

*The epidemiology of post-traumatic stress in the  
New York City metropolitan area after the  
September 11 terrorist attacks*

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*The New York  
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## *Outline*

- The epidemiology of PTSD
- Questions in the study of PTSD after disasters
- Methods
- Summary of findings
- Questions answered, questions raised

## *The epidemiology of PTSD*

## *The prevalence of traumatic event exposure*

- Lifetime experience of qualifying traumatic event in US: 60-90%<sup>1,2,3,4</sup>
- Lifetime prevalence of crime/aggravated assault: 36%<sup>2</sup>
- Lifetime prevalence of sudden, unexpected death of a loved one: 60%<sup>3</sup>
- Higher prevalence in recent surveys using DSM-IV criteria

<sup>1</sup>Norris FH. J Consult Clin Psychol 1992;60:409-418

<sup>2</sup>Resnick H. J Consult Clin Psychol 1993;61:984-991

<sup>3</sup>Breslau N. Arch Gen Psychiatry 1998;55(7):626-632

<sup>4</sup>Kessler R. Arch Gen Psychiatry 1995;52(12):1048-1060

## *The prevalence and incidence of PTSD*

- General population prevalence of PTSD in US: 7.8-9.2%<sup>1,2</sup>
- Past six month prevalence of PTSD among women: 4.6%<sup>3</sup>
- Conditional risk of PTSD overall: 9.2%<sup>2</sup>
- Conditional risk of PTSD after sexual/aggravated assault: 20-50%<sup>2,3</sup>
- Conditional risk of PTSD after death of a loved one: 14.3%<sup>2</sup>
- Proportion of PTSD precipitated by death of a loved one: 31%<sup>2</sup>
- Conditional risk of PTSD after natural disaster: 3.7-5.4%<sup>1</sup>

<sup>1</sup>Kessler R. Arch Gen Psychiatry 1995;52(12):1048-1060

<sup>2</sup>Breslau N. Arch Gen Psychiatry 1998;55(7):626-632

<sup>3</sup>Resnick H. J Consult Clin Psychol 1993;61:984-991

## *PTSD after disasters*

- Most studies have assessed direct victims of disasters
- Prevalence of PTSD among survivors of Oklahoma City bombing: 34%<sup>1</sup>
- General population prevalence of PTSD after Hurricane Mitch: 4.5%<sup>2</sup>
- General population prevalence of PTSD after LA riots: 4.1%<sup>3</sup>
- No peer-reviewed studies of the course of PTSD after disasters in the general population

<sup>1</sup>North CS. JAMA 1999;282(8):755-762.

<sup>2</sup>Caldera T. Soc Psychiatry Psychiatr Epidemiol 2001;36(3):108-114.

<sup>3</sup>Hanson RF. J Consult Clin Psychol 1995;63:987-986.

## *Limitations in the epidemiology of PTSD after disasters*

- Complex exposures: individual level exposure to the disaster may be coupled with changes in societal processes or with death of loved ones
- Timing of assessments, sampling frames, and instruments used in post-disaster assessments different
- Limited data available on subgroups and on different types of disasters



## *Primary aims of NYAM studies*

- To determine the initial burden of PTSD in the general population after September 11
- To characterize trends in prevalence of PTSD in the first 6 months after September 11
- To assess differences in determinants of PTSD onset and course

*Methods*

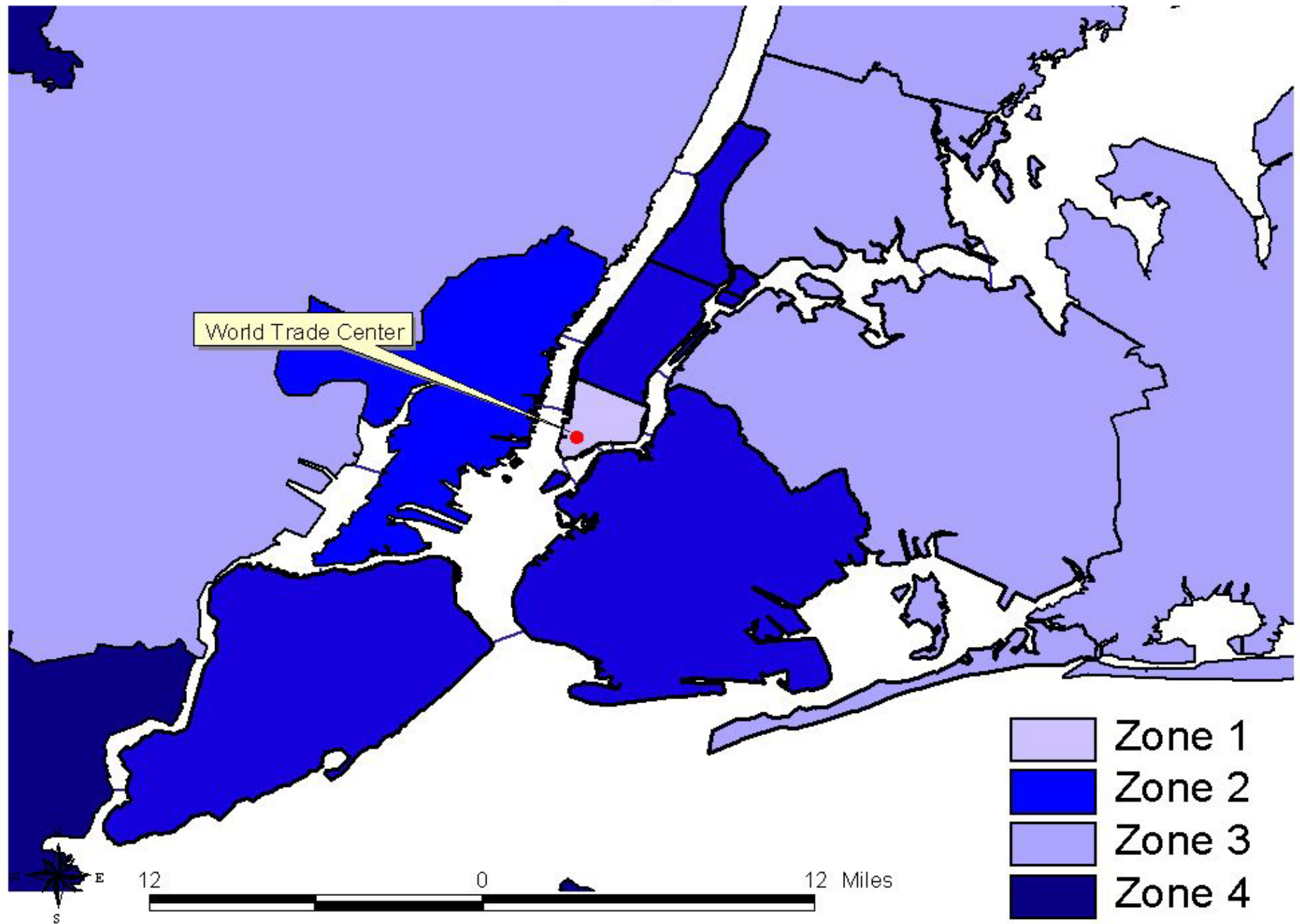
## *Study design*

- Random digit dial telephone survey to recruit baseline respondents in NYC metropolitan area
- Random selection of respondent in household
- 10 calls per number dialed; 35 minute questionnaire
- Three cross-sectional surveys
- Third cross-sectional survey served as baseline for cohort study
- Cohort study of residents of NYC metropolitan area 1 year and 2 years after September 11, 2001

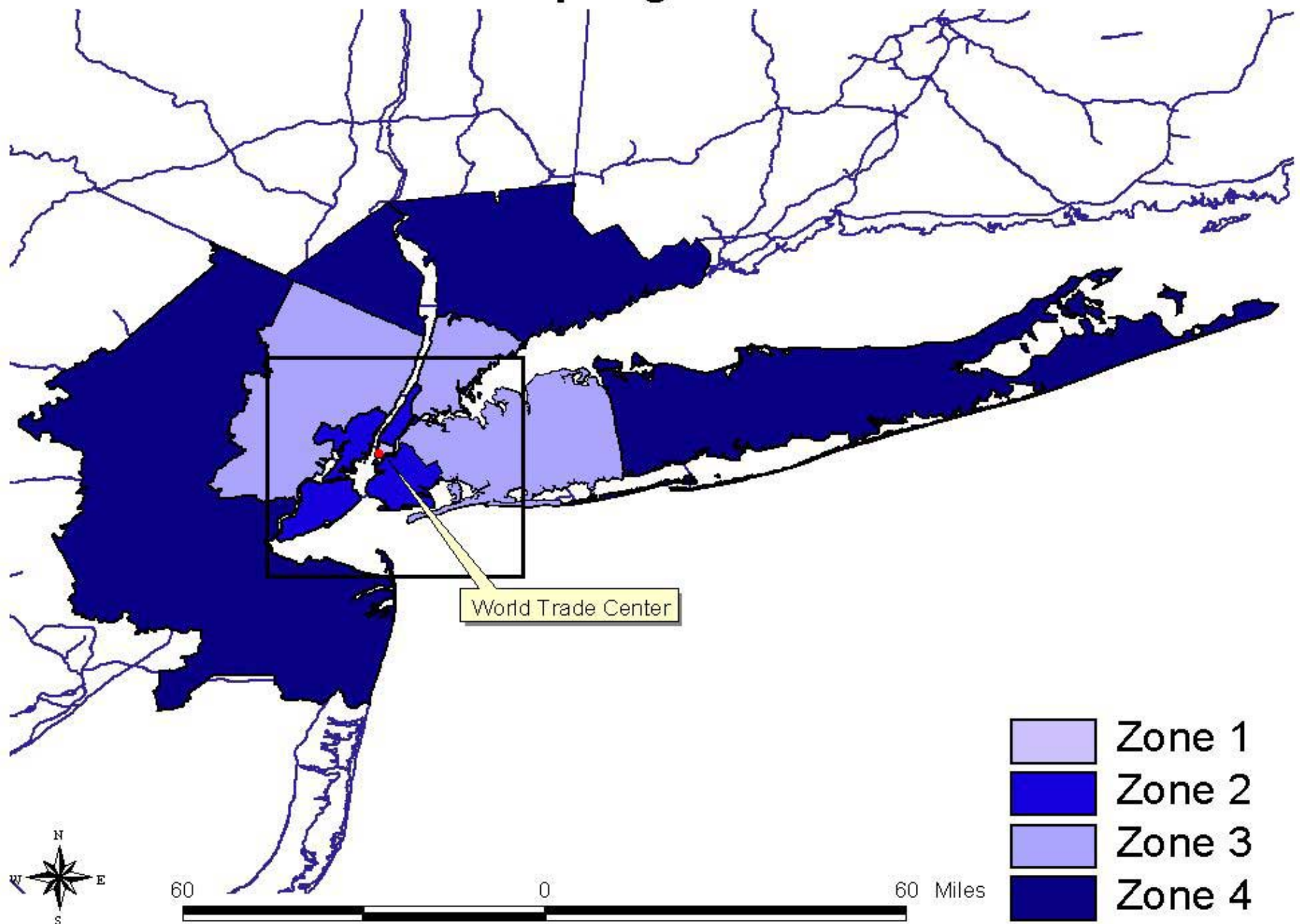
## *Sample details*

- |          |  |
|----------|--|
| SURVEY 1 | <ul style="list-style-type: none"><li>▪ October 16-November 15, 2001</li><li>▪ Manhattan South of 110<sup>th</sup> street</li><li>▪ Survey in English, Spanish</li><li>▪ n=988</li></ul>   |
| SURVEY 2 | <ul style="list-style-type: none"><li>▪ January 15 – February 21, 2002</li><li>▪ New York City</li><li>▪ Survey in English, Spanish</li><li>▪ n=2001</li></ul>   |
| COHORT   | <ul style="list-style-type: none"><li>▪ March 25 – June 25, 2002</li><li>▪ New York City metropolitan area</li><li>▪ Survey in English, Spanish, Chinese</li><li>▪ n=2752</li><br/><li>▪ September 25, 2002 – January 31, 2003</li><li>▪ n=1939; 71% follow-up</li></ul> |

# Sampling frames



# Sampling frames



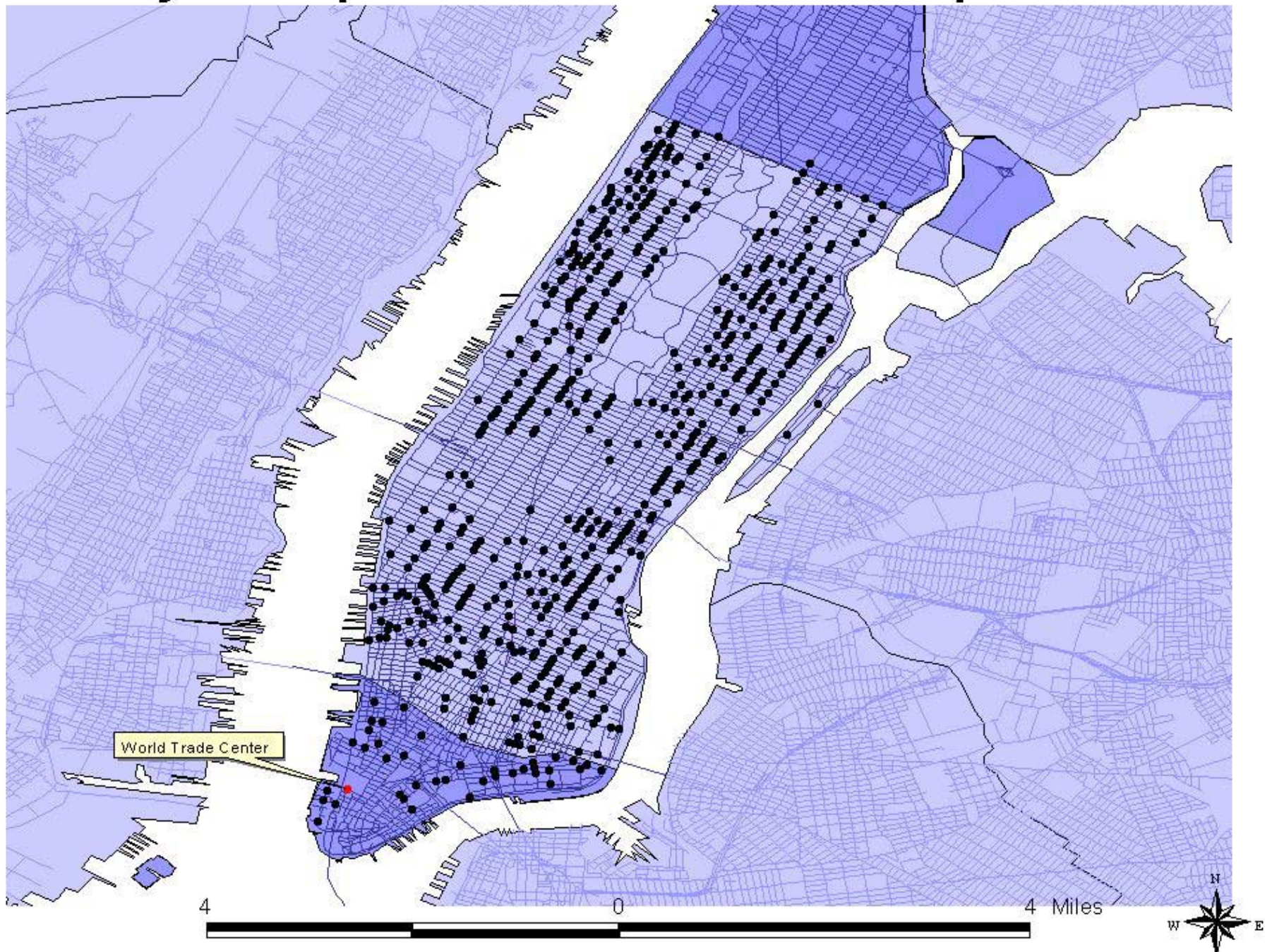
## *Summary of results*

## Survey 1: Sample demographics (n=988)

	n	Weighted %	Census 2000 %	Chi-square p-value
Age				
18-24	70	9.5	10.4	0.69
25-34	294	31.2	27.3	
35-44	193	20.0	19.9	
45-45	187	18.0	16.3	
55-64	122	12.2	11.3	
65+	106	9.1	14.8	
Gender				
Female	519	52.0	52.8	0.88
Male	469	48.0	47.2	
Race/ethnicity				
Asian	67	7.3	12.8	0.42
Black	49	5.3	6.5	
White	702	71.6	63.9	
Hispanic	114	14.3	14.4	
Other	17	1.5	2.5	

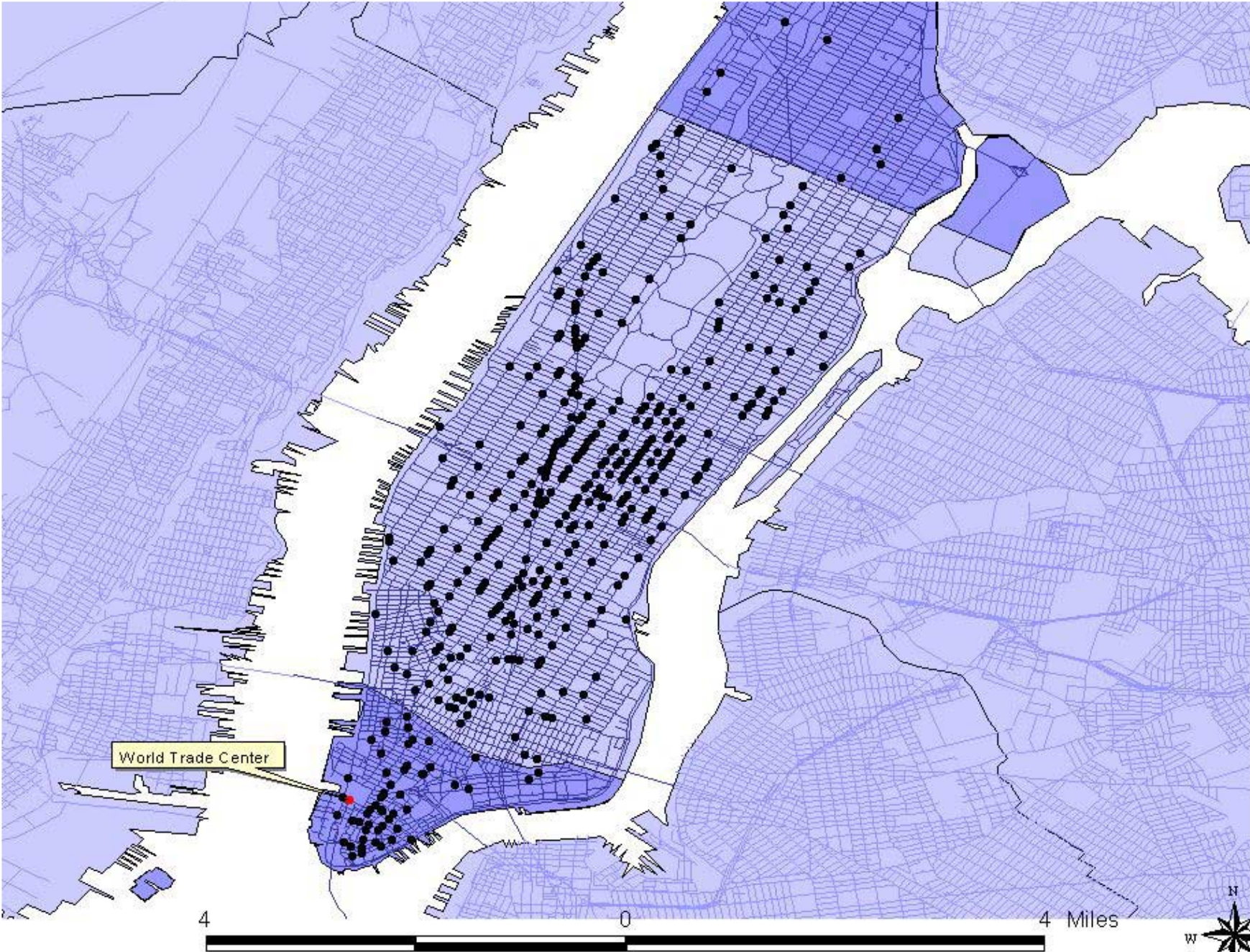


# Survey 1: Respondents' residences on September 11





# Survey 1: Respondents' locations on September 11



## Survey 2: Sample demographics (n=2001)

	n	Weighted %	Census 2000 %	Chi-square p-value
Age				
18-24	213	15.3	13.2	0.7
25-34	493	25.5	22.5	
35-44	468	22.2	20.8	
45-45	346	17.0	16.7	
55-64	202	10.2	11.3	
65+	236	9.8	15.5	
Gender				
Female	1110	53.5	53.8	0.95
Male	891	46.5	46.2	
Race/ethnicity				
Asian	91	5.4	9.7	0.6
Black	475	26.2	24.5	
White	930	39.9	35.0	
Hispanic	406	25.2	27.0	
Other	59	3.4	3.8	

## Cohort baseline demographics (n=2752)

	n	Weighted %	Census 2000 %	Chi-square p-value
Age				
18-24	261	13.6	11.7	0.69
25-34	667	23.7	20.4	
35-44	598	20.6	21.9	
45-45	521	19.0	17.7	
55-64	333	12.3	11.8	
65+	341	10.7	16.5	
Gender				
Female	1479	53.7	53.1	0.90
Male	1273	46.3	46.9	
Race/ethnicity				
Asian	166	5.2	7.7	0.80
Black	391	15.8	16.5	
White	1592	55.4	54.8	
Hispanic	465	19.6	18.5	
Other	91	4.0	2.6	



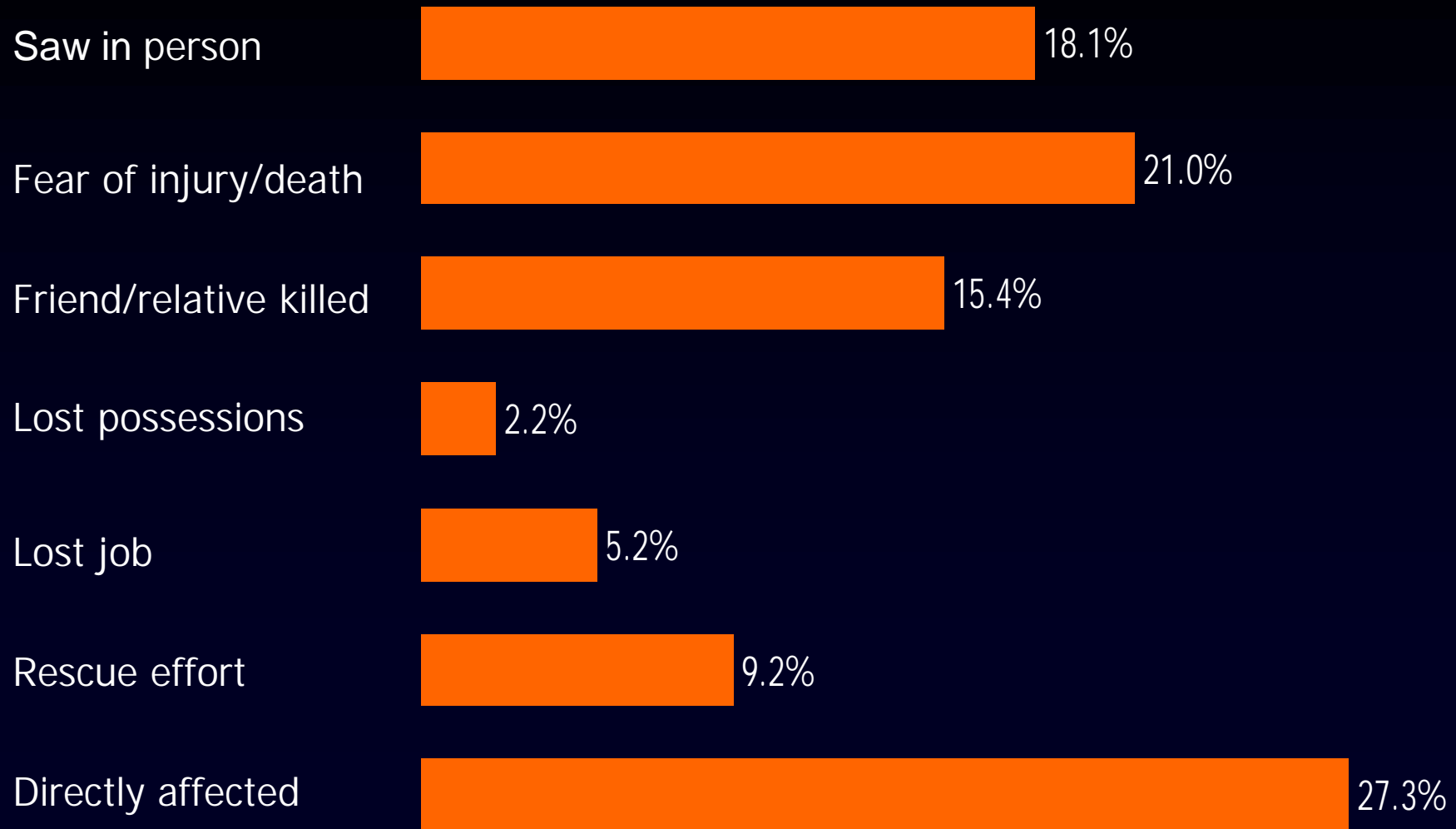
*Demographics; baseline (n=2752) and follow-up group (n=1939)*

	Baseline weighted %	Follow-up weighted %
Age		
18-24	13.6	13.6
25-34	23.7	23.5
35-44	20.6	20.7
45-45	19.0	19.1
55-64	12.3	12.4
65+	10.7	10.7
Gender		
Female	53.7	54.0
Male	46.3	46.0
Race/ethnicity		
Asian	5.2	5.3
Black	15.8	15.8
White	55.4	55.4
Hispanic	19.6	19.6
Other	4.0	4.0

## Follow-up demographics (N=1939)

	n	Weighted %	Census 2000 %	Chi-square p-value
Age				
18-24	164	13.6	11.7	0.70
25-34	389	23.5	20.4	
35-44	424	20.7	21.9	
45-45	398	19.1	17.7	
55-64	266	12.4	11.8	
65+	277	10.7	16.5	
Gender				
Female	1070	54.0	53.1	0.86
Male	869	46.0	46.9	
Race/ethnicity				
Asian	94	5.3	7.7	0.80
Black	265	15.8	16.5	
White	1188	55.4	54.8	
Hispanic	293	19.6	18.5	
Other	67	4.0	2.6	

## *Event experiences of residents of NYC metropolitan area (n=2752)*



## *Mental health in Manhattan 1-2 months after September 11*

	n (total= 988)	Weighted %	95% Confidence Interval
PTSD related to Sep 11 attacks	78	7.5	5.7-9.3
Current depression	99	9.7	11.2-16.0
Current PTSD or depression	139	13.6	11.2-16.0

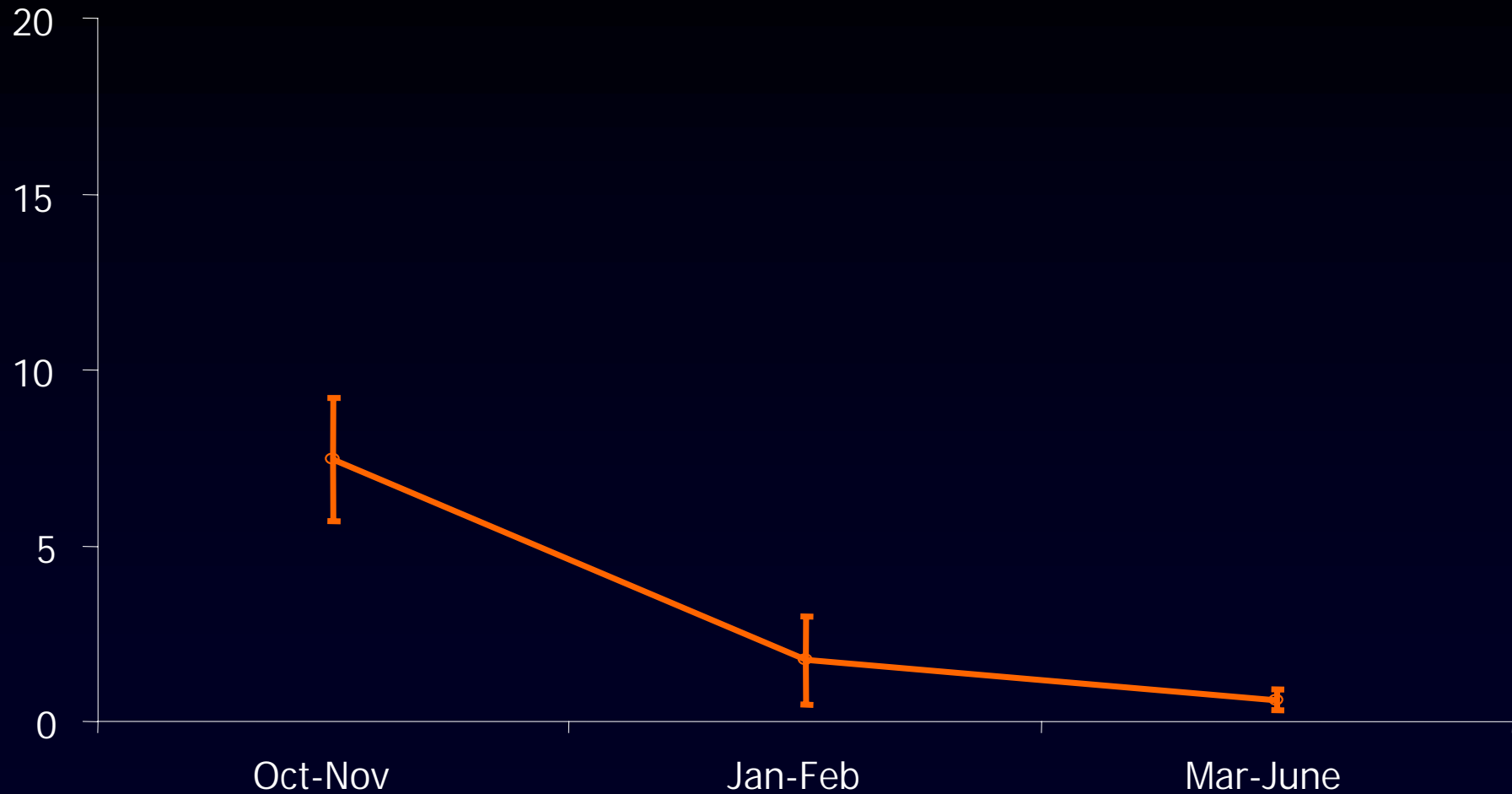


## *Mental health in Manhattan 1-2 months after September 11*

	n (total=988)	Weighted %	95% Confidence Interval	Population estimate*
PTSD related to Sep 11 attacks	78	7.5	5.7-9.3	67,000
Current depression	99	9.7	11.2-16.0	87,000
Current PTSD or depression	139	13.6	11.2-16.0	128,000

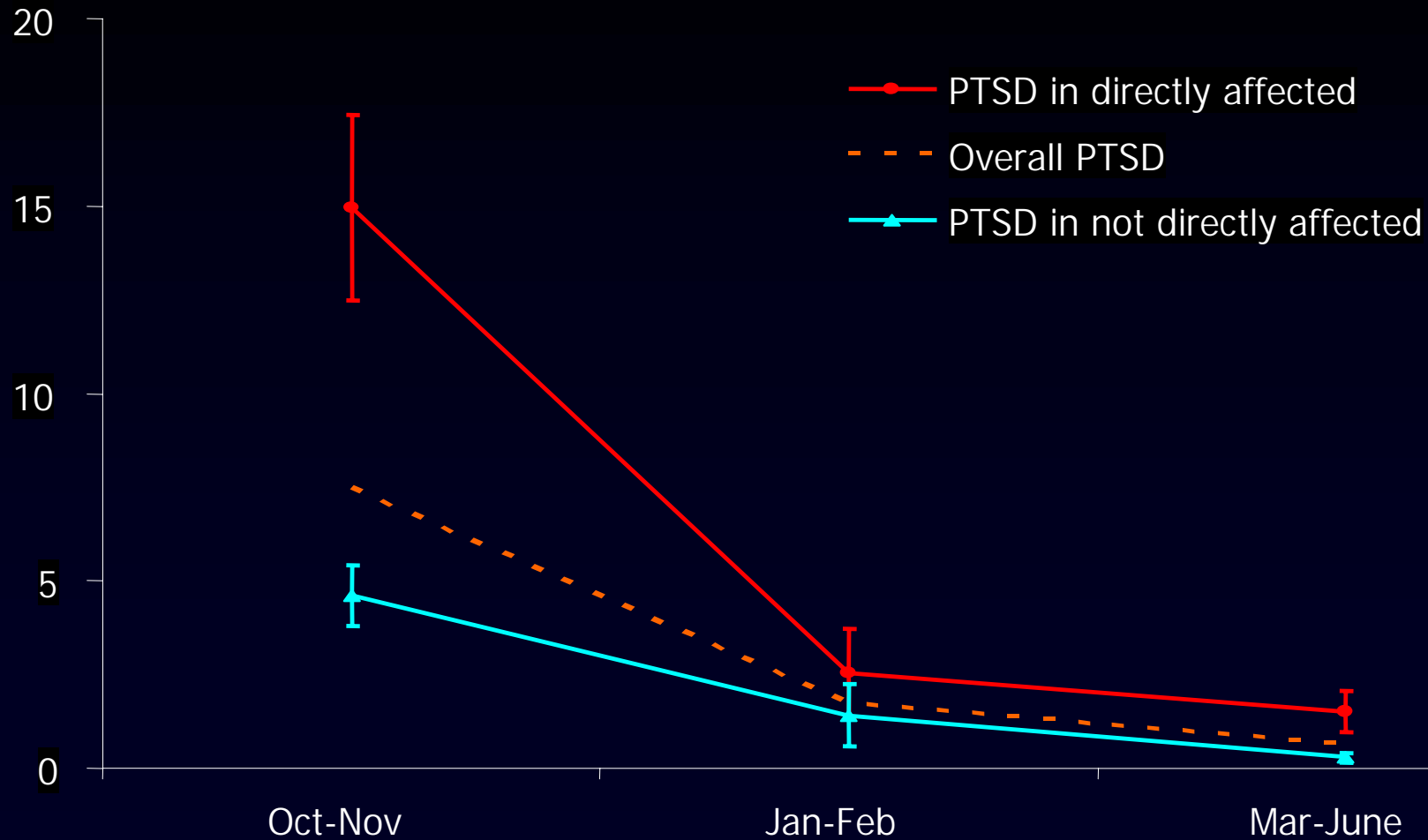
\*Based on US Census Bureau estimates that there were 918,665 residents of NYC in 2000  
Rounded to nearest 1,000

## *Prevalence of PTSD among residents of Manhattan living south of 110<sup>th</sup> street*

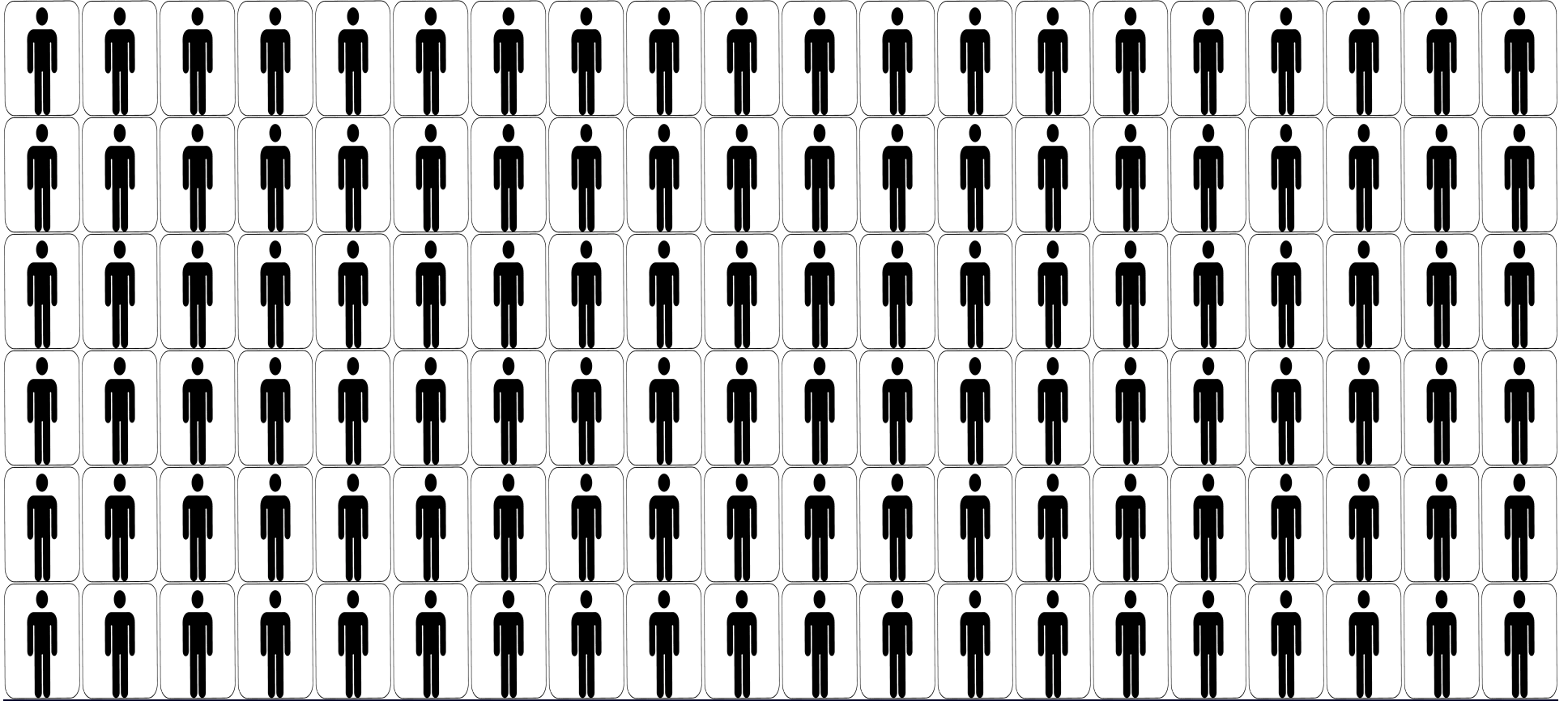


Galea et al. Am J Epidemiol 2003; 158(6): In press

## *Prevalence of PTSD among residents of Manhattan living south of 110<sup>th</sup> street*

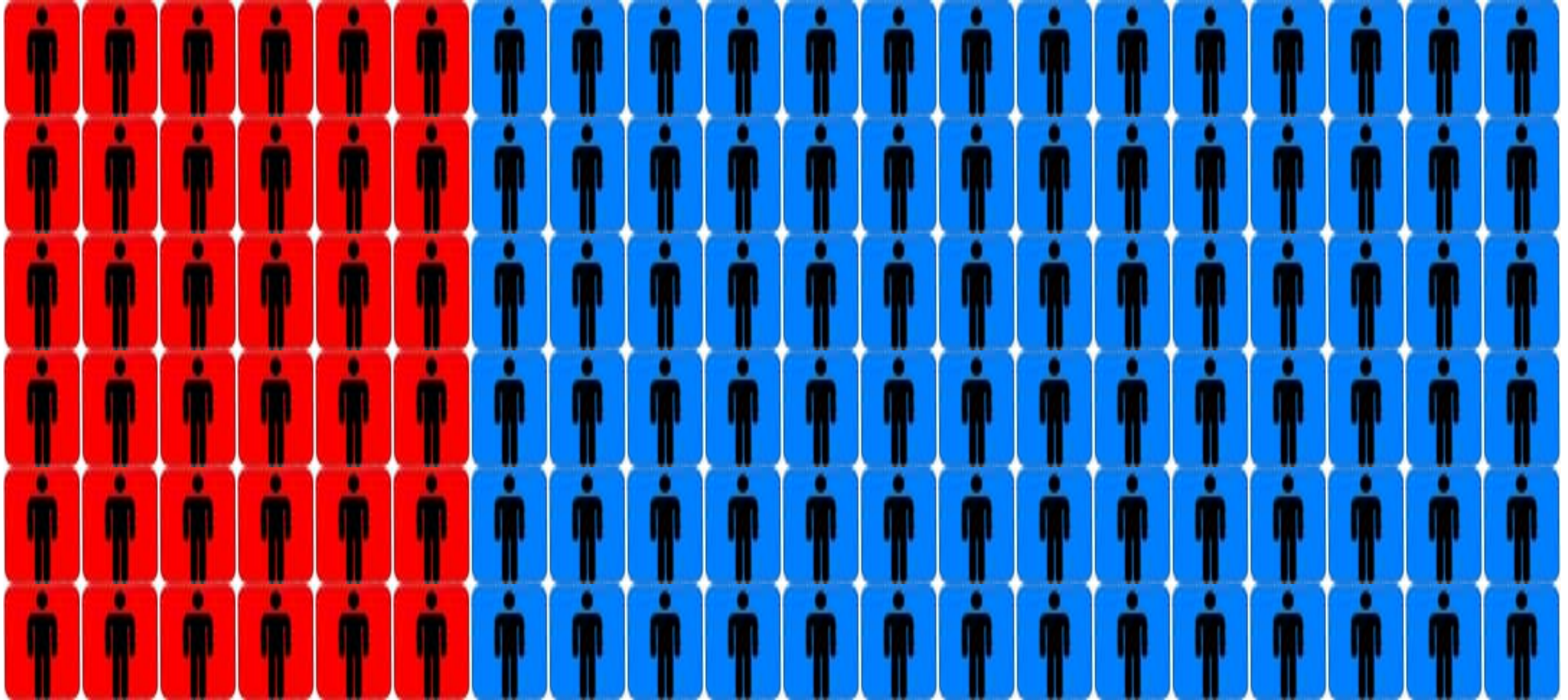


*NYC adult population = 6,068,009*



represents approximately 51,000 people

# *Residents directly vs not directly affected by September 11 attacks*



directly affected by September 11 attacks

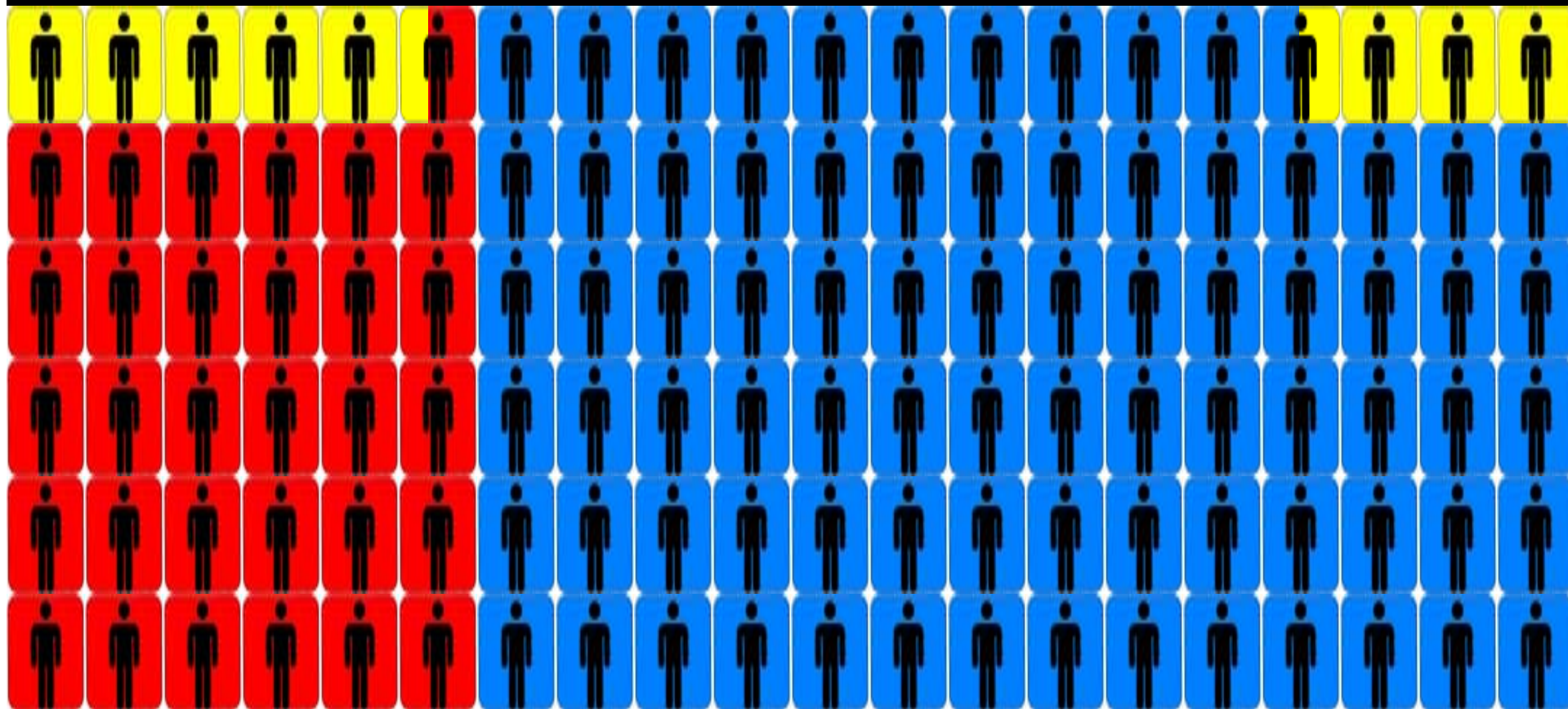


not directly affected by September 11 attacks



represents approximately 51,000 people

# *PTSD since September 11*



directly affected by September 11 attacks

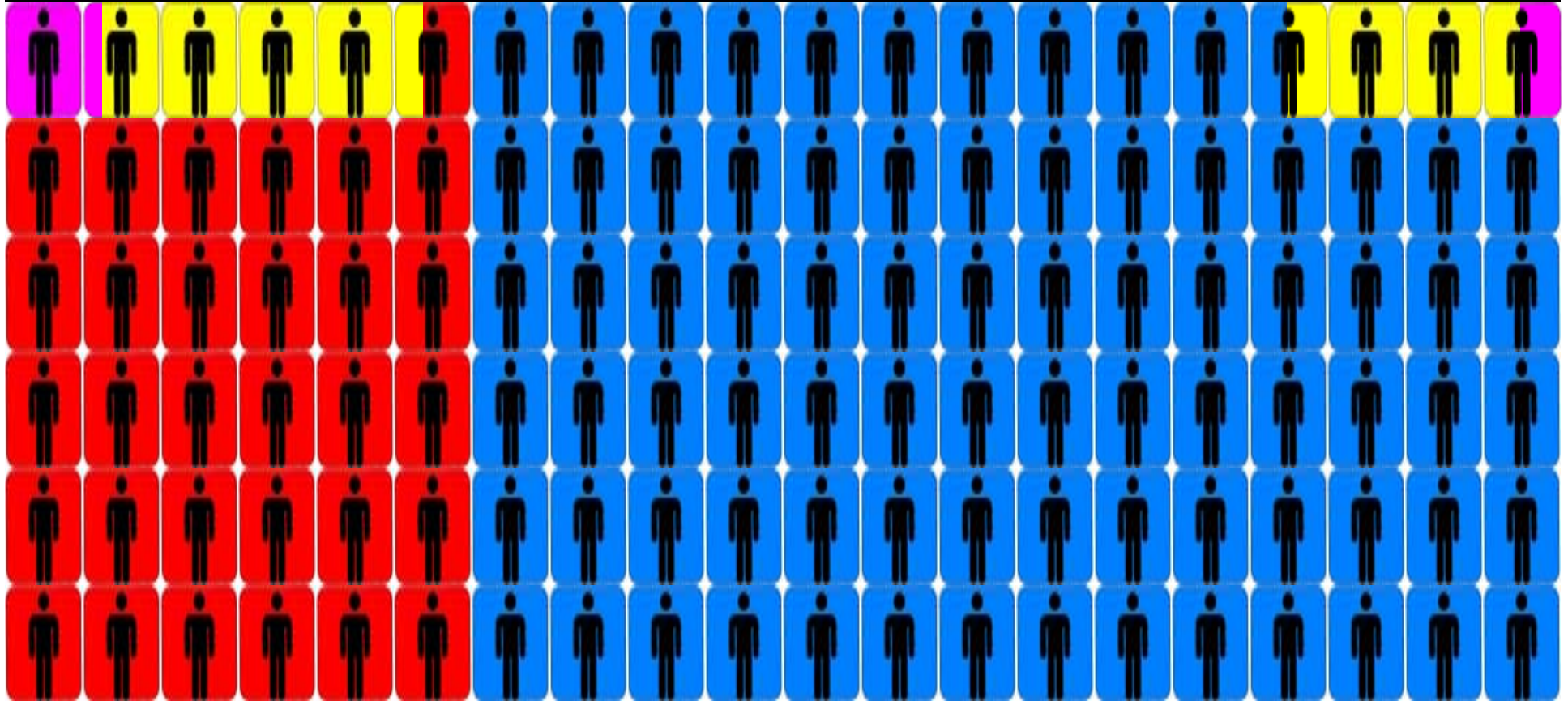


not directly affected by September 11 attacks



PTSD since September 11

# PTSD 6-9 months after September 11



directly affected by September 11 attacks



PTSD since September 11



not directly affected by September 11 attacks

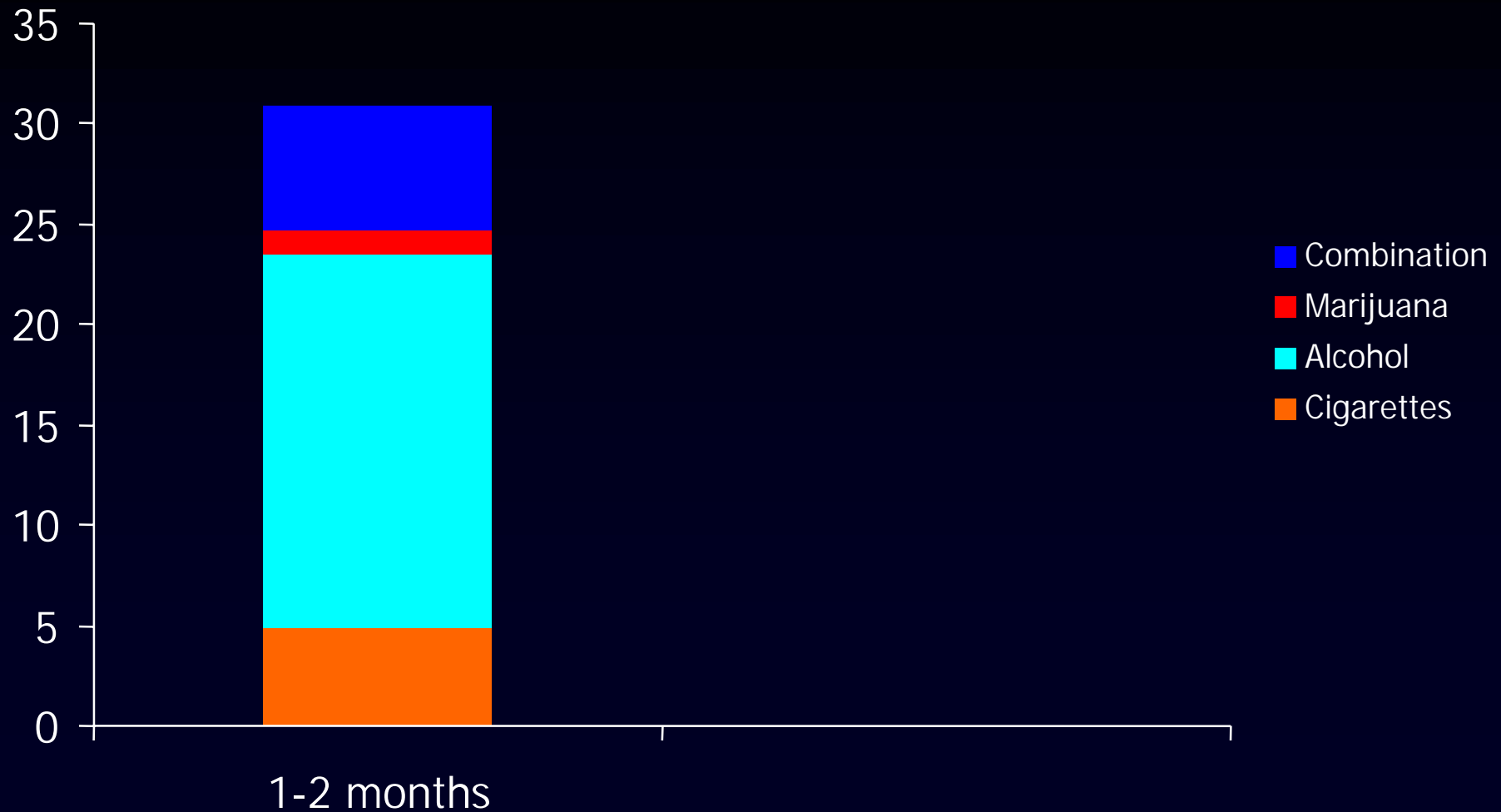


PTSD 6-9 months after September 11

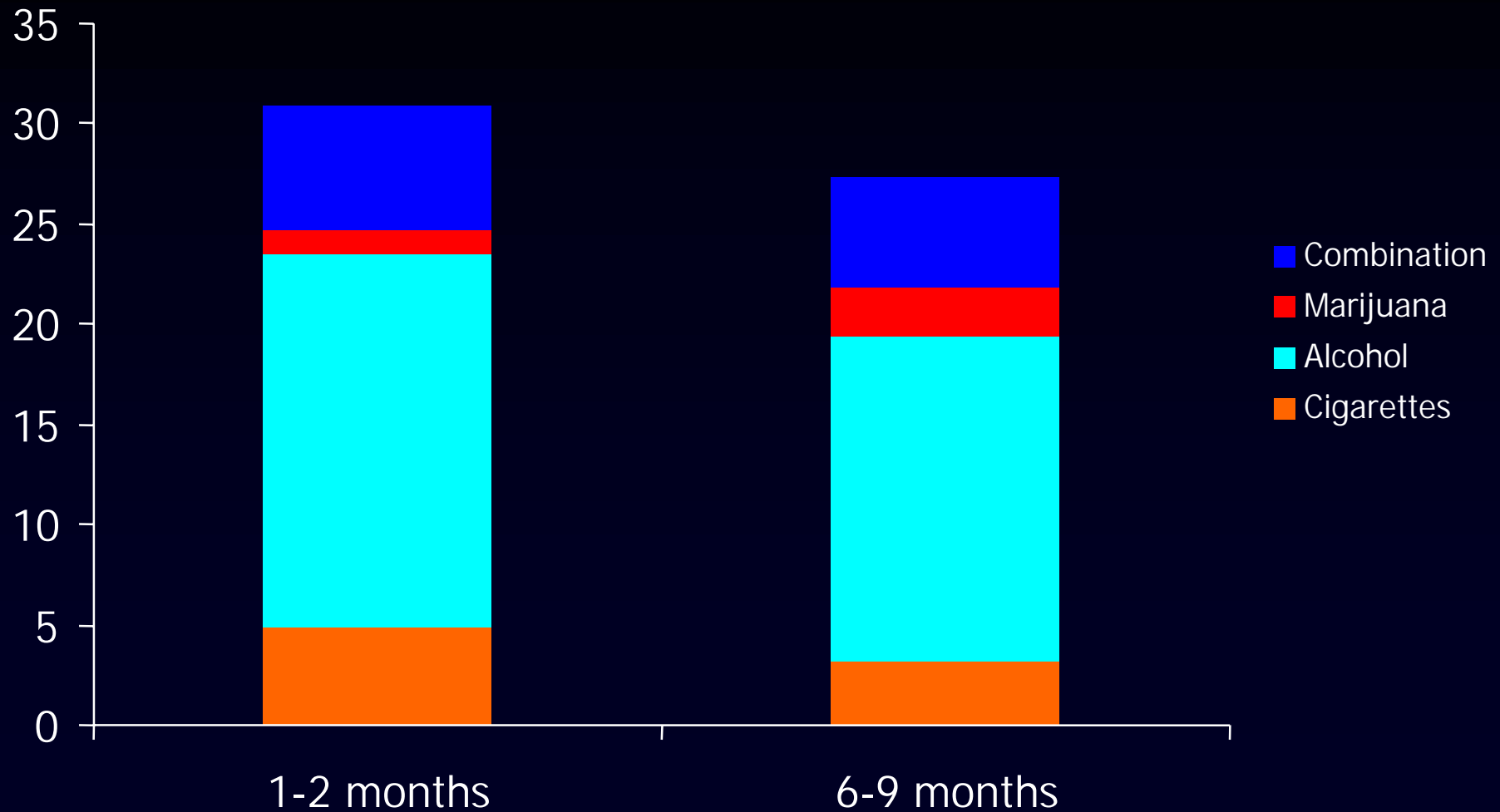
*Aside: Substance use*



## *Increased substance use in Manhattan after September 11*

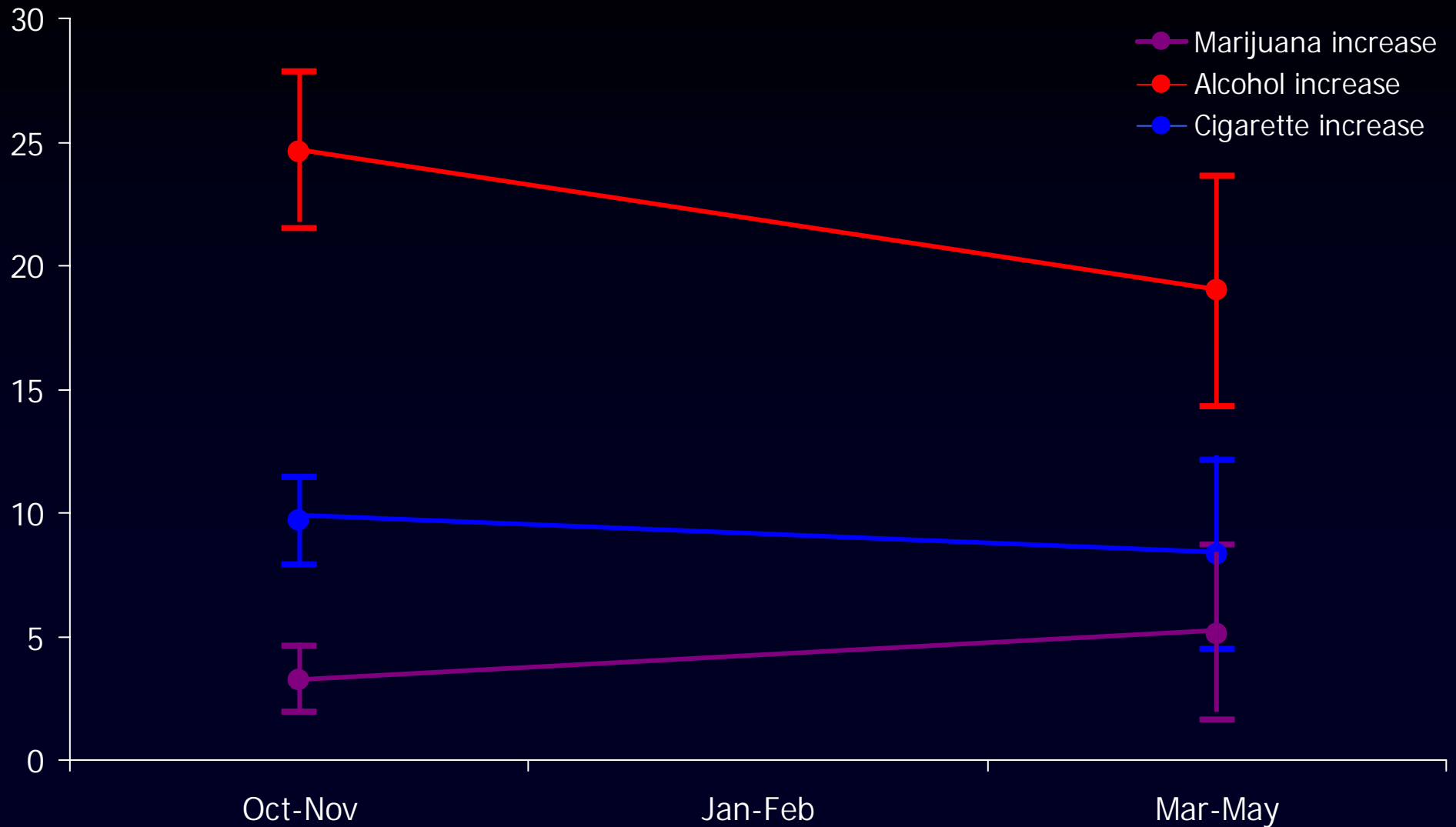


## *Increased substance use in Manhattan after September 11*

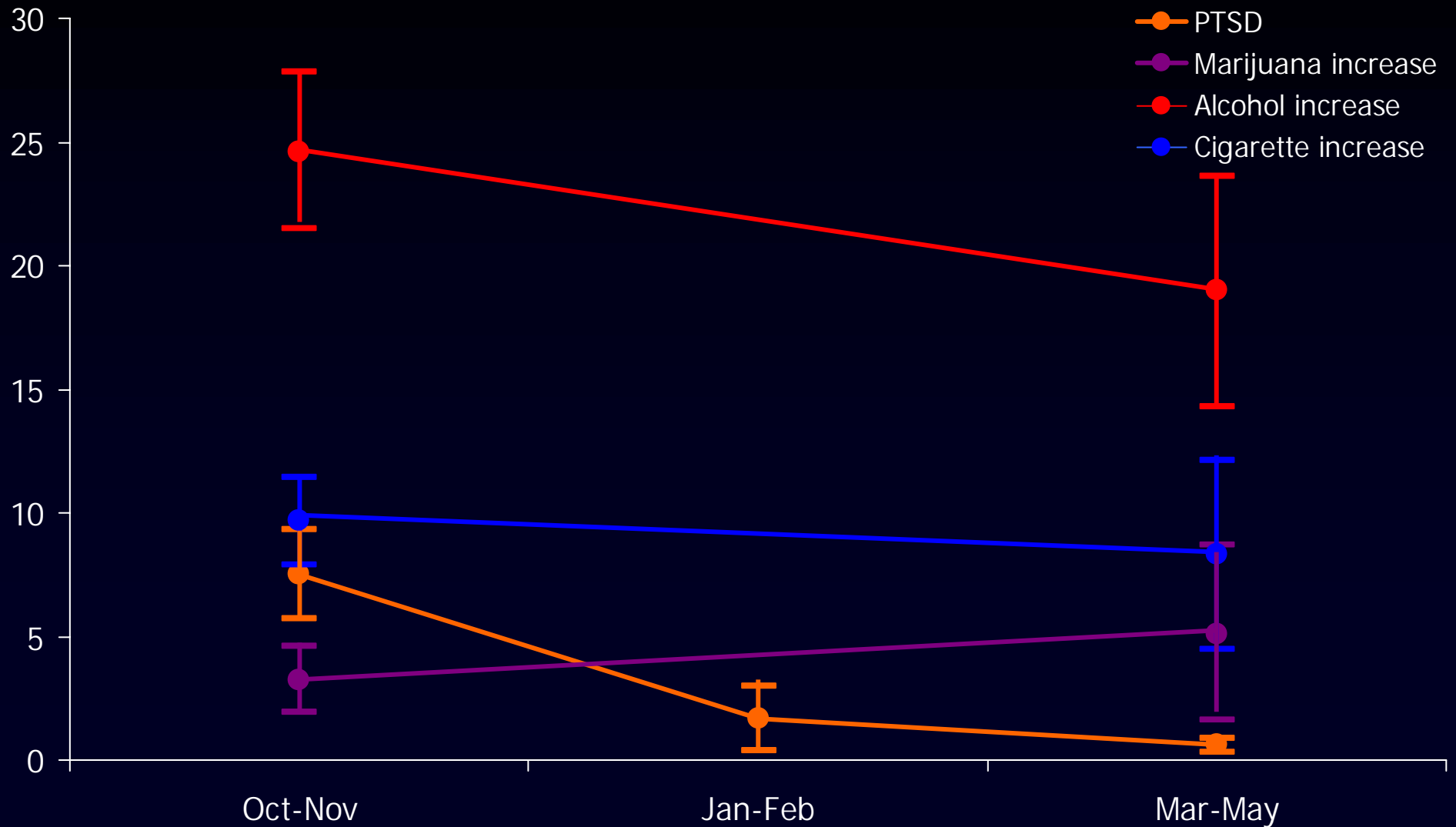


Vlahov et al. Am J Pub Health. 2004; In press

# *Increased substance use in Manhattan after September 11*



# *Increased substance use and PTSD in Manhattan after September 11*

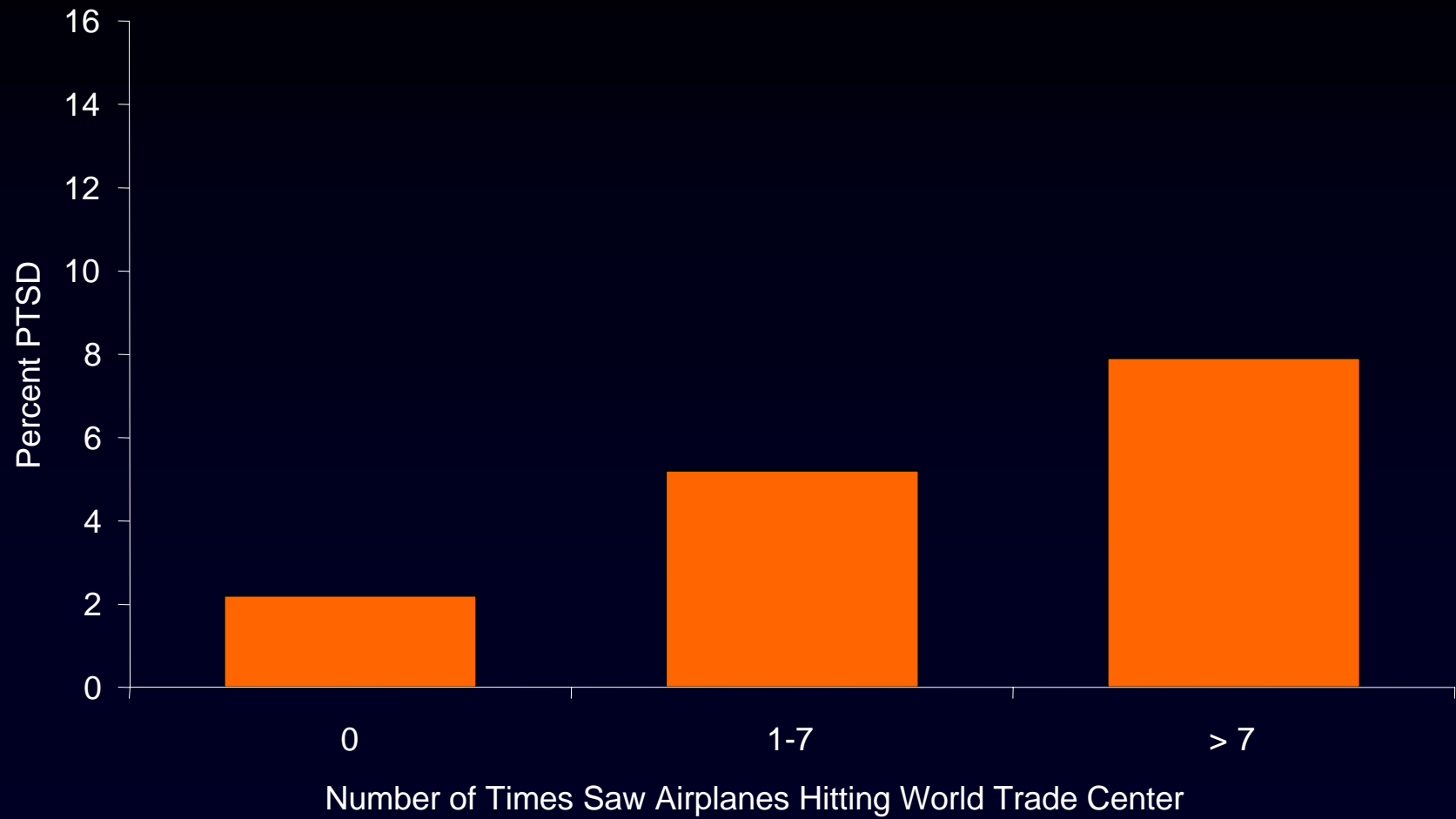


*Aside: The TV question*

## *The media question*

- Was more frequent viewing of the images of September 11 on television associated with higher likelihood of having probable PTSD?

## *TV Images and PTSD*

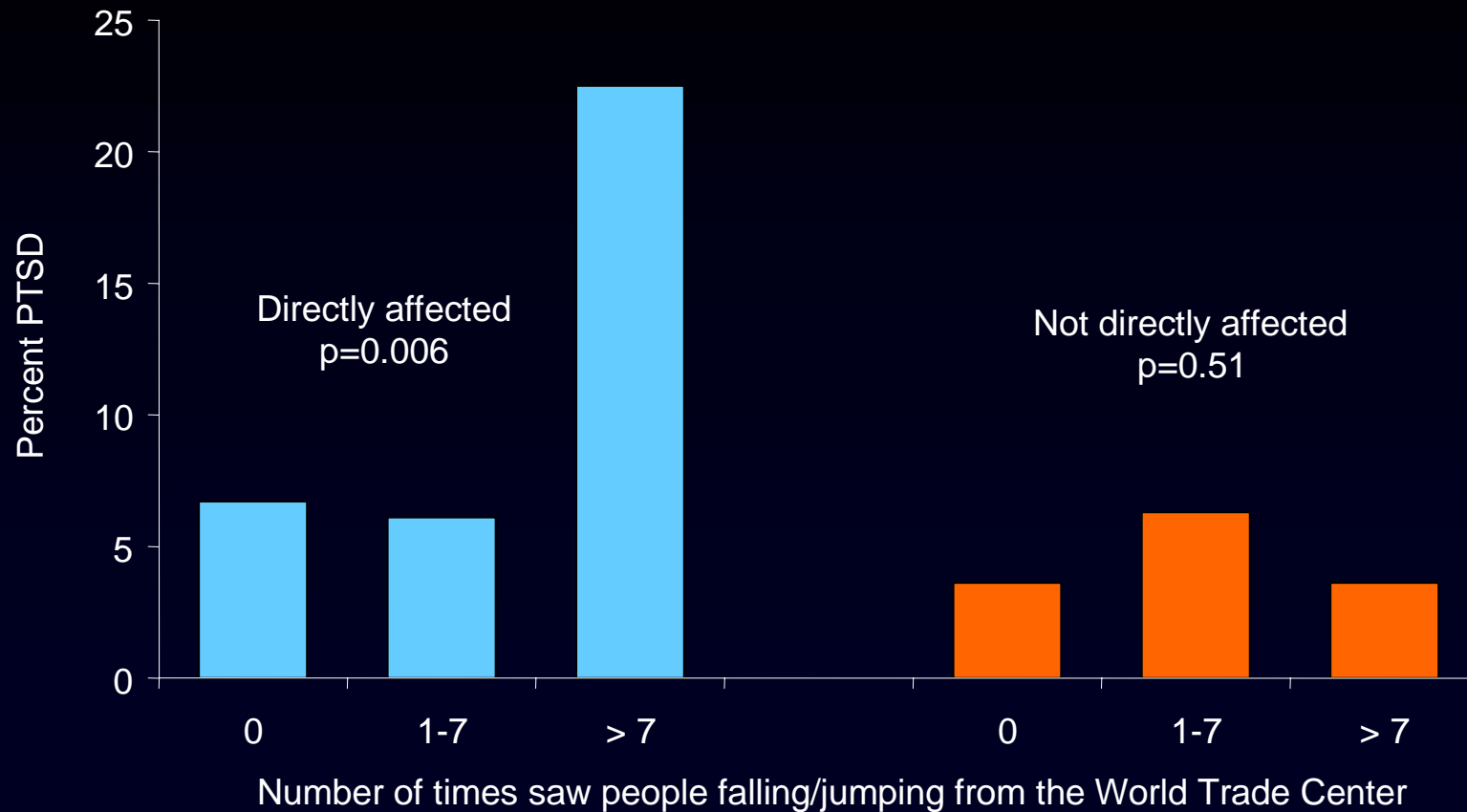


*And...*

- Was the association between television images and symptoms of PTSD different for those directly affected by the attacks of September 11, compared with those who were not directly affected?



## *TV Images, PTSD, and being directly affected by the terrorist attacks*



Note: Directly Affected includes friend or relative killed, witnessing the attacks in person, loss of a job, loss of possessions, displacement from home, participation in the rescue efforts

*Cohort data*

*The overall picture*

## *Summary*

- Substantial prevalence of PTSD in general population of NYC metropolitan area after September 11 attacks
- Prevalence of PTSD decreased by two thirds in the first 6 months after September 11
- Approximately half of participants with PTSD at month 6 had persistent PTSD one year after September 11
- New cases of PTSD documented one year after September 11
- Pre-event characteristics tend to predict new PTSD among persons who previously had symptoms; new stressors among persons with no prior symptoms

## *Questions answered*

- Burden of PTSD in the general population after a large disaster is substantial
- More rapid resolution of symptoms in general population than previously documented in direct victims of traumatic events
- Ongoing stressors are key determinant of course of PTSD

## *Questions raised*

- What are the implications of these observations for the diagnosis of traumatic “exposure”?
- Is there a difference in the PTSD experienced in those directly affected vs. those who are not?
- Is the observed difference between predictors of PTSD onset and persistence consistent in different groups in different contexts?

## *Research directions*

- The diagnosis of PTSD in the face of different forms of exposure
- Impact of other large-scale disasters on the general population in densely-populated urban areas; the role of contextual variables
- Longitudinal course of PTSD in the general population after disasters
- Role of public mental health interventions

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