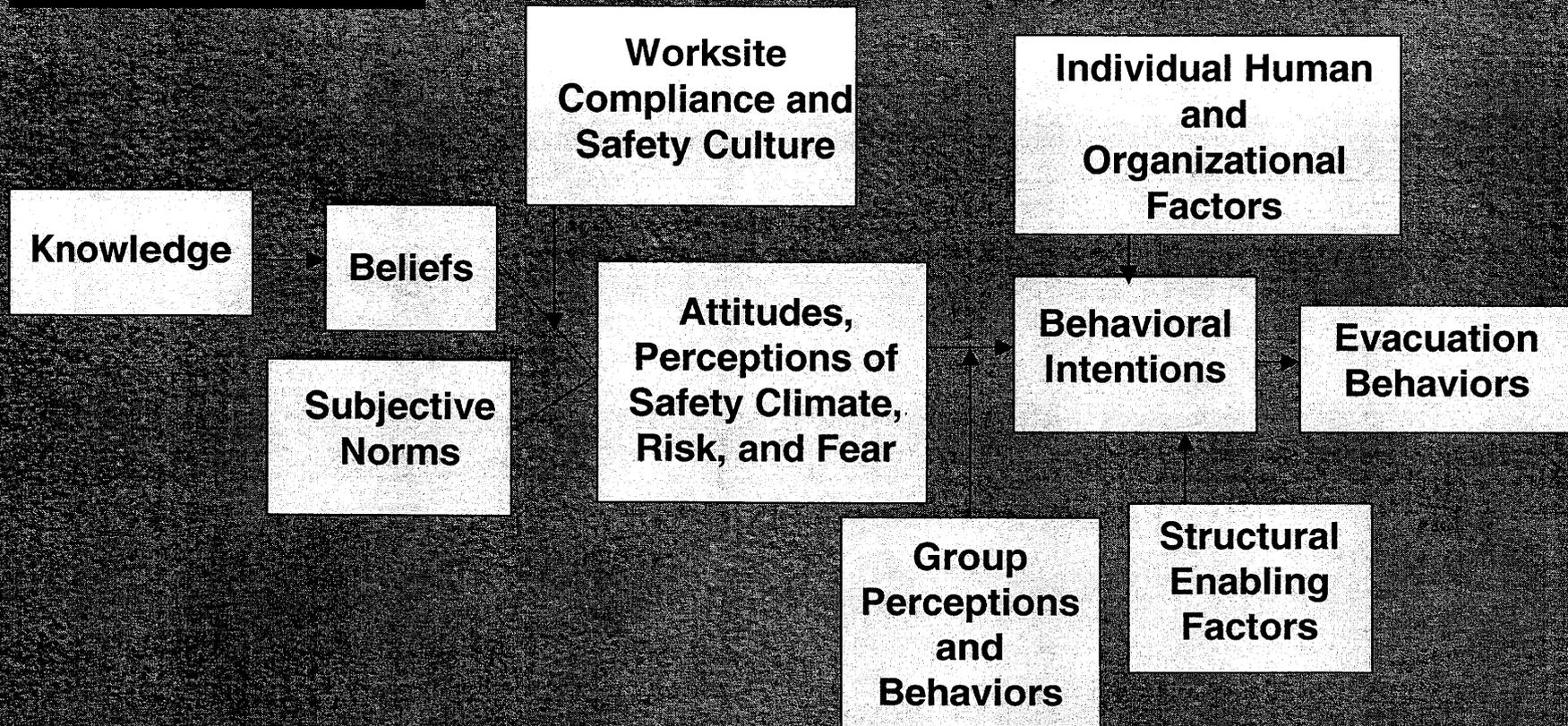
Study Overview



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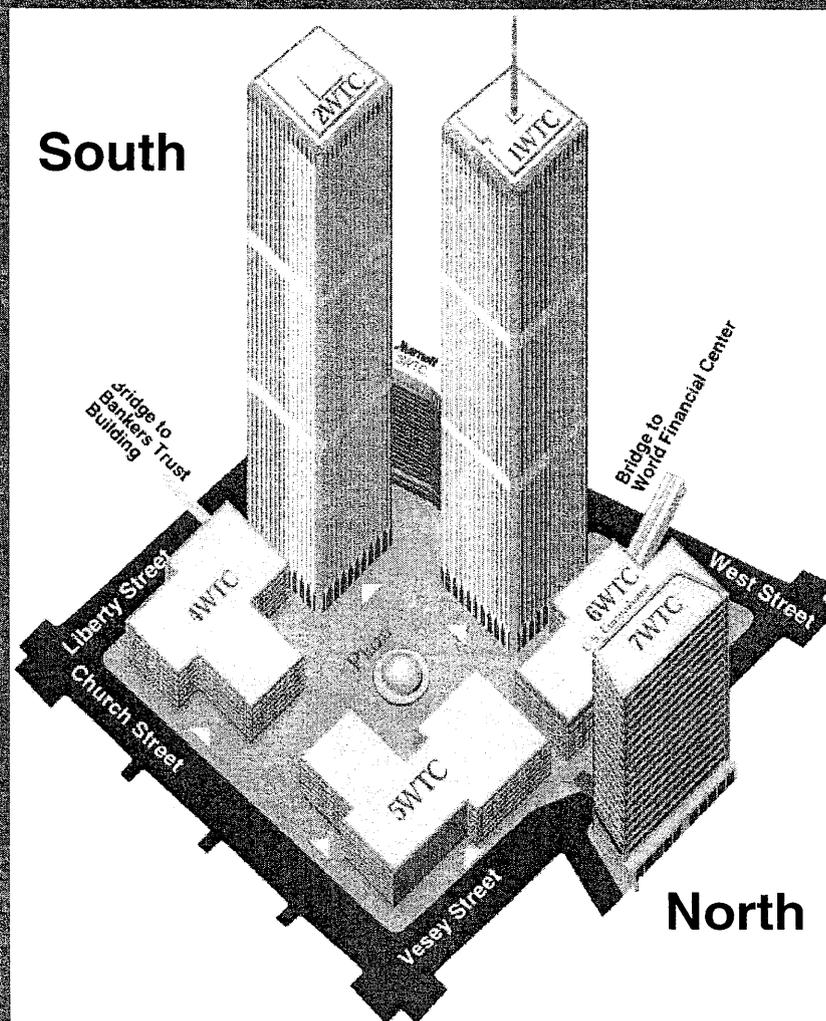
Theoretical Model



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WTC Complex





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September 11, 2001

North Tower Impact

- 8:46 am- American Airlines Flight 11
- Boeing 767 (198 tons)
- 470 MPH
- 10,000 gallons of fuel
- North face between 94-98 floors
- Collapses 1 hour, 42 min after impact

South Tower Impact

- 9:03 am- United Airlines Flight 175
- Boeing 767 (198 tons)
- 590 MPH
- 10,000 gallons of fuel
- South Face between 78-84 floors
- Collapses 56 minutes after impact



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WTC Evacuation

- In the span of 102 minutes, approximately 14,000 people evacuated the North and South Towers
- High percentage of people below the impact site survived from both towers
- 16-18 survivors above impact site in South Tower
- 0 survivors above impact site in North Tower
- Fatalities below impact line linked to proximity
- About 200 fell or jumped



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Morbidity and Mortality

- 810 people treated at hospitals
- 16% hospitalized
- 0.4% died during emergency room treatment
- 86% physical injuries
- 14% had non-injury conditions
 - ← Asthma
 - ← Cardiac
 - ← Panic Attacks
- Injuries
 - ← Inhalation
 - ← Burns
 - ← Fractures
 - ← Ocular
 - ← Head Injuries



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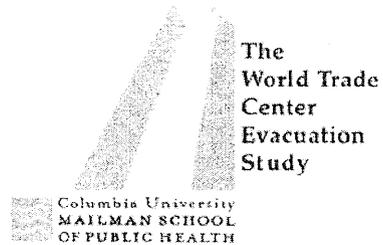
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Morbidity and Mortality

Fatalities:

- 479 rescue workers
- 157 jetliner crew and passengers
- 2190 civilian deaths
 - 1434 in North Tower
 - 599 in South Tower
 - 147 location unknown
 - 10 Bystanders (on the ground)
- 70% worked on *upper* floors
- Approximately 800 people in North Tower and 300 people in South Tower were trapped above impact zone

Source: USA Today



History of Emergencies at the WTC

<u>Year</u>	<u>Type</u>	<u>Result</u>
1975	Fire	
1977	Blackout	
1980	Bomb Scare	
1990	Power Outage	
1991	Transformer	
1993	Bomb explosion in underground parking garage	1,000 injuries, 6 deaths, mass evacuation attempted
2001	Terrorist attacks	2,700 Fatalities



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Preliminary Findings: In-Depth Interviews (N=30)

- The absence of leadership or direction led to delays
 - Leaders emerged – prior experience
 - Employers, for the most part, did not provide emergency training
 - Training that was provided was cursory
 - Communication failures delayed evacuation
 - Individuals with disabilities
 - Uniformed services presence was calming
 - People were unfamiliar with the building
 - Once outside, confusion on how to vacate immediate area
- slowed down others
- Helping others provided a focused goal



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Preliminary Findings: In-Depth Interviews

- Footwear became an important issue
- Praying helped some individuals and others nearby
- Seniority played a role in leaving
- Locked or jammed stairwell doors increased sense of panic

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Preliminary Findings: In-Depth Interviews

- Intuitive feelings or sense of seriousness led people to leave
- Environmental cues triggered action
- 1993 Bombing experience Blasé
- Disorientation in and outside WTC reported Propelled into action
- Uncertainty about elevators and sky lobbies



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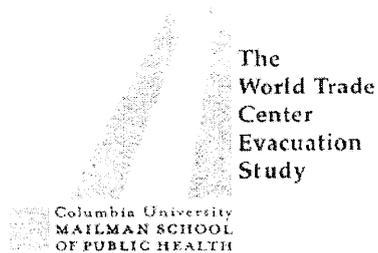
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Challenges to Disaster Research

- Funding timeliness
- Access to participants
- Potential recruitment-related biases
- Coordination across studies and agencies
- Protection of study participants

Ethical Issues Related to Disaster Studies

- Decision-making ability of survivors and assessment of ability
- How to assess impact of the research on the survivors
- Weighing societal benefits vs. costs to participants, especially when individual benefits may be lacking



Preliminary Recommendations

- High rise buildings → High risk occupancies
- High rise buildings occupancies – specialized training
- Identify and train evacuation leaders
- Pre-planning with local Office of Emergency Management for area evacuation planning

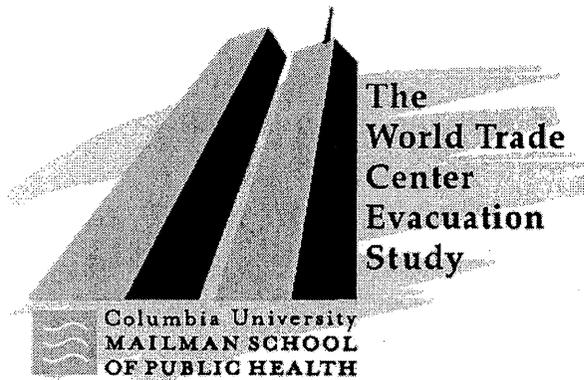


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World Trade Center Evacuation Study

[http://cpmcnet.columbia.edu/dept/sph/CPHP/
wtc.html](http://cpmcnet.columbia.edu/dept/sph/CPHP/wtc.html)



Meeting with the 9-11 Commission

Tuesday, October 21, 2003, 11:00 a.m.

Agenda

Purpose: To provide an overview of the World Trade Center Evacuation Study and preliminary findings and recommendations to the 9-11 Commission.

Where: Elinson Conference Room,
600 West 168th Street, 4th Floor Center, New York, NY 10032

For more information, please call Ms. Erin Hogan, Project Coordinator at 212-342-0262

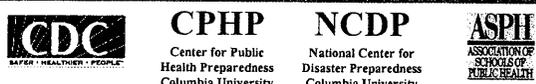
Time	Item	Lead
11:00 – 11:15 am	Welcome and Introductions	Dr. Robyn Gershon
11:15 – 11:30 am	Factors Associated with the Evacuation of the WTC : Preliminary Findings	Dr. Robyn Gershon
11:30 – 11:45	Interim report on psychological impact of interviews	Dr. Elizabeth Smailes
11:45 – 12:00 pm	Open Discussion	Open

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The World Trade Center Evacuation Study

Research Team

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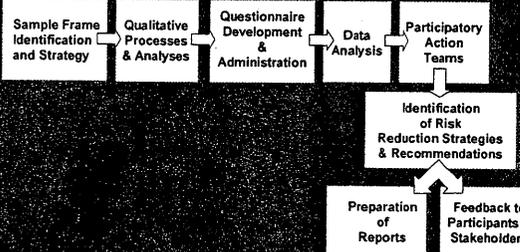
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Goals

1. To identify the individual, organizational, and structural factors that affected evacuation from the WTC on 9/11/01
2. To inform policy and practice in order to improve the safe evacuation of high rise structures under extreme conditions

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Study Overview

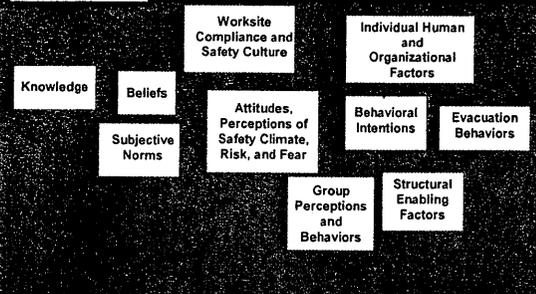


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    A[Sample Frame Identification and Strategy] --> B[Qualitative Processes & Analyses]
    B --> C[Questionnaire Development & Administration]
    C --> D[Data Analysis]
    D --> E[Participatory Action Teams]
    E --> F[Identification of Risk Reduction Strategies & Recommendations]
    F --> G[Preparation of Reports]
    F --> H[Feedback to Participants & Stakeholders]
  
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Theoretical Model

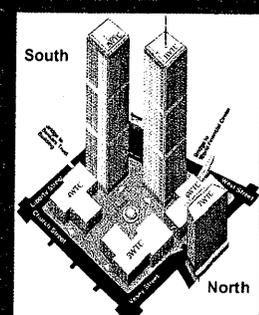


The model consists of several interconnected boxes:

- Knowledge** (left side)
- Beliefs** (top left)
- Subjective Norms** (bottom left)
- Worksite Compliance and Safety Culture** (top center)
- Attitudes, Perceptions of Safety Climate, Risk, and Fear** (center)
- Group Perceptions and Behaviors** (bottom center)
- Individual Human and Organizational Factors** (top right)
- Behavioral Intentions** (center right)
- Structural Enabling Factors** (bottom right)
- Evacuation Behaviors** (far right)

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WTC Complex



South

North

The World Trade Center Evacuation Study

September 11, 2001

<p>North Tower Impact</p> <ul style="list-style-type: none"> 8:46 am- American Airlines Flight 11 Boeing 767 (198 tons) 470 MPH 10,000 gallons of fuel North face between 94-98 floors Collapses 1 hour, 42 min after impact 	<p>South Tower impact</p> <ul style="list-style-type: none"> 9:03 am- United Airlines Flight 175 Boeing 767 (198 tons) 590 MPH 10,000 gallons of fuel South Face between 78-84 floors Collapses 56 minutes after impact
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WTC Evacuation

- In the span of _____ minutes, approximately _____ people evacuated the North and South Towers
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World Trade Center Evacuation Study

<http://cpmcnet.columbia.edu/dept/sph/CPHP/wtc.html>



ASSESSING THE IMPACT OF RESEARCH ON DISASTER SURVIVORS

The Second International Conference on Urban Health
October 16, 2003

Elizabeth Smailes, Ph.D, Tracy Durrah, DrPH., Robyn R.M. Gershon, DrPH, Bridgette Murphy, M.S., Erin Hogan, B.S., Vitoria Raveis, Ph.D., Fredrick Matzner, MD

Introduction

Survivors of disasters are often recruited to participate in research related to the disaster. However, little is known about the impact of participation in such research on disaster survivors. We developed a protocol to minimize and track the potential adverse effects of study participation on World Trade Center evacuees' well-being.

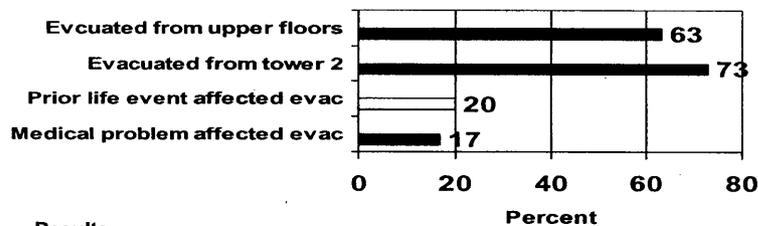
Study Design

A detailed protocol was developed for use when conducting in-depth interviews, which involved 30 survivors of the World Trade Center Evacuation. As part of this protocol, participants were asked to complete the Posttraumatic Stress Disorder Checklist (Weathers, 1993) two weeks prior to participating in the in-depth interview (T1), directly following the interview (T2), and then two weeks after the interview (T3).

Demographic and Work Status Information

- Interviewees were an average age of 43 years old; 60% were male; 63% were white; 70% were college graduates
- On average, interviewees worked 45 hours per week and had worked for an average of 5 years with their company at WTC
- 68% were from companies with less than 500 employees, and 59% were senior management

Figure 1. Evacuation Risks



Results

- A number of participants reported prior traumatic life events, as well as evacuation
- Figure 2. Interviewees reported no significant change in frequency of health symptoms between the 24 hour and two week follow-up, (head aches: $t(28) = 1.00, p = .33$; stomach aches: $t(28) = 1.44, p = .16$).
- Figures 3 and 4. On average interviewees reported at most experiencing minimal PTSD symptoms two weeks prior to participating in the interview (T1), directly following the interview (T2), and two weeks after the interview T3. T1 Mean= 2.05; T2 Mean= 2.08; T3 Mean= 1.80, where response item 2 was 'a little bit.'
- The results of a paired samples t-test indicate no significant elevation in symptoms from the screen to following the interview ($t(29) = .31, p = .76$).
- Interviewees reported a significant drop in PTSD symptoms between the interview and the two weeks after the interview ($t(29) = -3.61, p < .001$).

Figure 2. Health Outcomes Following the Interviews

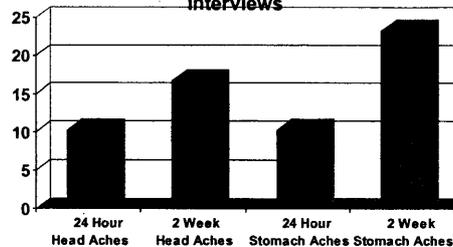


Figure 3. Mean of PTSD symptoms for each assessment time (N=30)

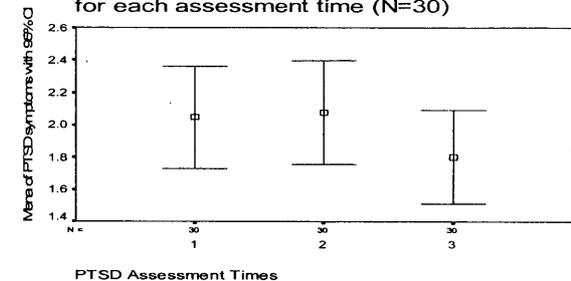
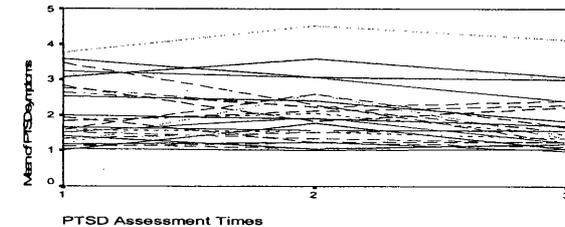


Figure 4. Mean of PTSD symptoms across 3 times for each WTC interviewee (N=30)



Conclusions

Among this sample of disaster survivors, PTSD symptoms decreased following the interviews. These results suggest that the implementation of a detailed protocol may have been beneficial in preventing an adverse impact of the interview on participants.

For more information please contact Dr. Elizabeth Smailes, ems37@columbia.edu, (212) 342-0264