Long-Term Life Recovery from a Mega-disaster: Findings from 1999, 2001, 2003, and 2005 cross-sectional and panel surveys of the 1995 Kobe Earth Quake Survivors

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Shigeo TATSUKI
Doshisha University
Kyoto, Japan

Long-Term Life Recovery from a Mega-disaster

- The 1999 Hyogo Life Recovery Survey
- The 1999 Grass-root Assessment Workshop on Life Recovery (5 years after EQ)
- The 2001 Hyogo Life Recovery Survey
- The 2003 & 2005 Hyogo Life Recovery Surveys
- The 2001, 2003, & 2005 Hyogo Life Recovery Panel Survey
- The 2003/2004 Grass-root Assessment Workshop on Life Recovery(10 years after EQ)

Research Designs of the 1999 & the 2001/2003/2005 Surveys

	1999 Survey	'01, '03, & '05 Surveys	
Measures	Life Recovery, SCEM, Damage, & Demographic Variables		Same & Added
Sampling Areas & Subjects	Seismic Intensity JMA 7 and/or City Gas Supply Disrupted for more than 2 mo. (250 areas) Head of Household	The 1999 Survey Areas (250 areas) +West & North Words of Kobe (80 areas) Both Men & Women 20 Yr. +	Modified
Sampling Method	Stratified Two-Stage Random Sampling		Same
Popu-lation	The 1995 Kobe EQ Survivors		Same

Those who were residing and are still residing in the 1995 Kobe earthquake disaster hit areas (2,530,672 people)

The 1999 Hyogo Life Recovery Survey

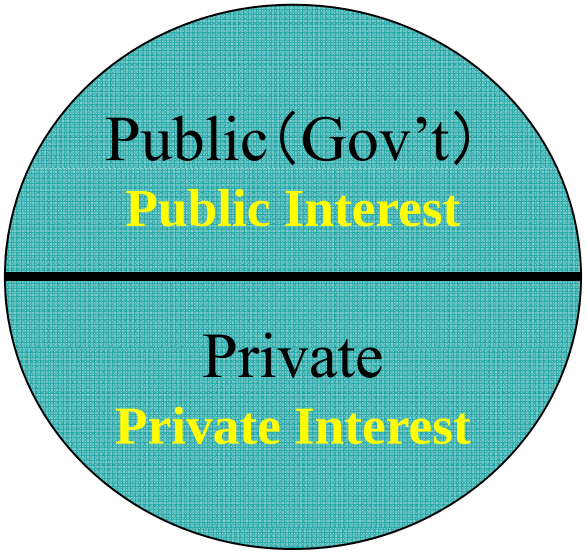
The first attempt to construct standardized measures of life recovery, physical and mental stress, civic-mindedness and family relations

Life Recovery Scale

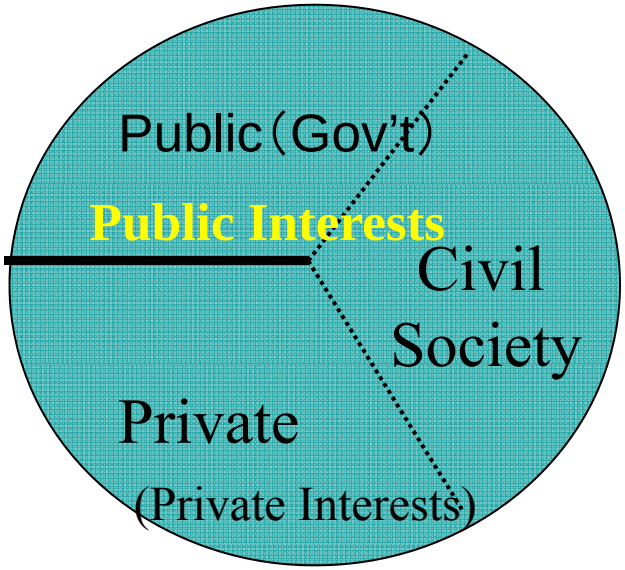
- Life recovery scale is a 14 item 5-point Likert scale.
- 7 items ask subjective evaluations of life fulfillment/ readjustment compared with pre-earthquake days in such areas as
  - daily living, work, the meaning of life, social life, enjoyment, hope, and liveliness of everyday life.
- 6 life satisfaction items inquire about satisfaction in
  - everyday life, health, human relationships, household finance, family life, and work.
- 1 item was used to ask about the prospects in the respondent's life one year from now.

Movement toward Three Sector Collaboration for Public Interests

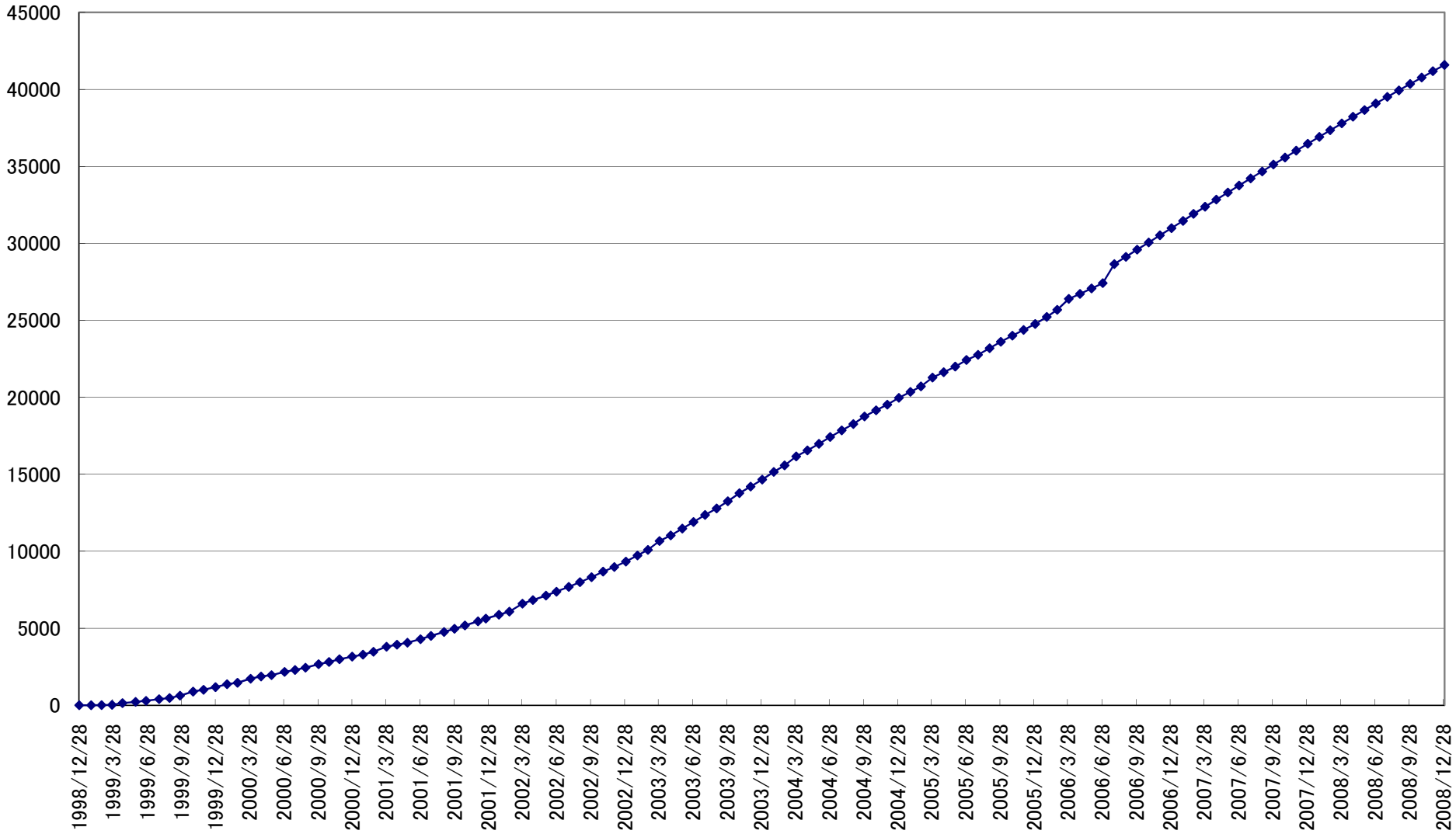
Societal Image in Pre-EQ Days



New Image of Society in Post-EQ Days



Number of Incorporated Non-Profit Organizations in Japan since 1999



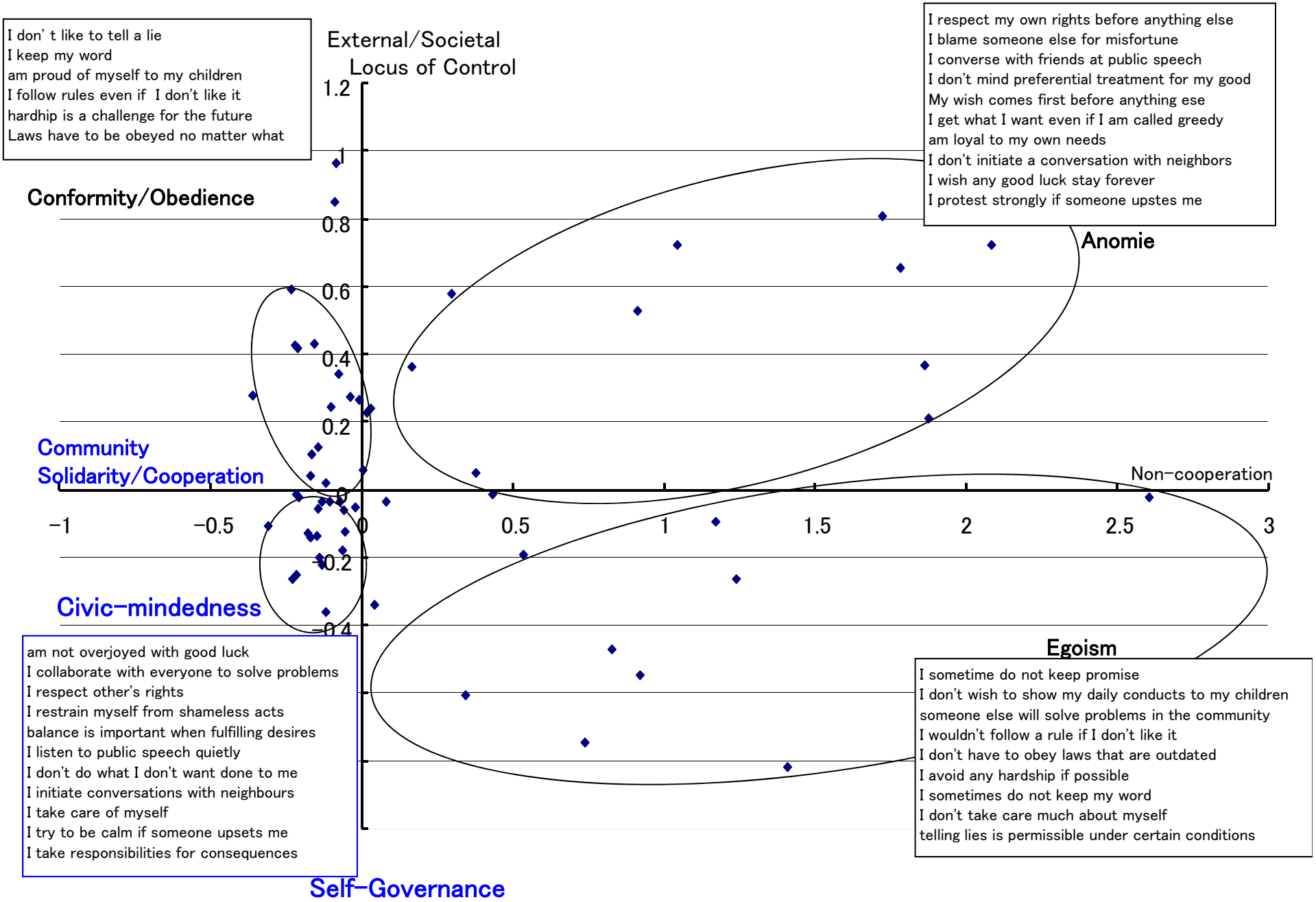
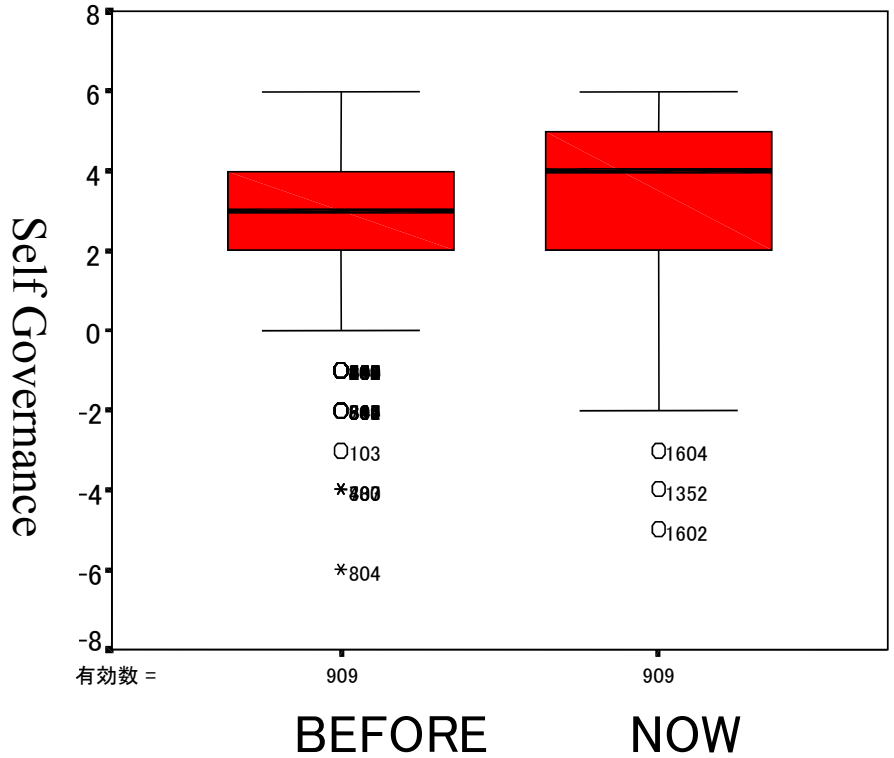
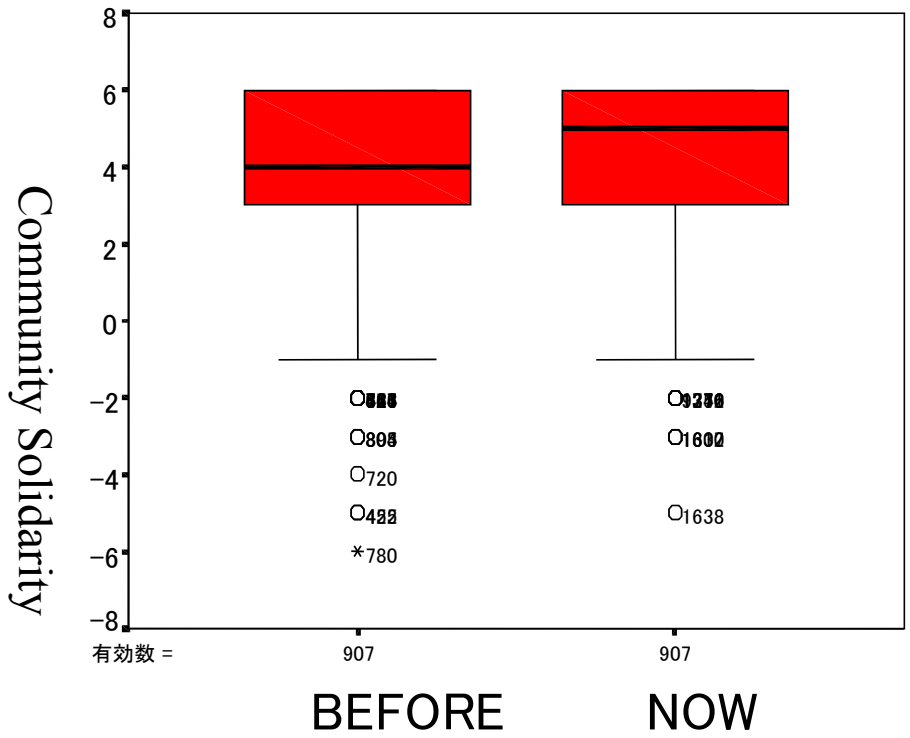


Figure 1: Dual Scaling analysis of the 1999 study civic-mindedness scale items

Changes in Civic-mindedness Pre- & Post-Earthquake

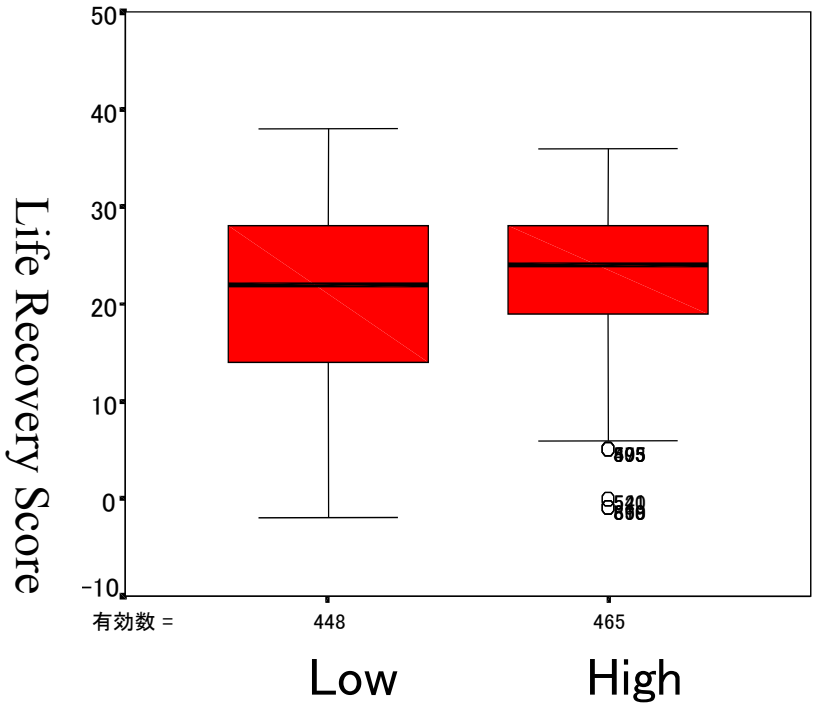
Hyogo Life Recovery Survey
（N=993, March, 1999)



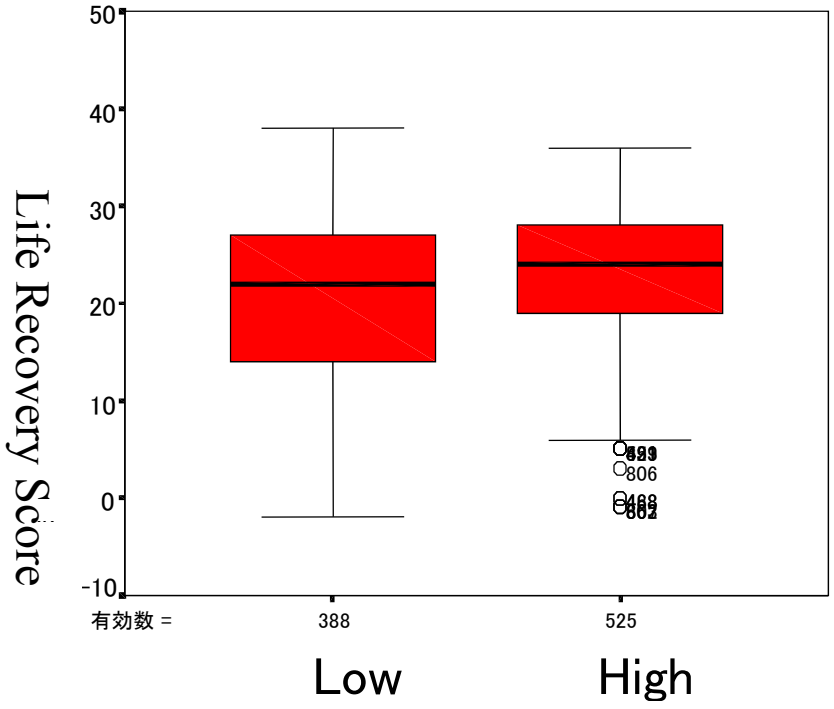


Level of Civic-mindedness by Degree of Recovery

Hyogo Life Recovery Survey
（N=993, March, 1999)



Pre-EQ Civic-mindedness



Current Civic Mindedness

The 1999 Grass-root Assessment Workshops on Life Recovery (5 years after EQ)

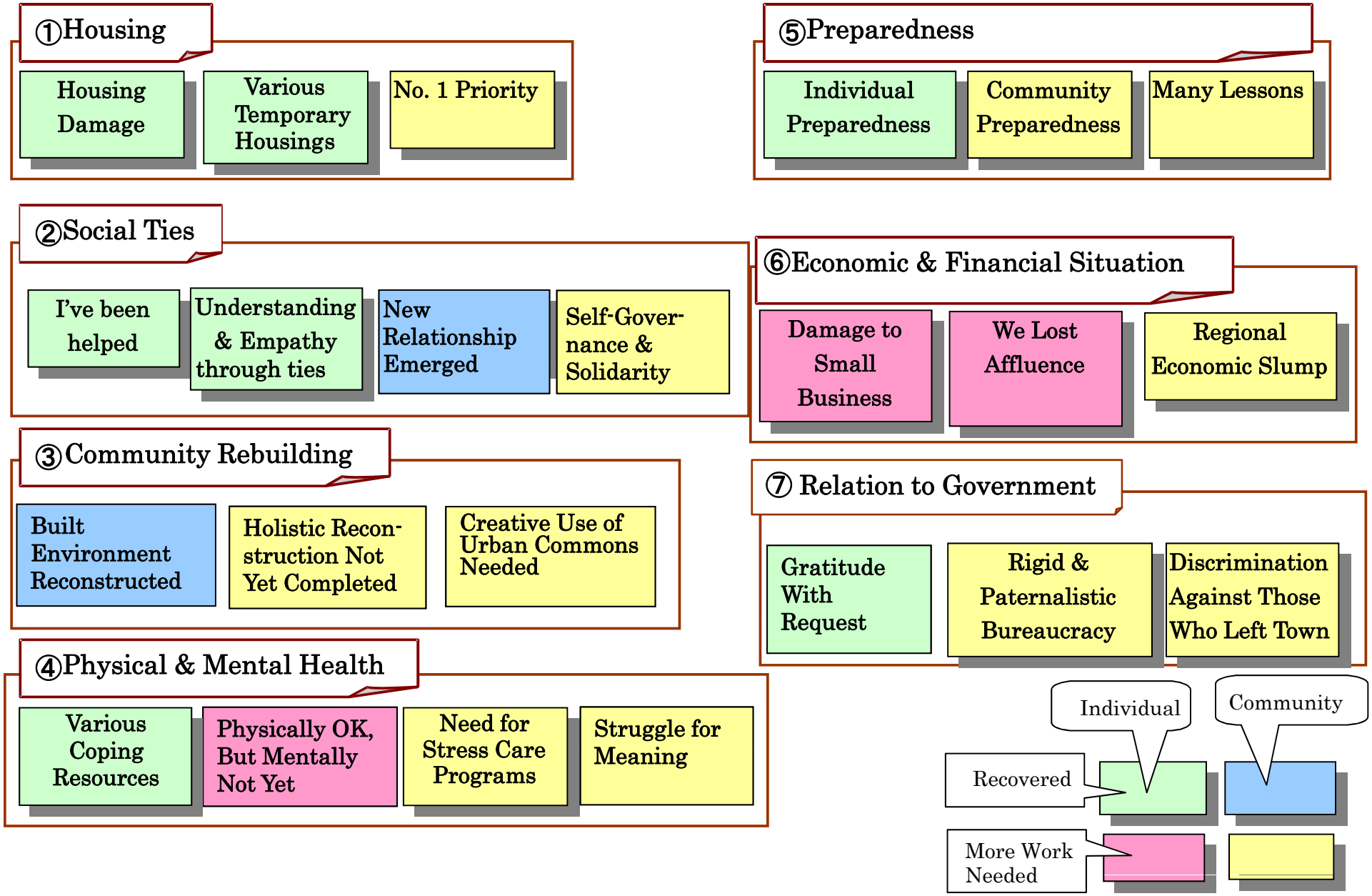
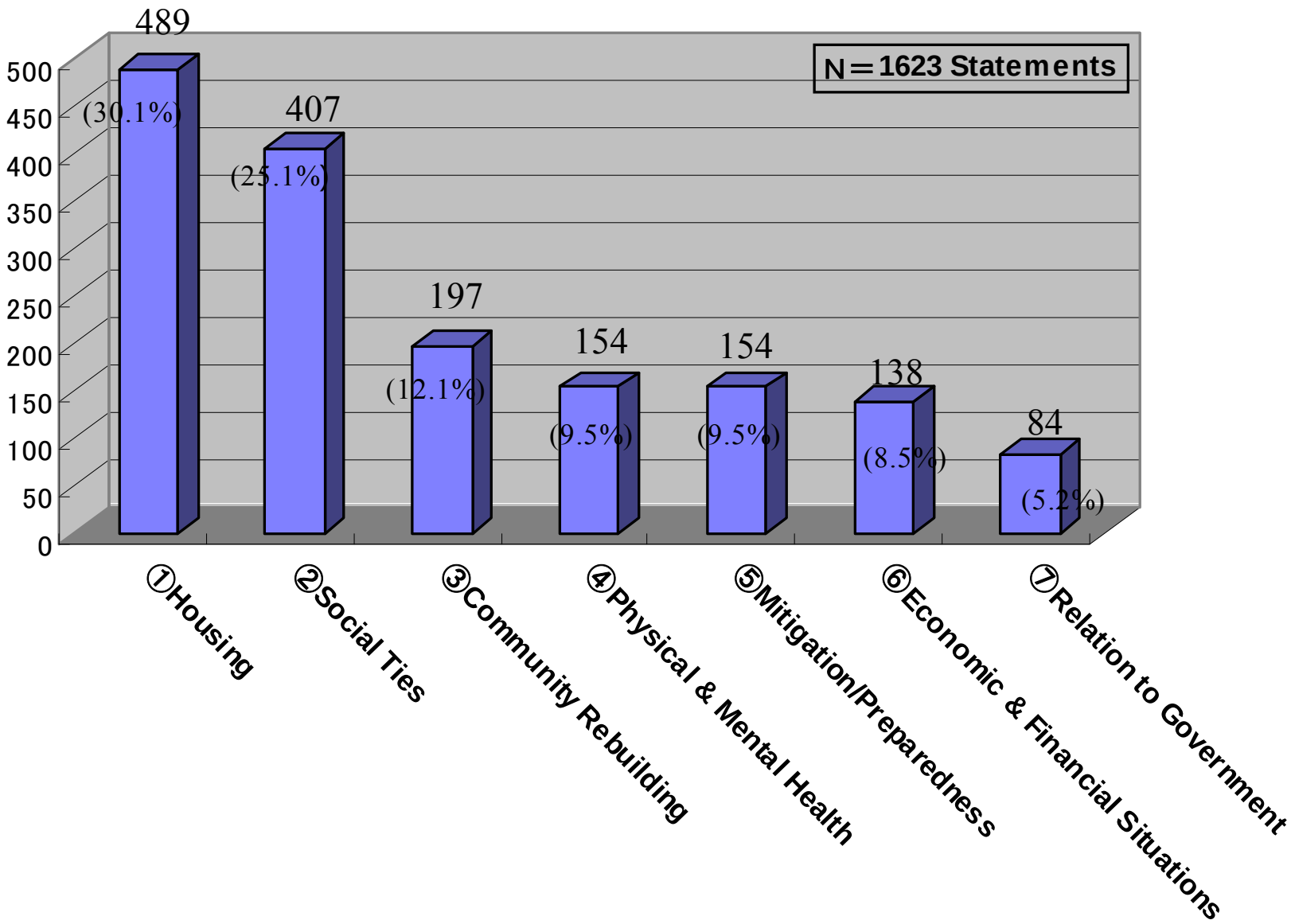


Figure 4: Seven Critical Element Model (SCEM) for life recovery (Jul. to Aug., 1999)

Number of Opinion Cards for Each Life Recovery Element



The 2001 Hyogo Life Recovery Survey

The 2001 study aimed to develop valid and reliable scales for the Seven Critical Element Model (SCEM) of Life Recovery.

The 2001 study conducted GLM analyses to examine which variables or what combinations of variables best predicted the level of life recovery.

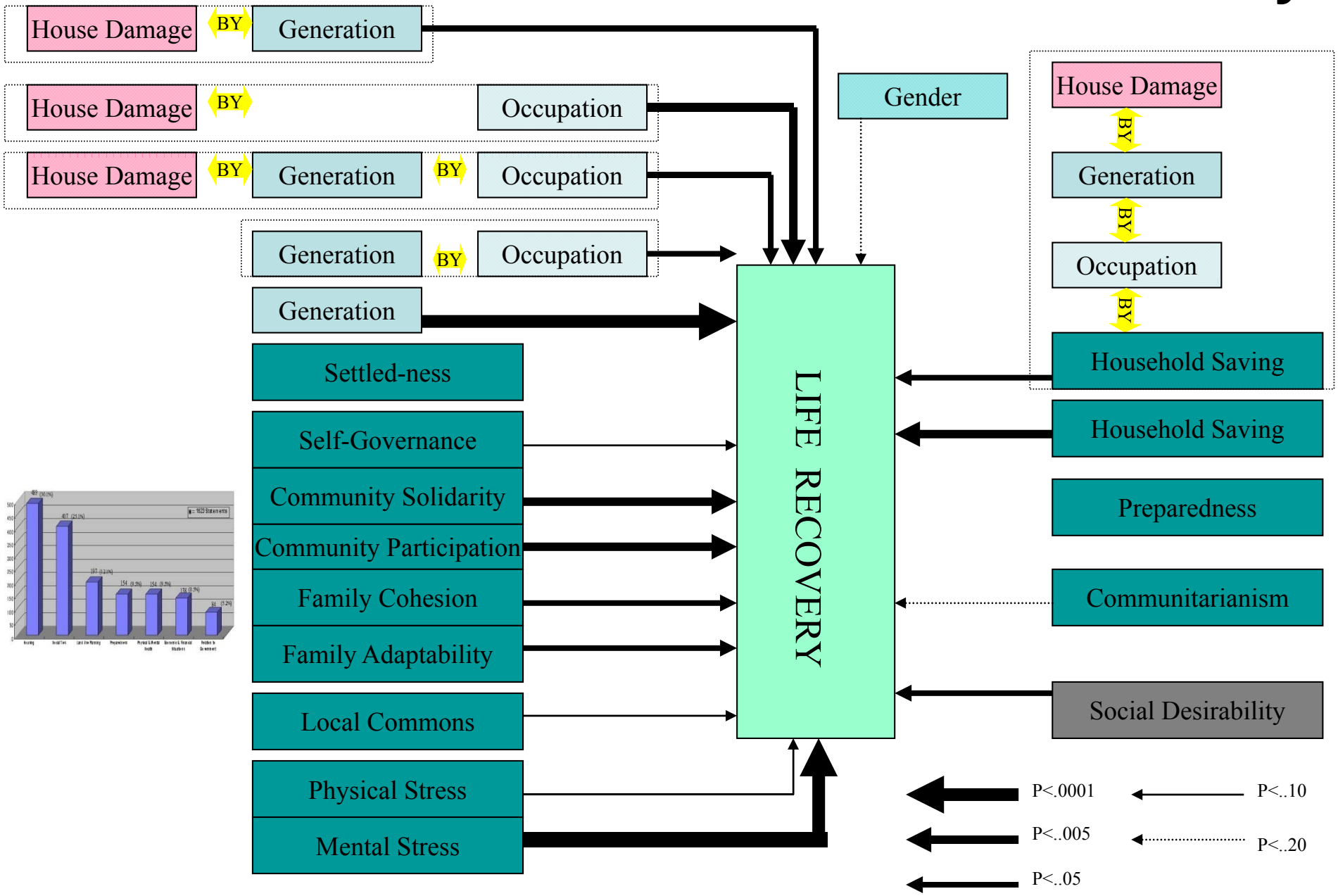
Overview of the SCEM Predictor and Dependent Variables

Variables/Factors	Description
Housing	Acceptance/Satisfaction of the current housing condition
Social Ties	Self-Governance, Community Solidarity, Community Participation, Family Cohesion & Adaptability
Townscape	Awareness of Urban Commons
Preparedness	Awareness/Preparedness for the next major earthquake
Physical & Mental Health	Physical and Mental stress symptom checklist
Economic & Financial Situation	Increase/decrease in household income, expenditure, and savings
Relation to Government	Paternalistic, liberal, & communitarian views of government
Life Recovery	Life satisfaction, Life fulfillment(QOL in daily activity), Future prospect
Social Desirability	MMPI lie scale

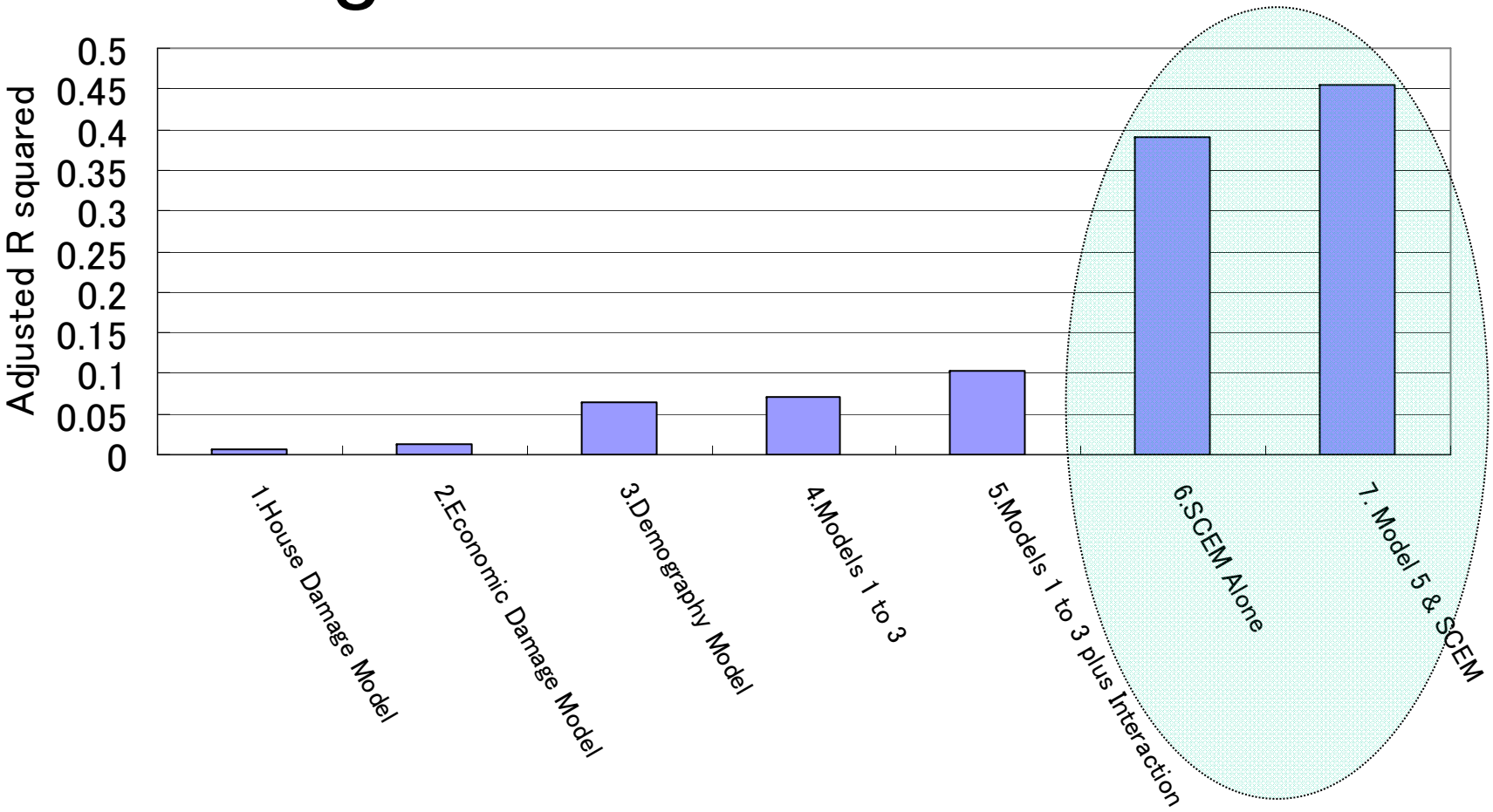
Table 2. The 2001 life recovery survey general linear model analysis results

Source of Variance	Type III SS	df	MS	F value	p	partial η^2
Corrected Model	702.311	293	2.397	4.360	***	0.584
Intercept	0.000	1	0.000	0.001	n.s.	0.000
Damage						
House Damage	0.955	3	0.318	0.579	n.s.	0.002
Furniture Damage	2.116	9	0.235	0.428	n.s.	0.004
Economic Damage	2.736	4	0.684	1.244	n.s.	0.005
Demography						
Locality	7.817	16	0.489	0.889	n.s.	0.015
Locality*Economic Damage	81.829	119	0.688	1.251	**	0.141
Sex	0.984	1	0.984	1.790	n.s.	0.002
Generation	15.848	2	7.924	14.415	***	0.031
Occupation	16.149	9	1.794	3.264	***	0.031
House Damage*Sex	4.222	3	1.407	2.560	*	0.008
House Damage*Generation*Occupation	69.058	86	0.803	1.461	***	0.121
①Housing						
Relocation Experience	2.332	1	2.332	4.242	*	0.005
②Social Ties						
Family Cohesion	13.515	3	4.505	8.195	***	0.026
Family Adaptability	6.925	3	2.308	4.199	***	0.014
Self Governance	2.263	1	2.263	4.117	**	0.005
Community Solidarity	2.990	1	2.990	5.439	**	0.006
Community Activity Participation	4.827	1	4.827	8.781	***	0.010
Social Trust	7.947	1	7.947	14.456	***	0.016
③Community Rebuilding						
Urban Common.s.	2.025	1	2.025	3.684	*	0.004
④Physical and Mental Stress						
Physical Stress	1.114	3	0.371	0.676	n.s.	0.002
Psychological Stress	57.008	3	19.003	34.568	***	0.102
Physical * Psychological Stress	17.631	8	2.204	4.009	***	0.034
General Health Practice	7.306	1	7.306	13.291	***	0.014
⑤Preparedness						
Future Earthquake Damage	3.581	1	3.581	6.515	***	0.007
⑥Economic/Financial Situation						
Income	17.437	3	5.812	10.573	***	0.034
Savings	2.473	3	0.824	1.499	n.s.	0.005
Expenditure	2.928	3	0.976	1.776	n.s.	0.006
⑦Relation to Government						
Communitarianism	1.420	1	1.420	2.584	n.s.	0.003
Willingness to Pay	4.291	1	4.291	7.806	***	0.009
Communitarianism*WTP	1.909	1	1.909	3.472	*	0.004
Social Desirability Bias	2.041	1	2.041	3.712	*	0.004
Error	501.598	910	0.551			
Total	1202	1203				
*** p<.01 ** p<.05 * p<.10 n.s. Not Significant		0.365				

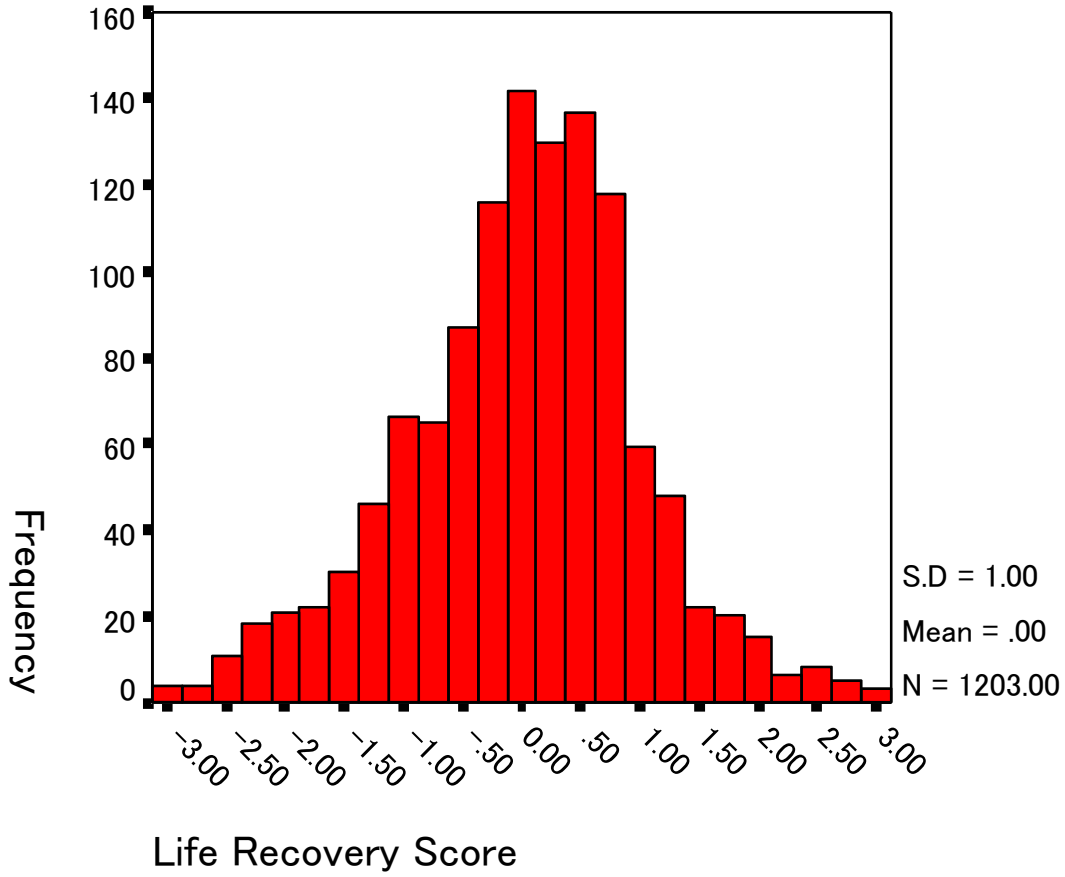
General Linear Model of Life Recovery



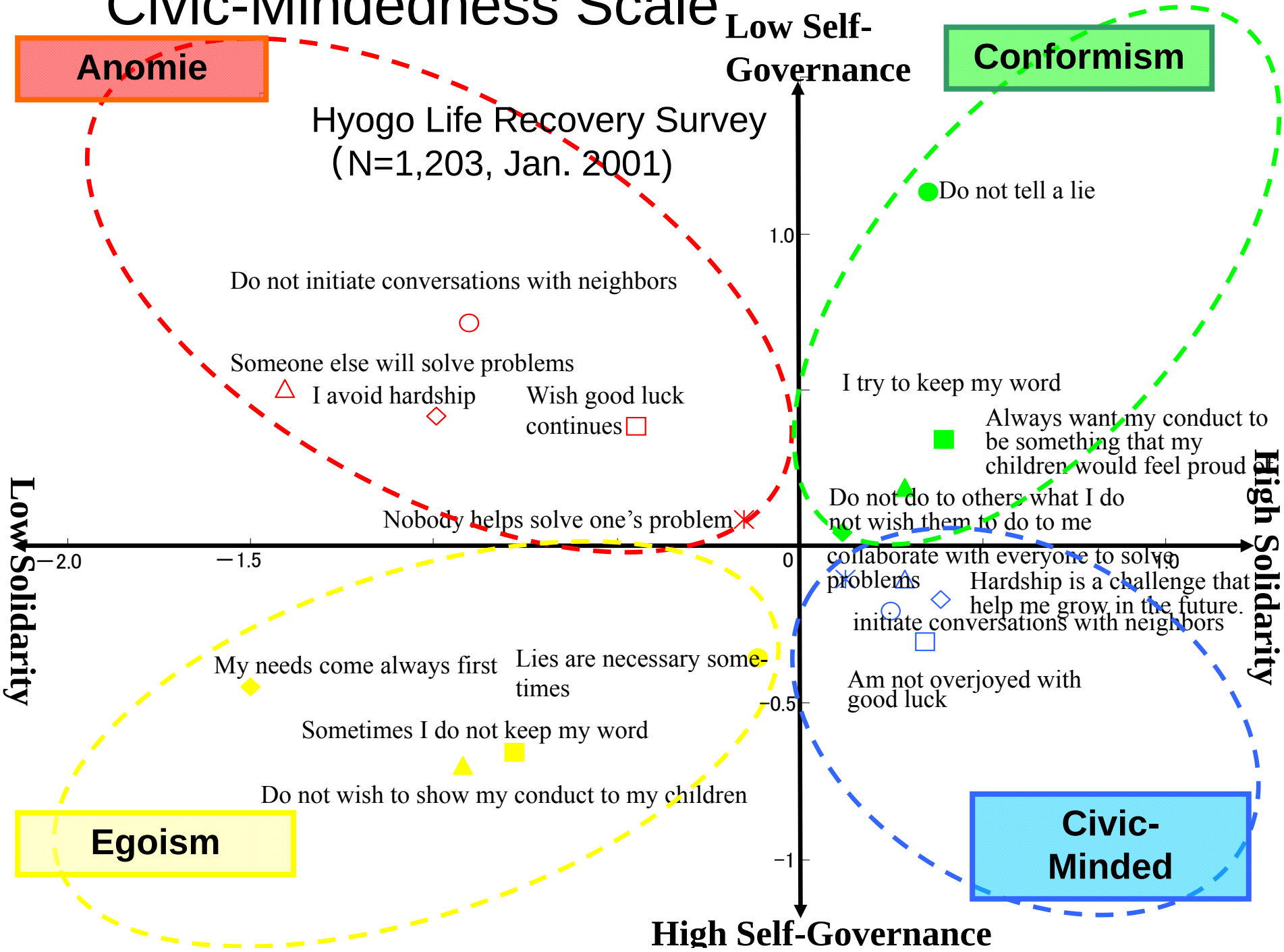
Comparisons of Adjusted R-Squared among the General Linear Models



The integrated model accounted for 58.4 % of the total variance of Life Recovery

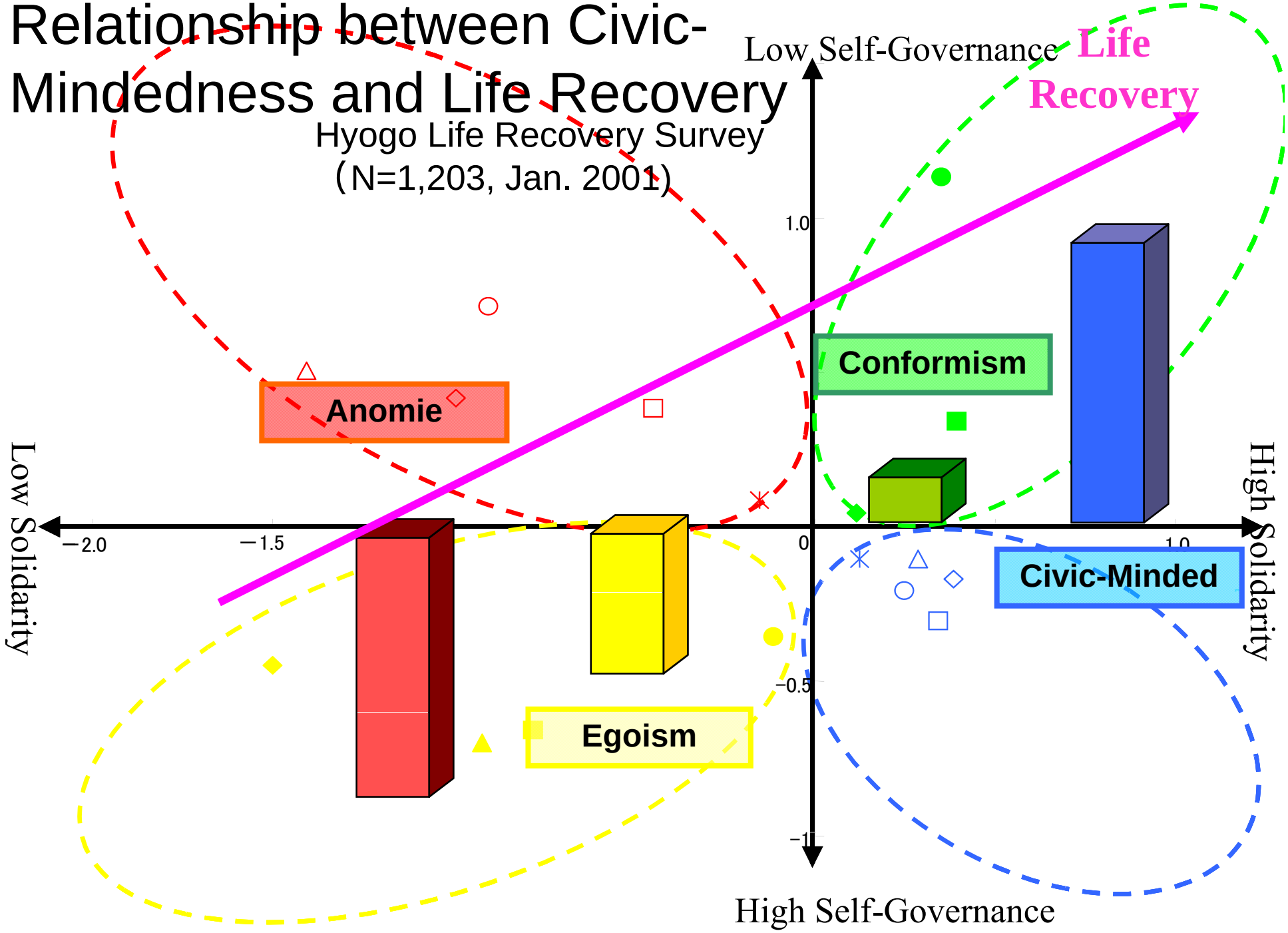


Civic-Mindedness Scale



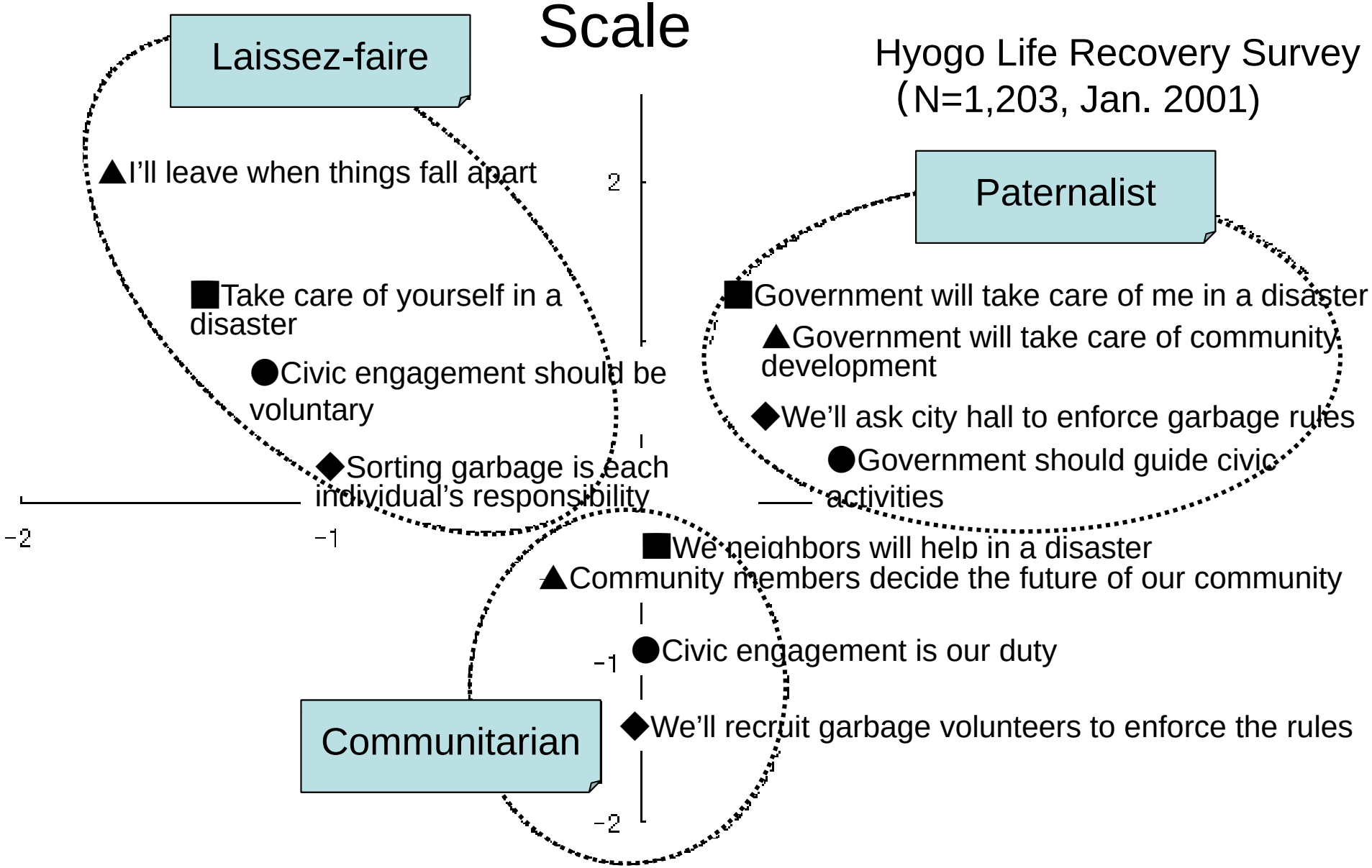
Relationship between Civic-Mindedness and Life Recovery

Hyogo Life Recovery Survey
（N=1,203, Jan. 2001）



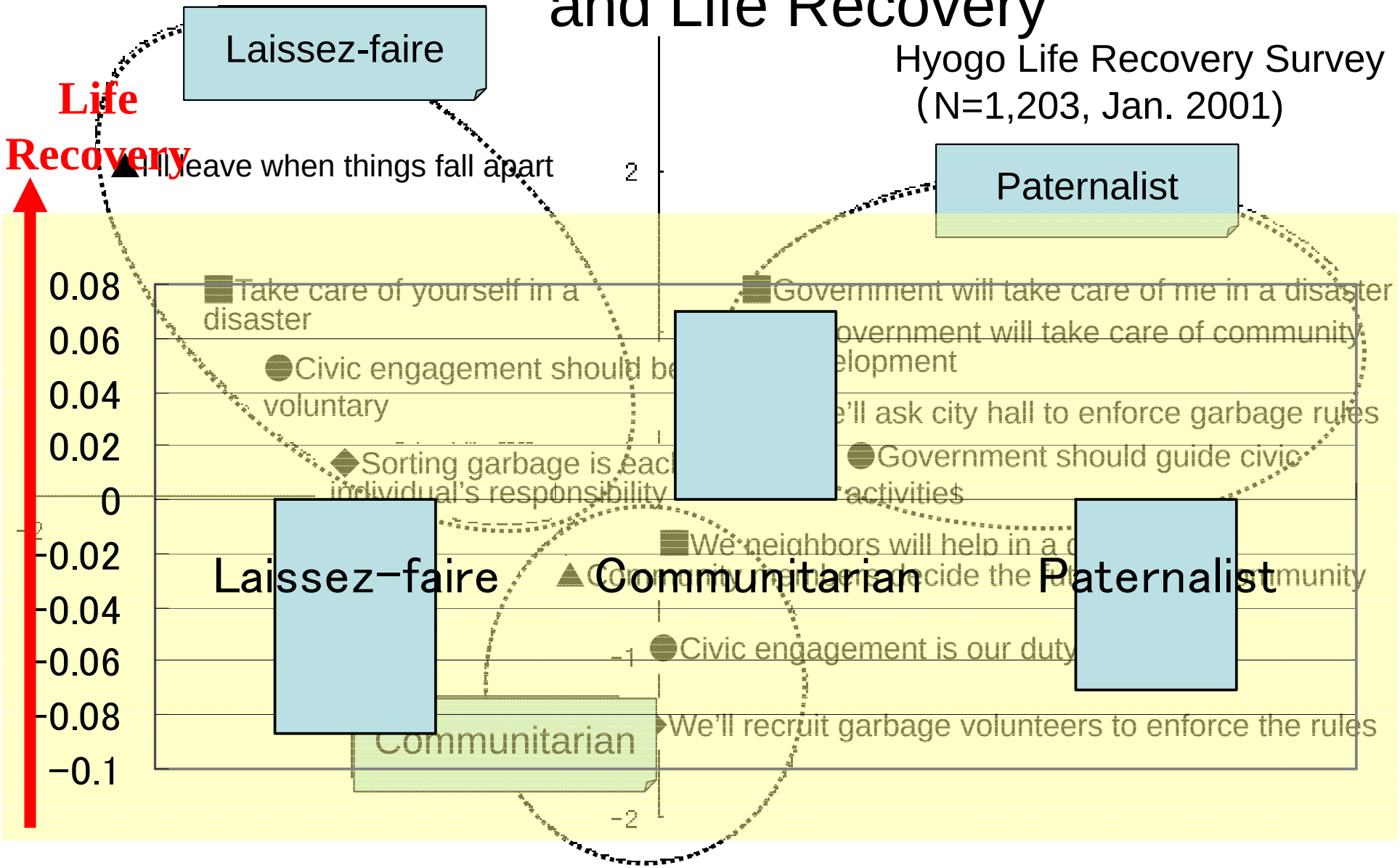
Relation-to-Government Scale

Hyogo Life Recovery Survey
（N=1,203, Jan. 2001)



Relation-to-Government and Life Recovery

Hyogo Life Recovery Survey
（N=1,203, Jan. 2001)

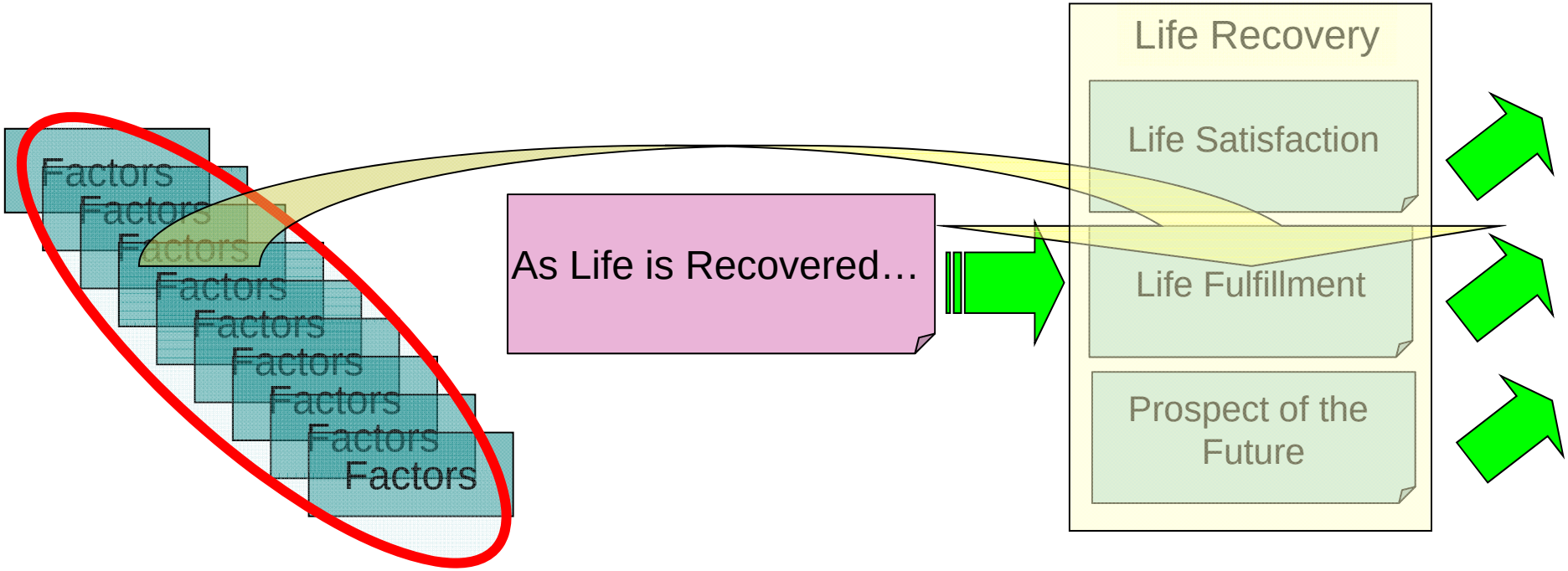


The 2003 & 2005 Hyogo Life Recovery Survey:

Structural Analyses of SCEM, Life Recovery Processes, & Life Recovery Outcome Variables

Research Framework of the 1999 & 2001 Hyogo Life Recovery Surveys

- The 1999 Disaster Process Study
- The 2001 Hyogo Life Recovery Survey Study



What is Recovery？

An Image of Life Recovery Process

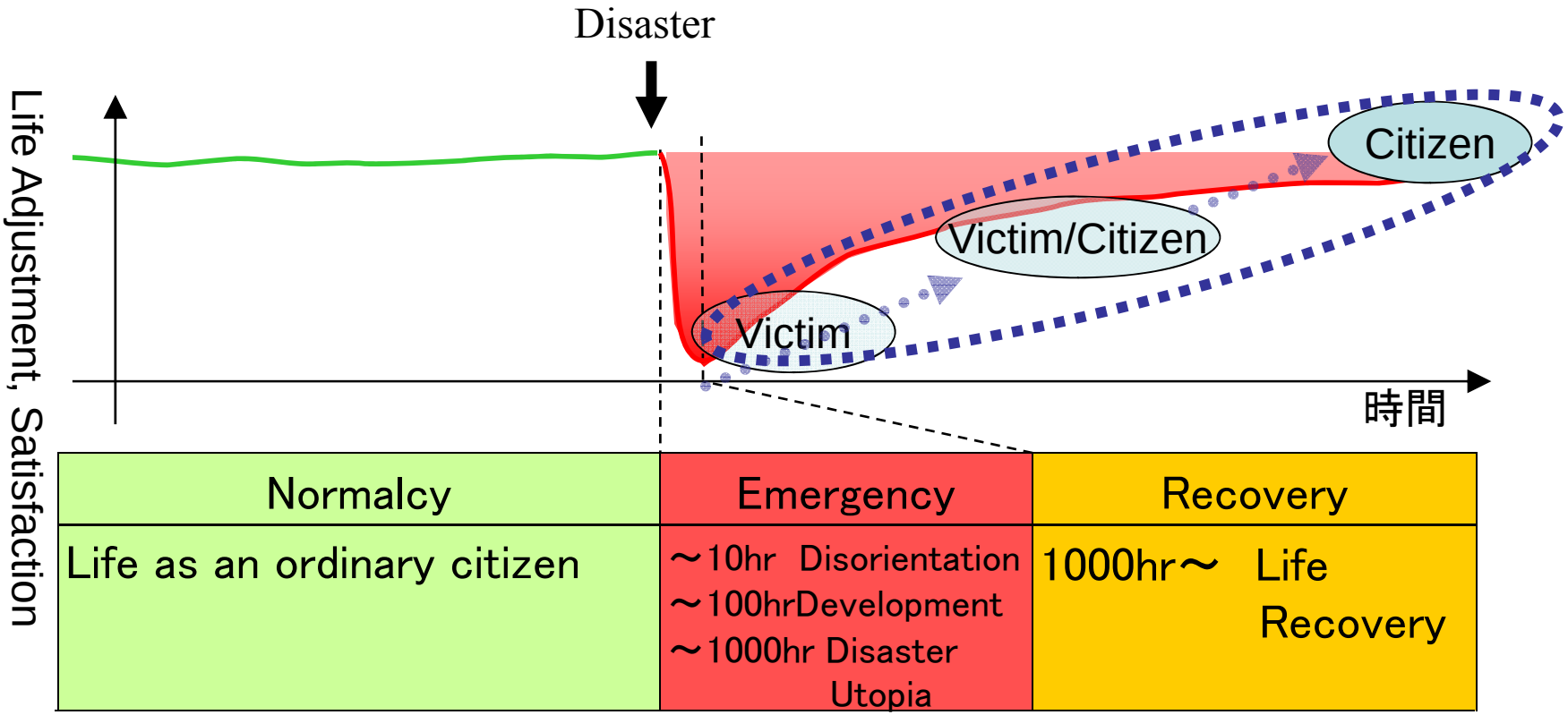


Figure 5: The “normalcy-to-disaster-to-recovery” model of life recovery

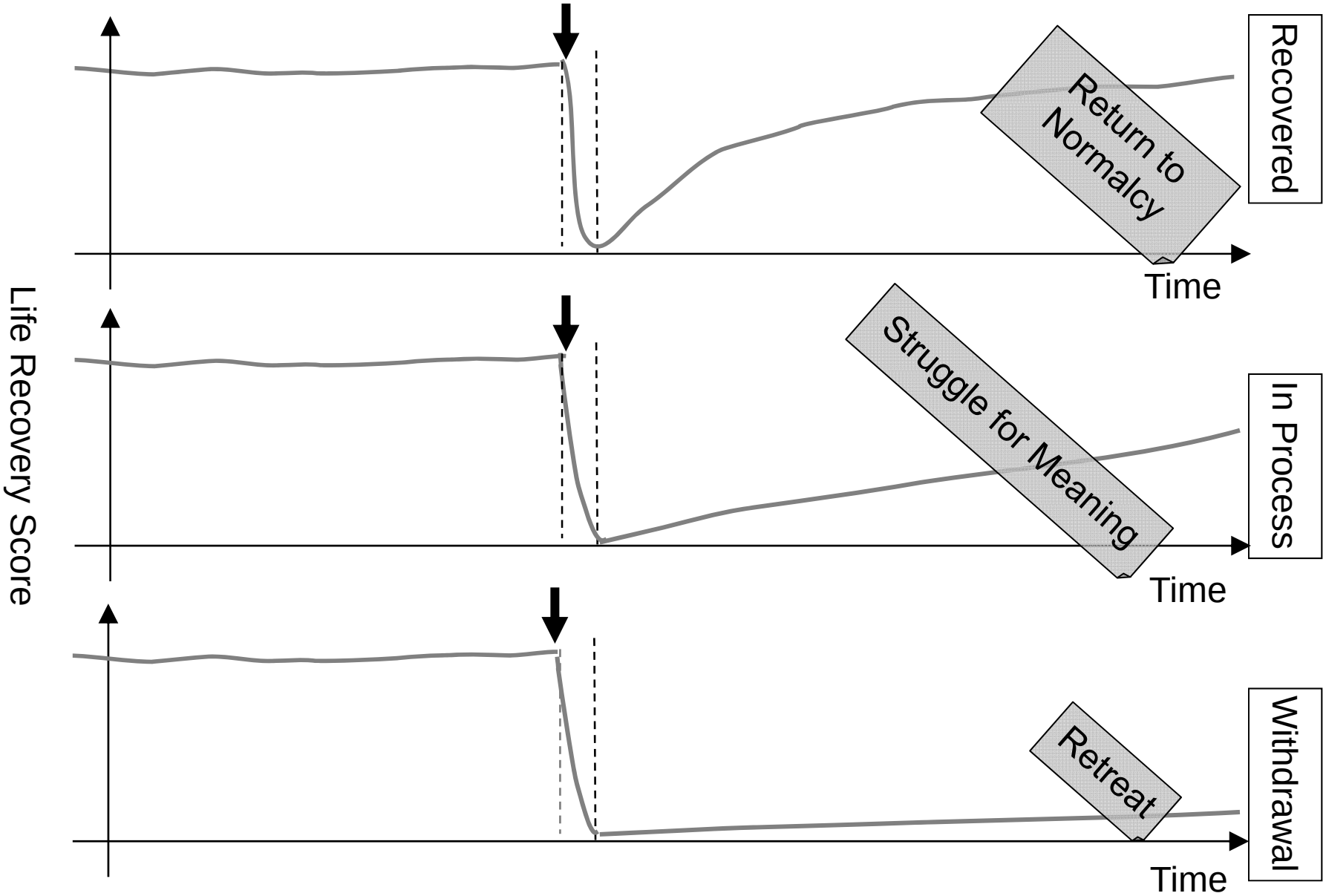


Figure 6: Three recovery curve typologies

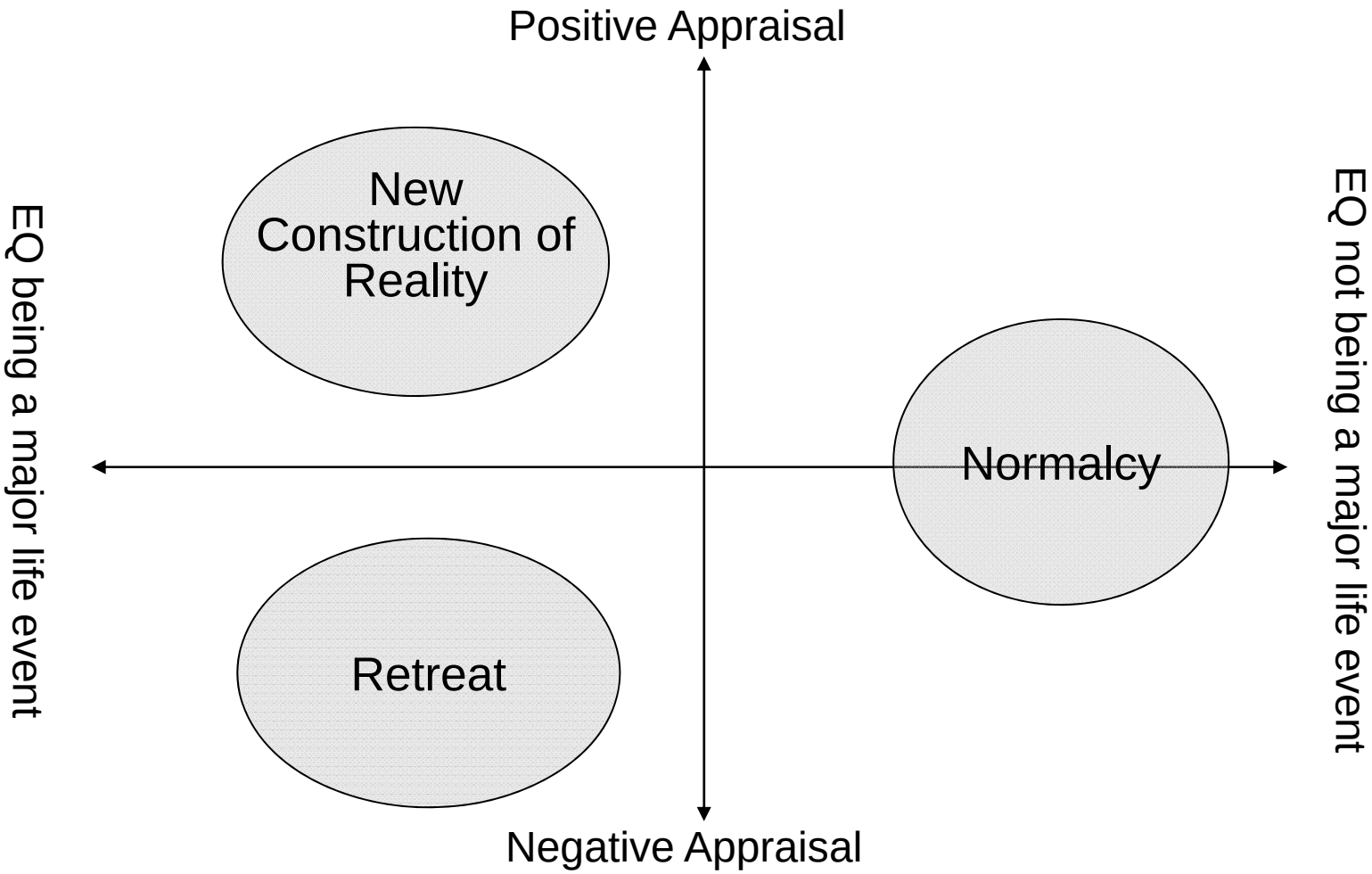


Figure 7: Life change appraisal model and three recovery typologies

Research Framework of the 2003 & 2005 Hyogo Life Recovery Surveys

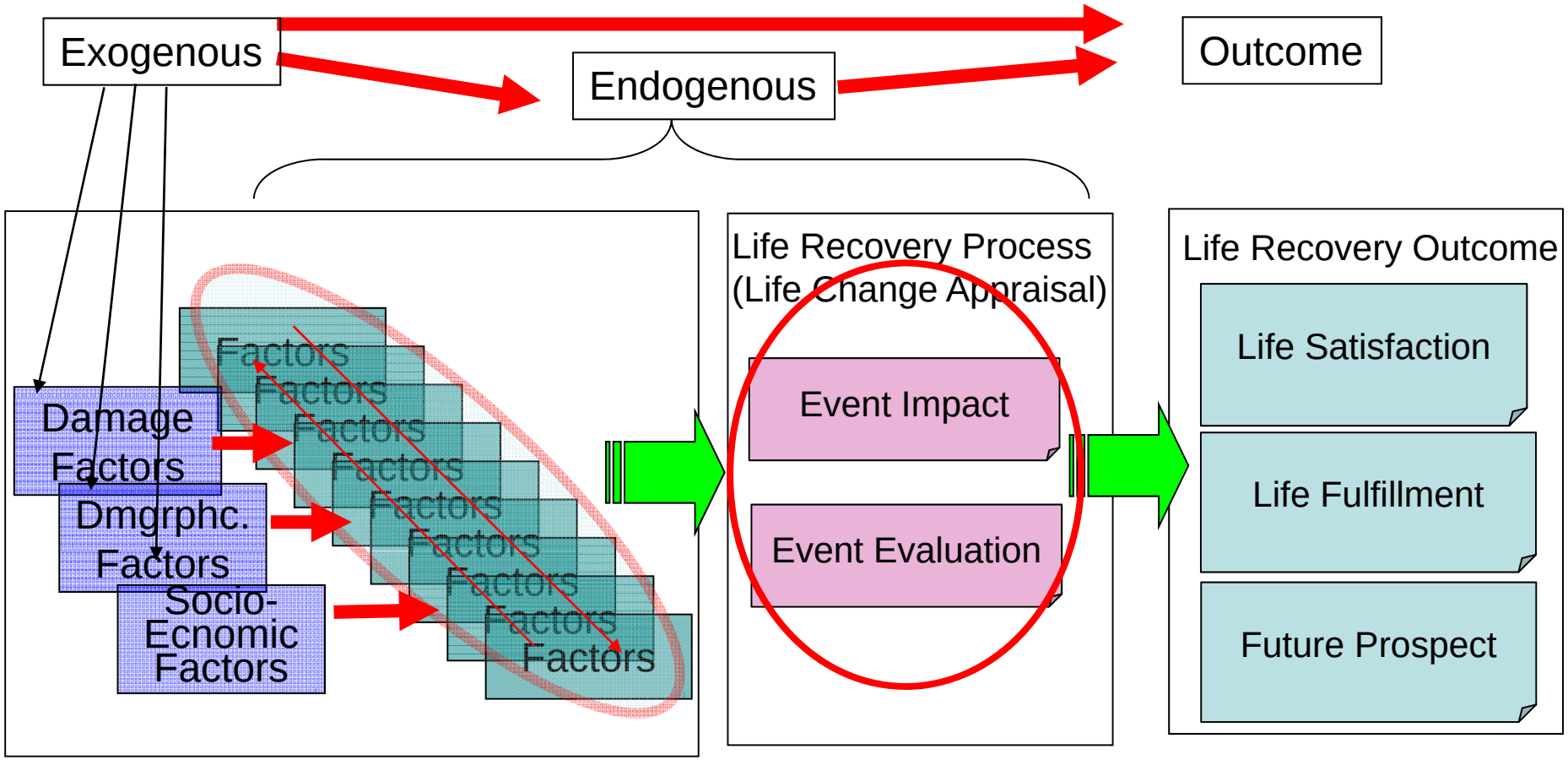


Table 7: The 2003 study second-order factor analysis results of 5 factors (promax rotation)

First-order Factors	Event Evaluation	Event Impact	Communality
Struggle for Meaning	0.789	0.055	0.629
Life Change Direction	0.784	0.015	0.617
Retreat	−0.534	0.474	0.493
Sense of Life Change	0.267	0.740	0.633
Return to Normalcy	0.150	−0.668	0.463
Eigenvalues	1.621	1.214	
Variance Accounted For (%)	32.4%	24.3%	

Table 8: The 2005 study second-order factor analysis results of 5 factors (promax rotation)

First-order Factors	Event Evaluation	Event Impact
Struggle for Meaning	0.803	-0.102
Life Change Directon	0.632	-0.418
Sense of Life Change	0.629	0.620
Return to Normalcy	0.089	-0.682
Retreat	-0.165	0.628
Eigenvalues	1.611	1.302
Variance Accounted For (%)	32.2%	26.0%

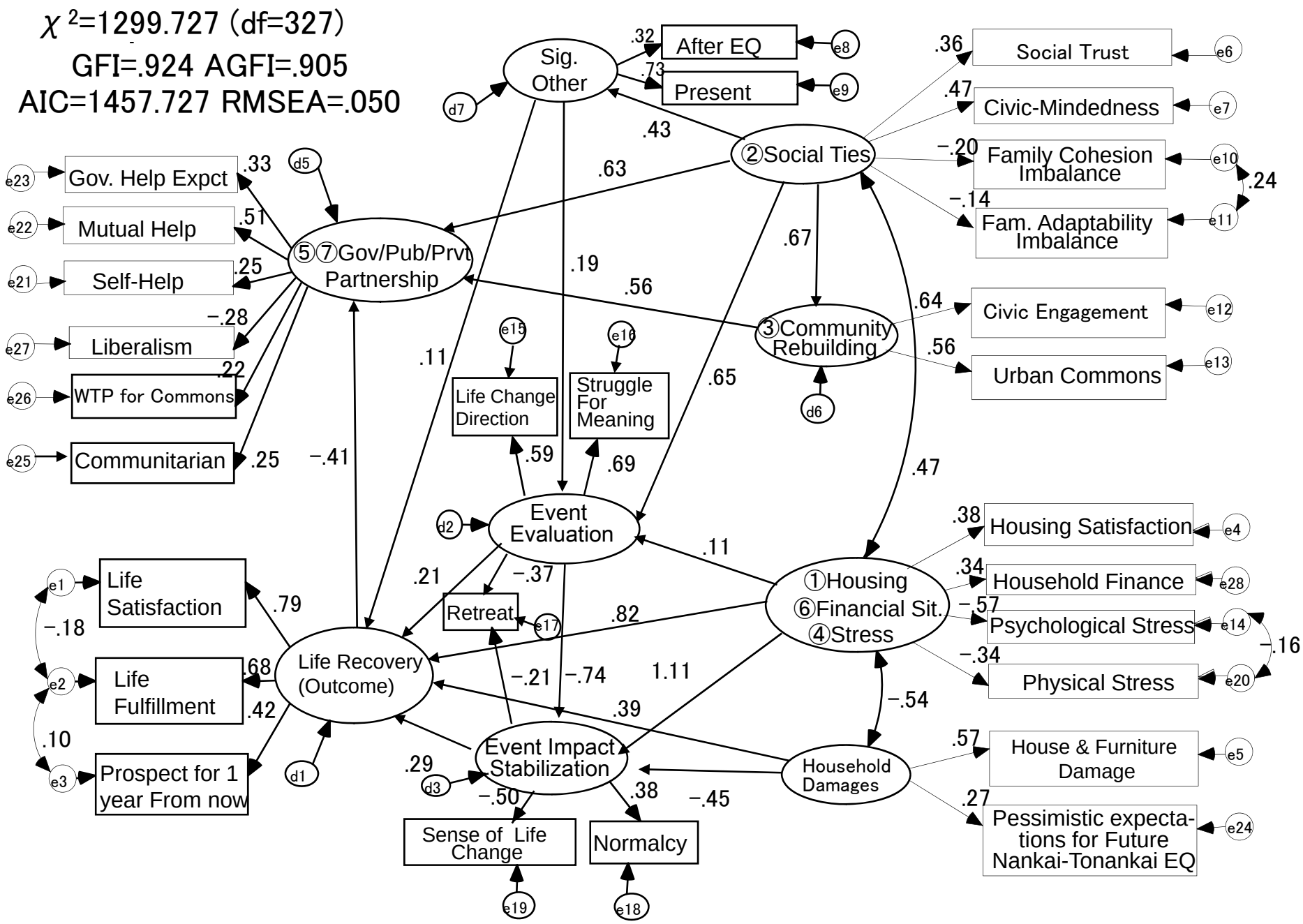


Figure 8: The final SEM life recovery model for the 2003 study data

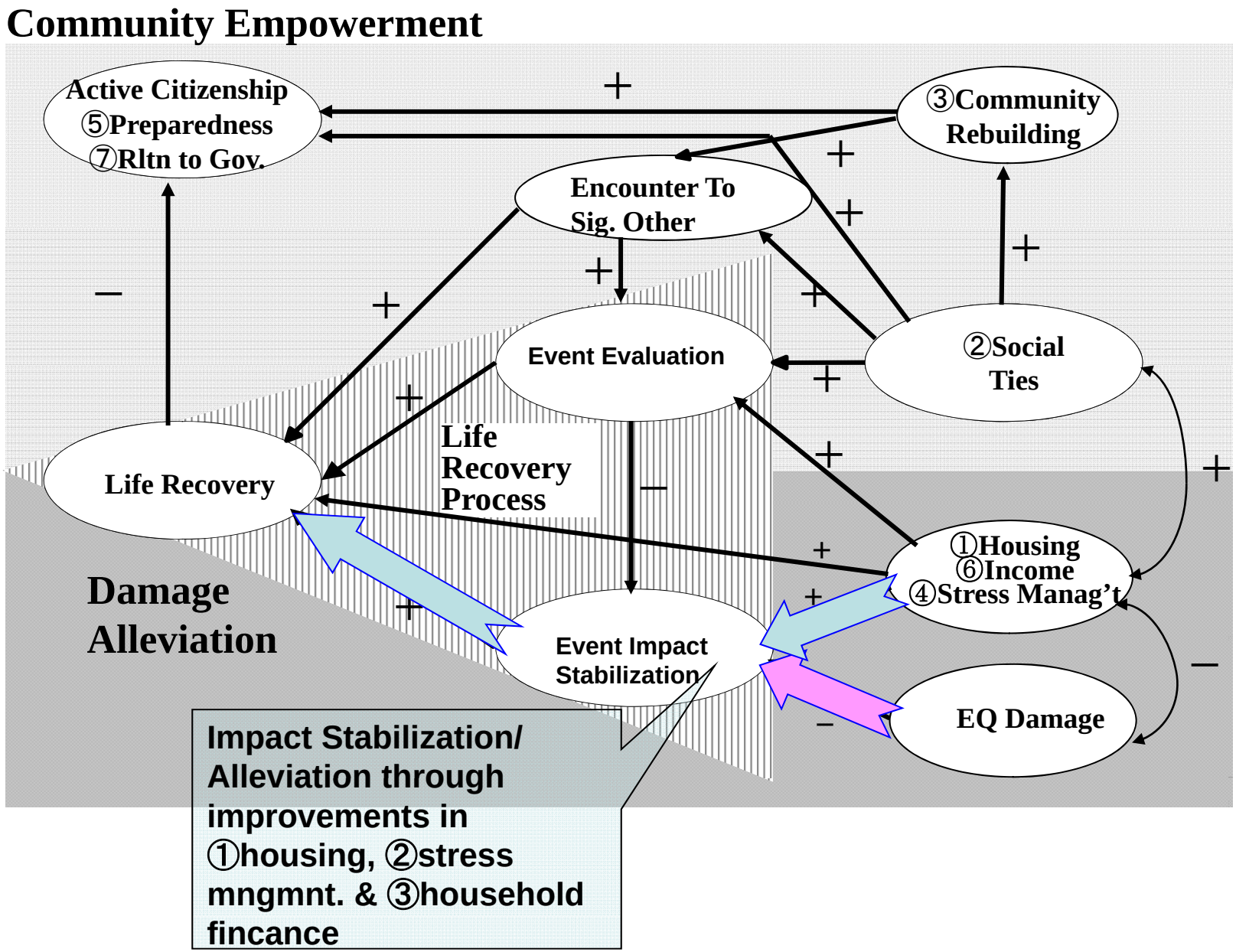


Figure 9: Bird's-eye view of life recovery process: The 2003 study results (N=1,203, Jan. 2003)

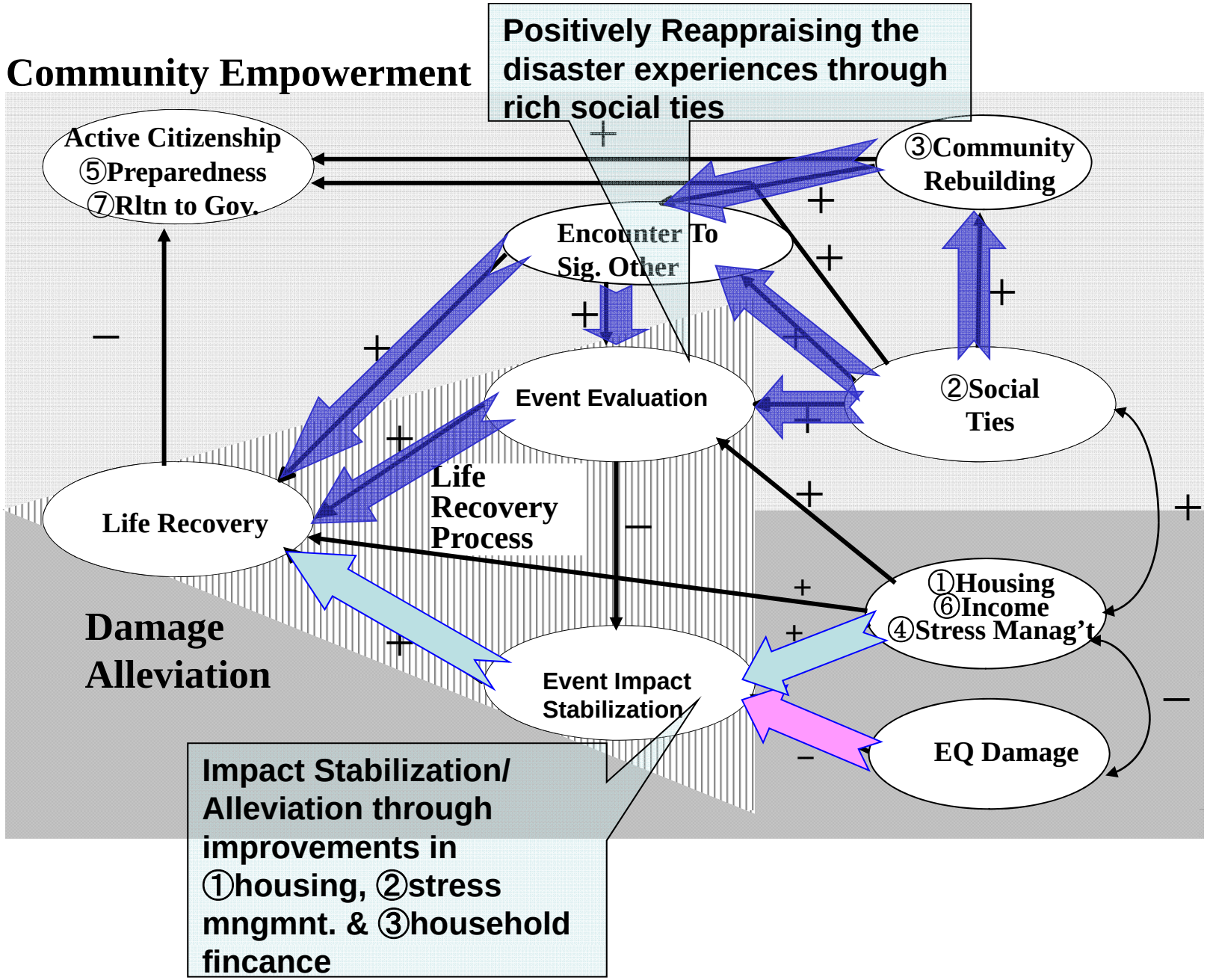


Figure 9: Bird's-eye view of life recovery process: The 2003 study results (N=1,203, Jan. 2003)

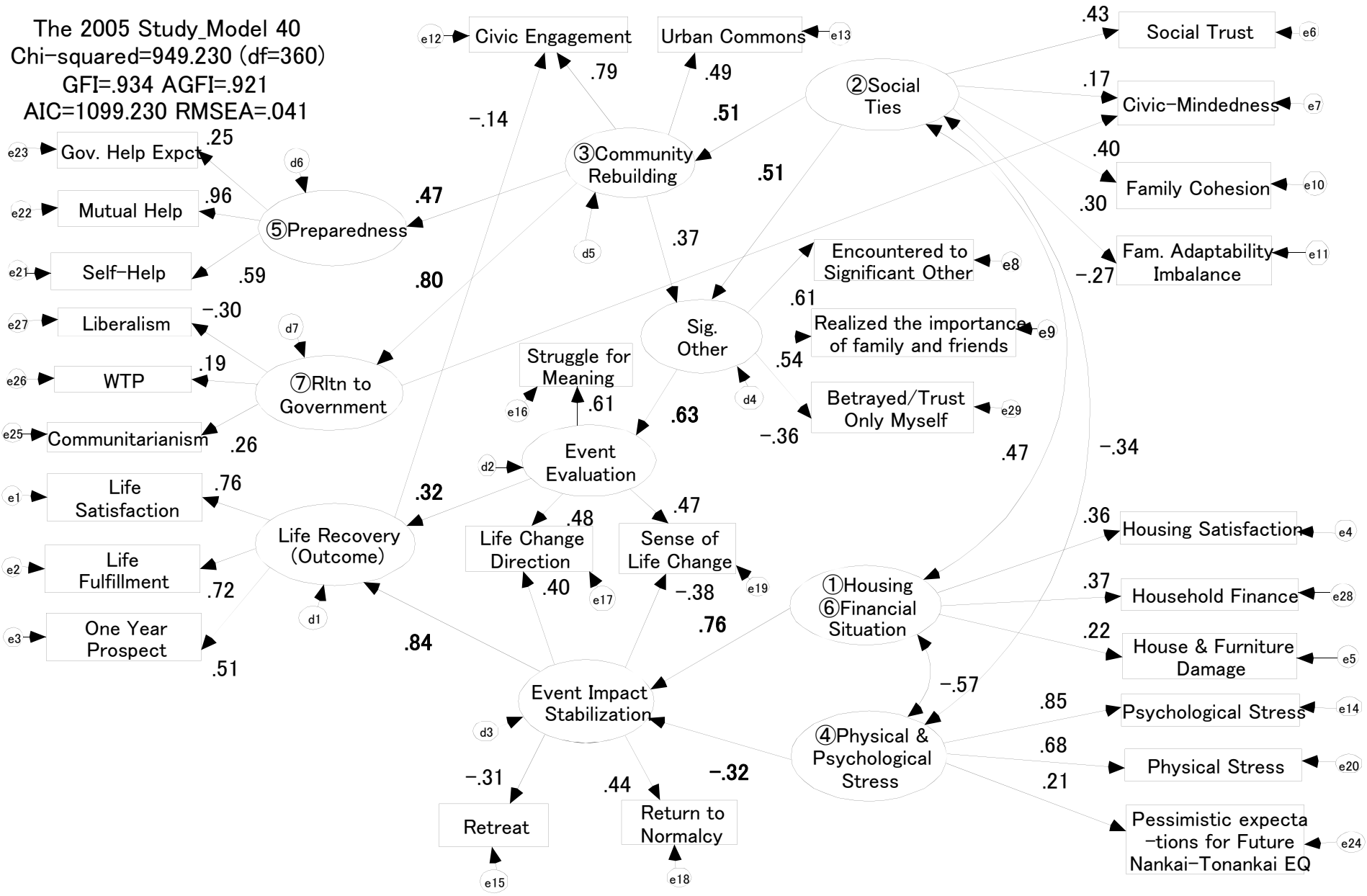


Figure 10: The final SEM life recovery model for the 2005 study data

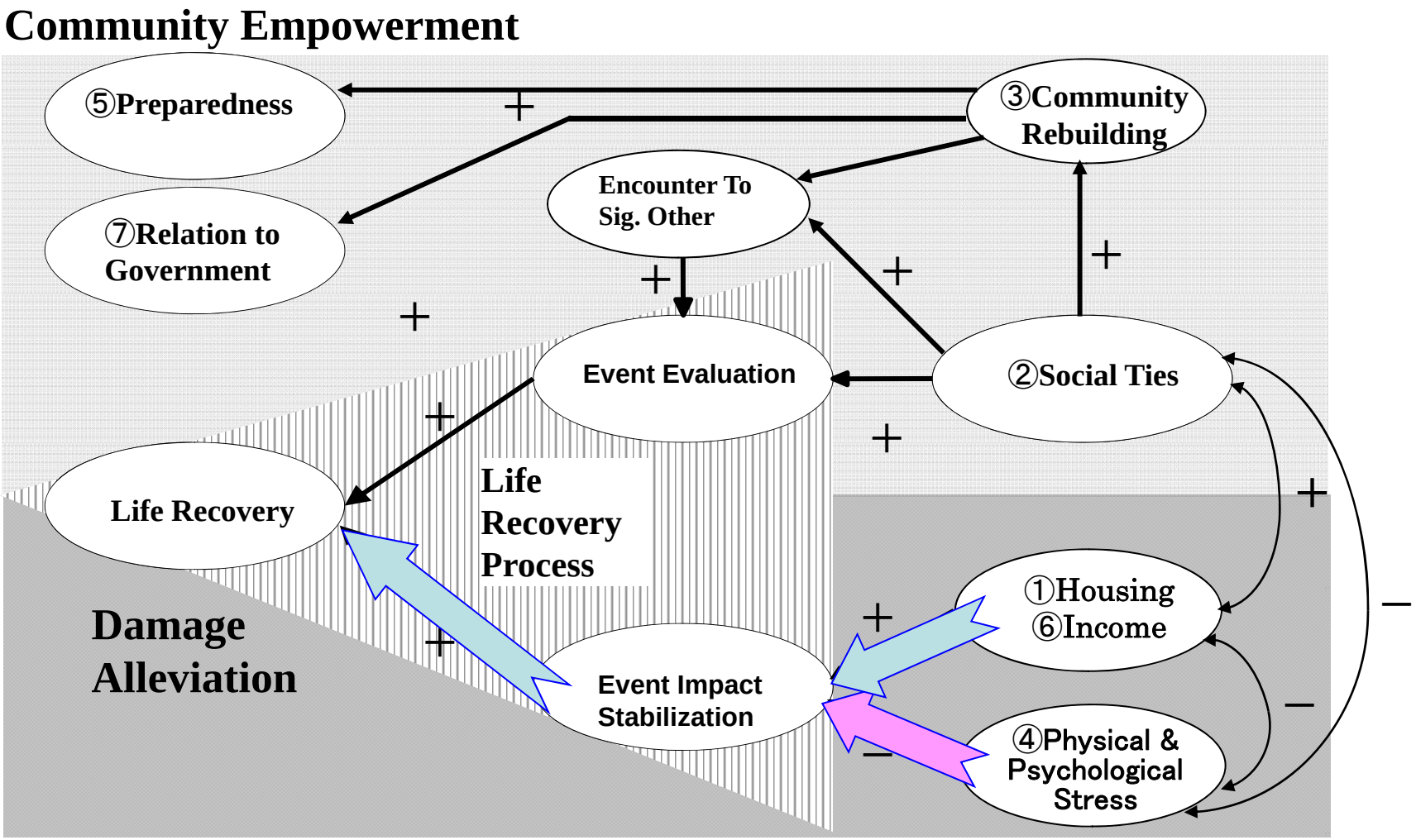


Figure 11: Bird's-eye view of life recovery process: The 2005 study results (N=1,028, Jan. 2005)

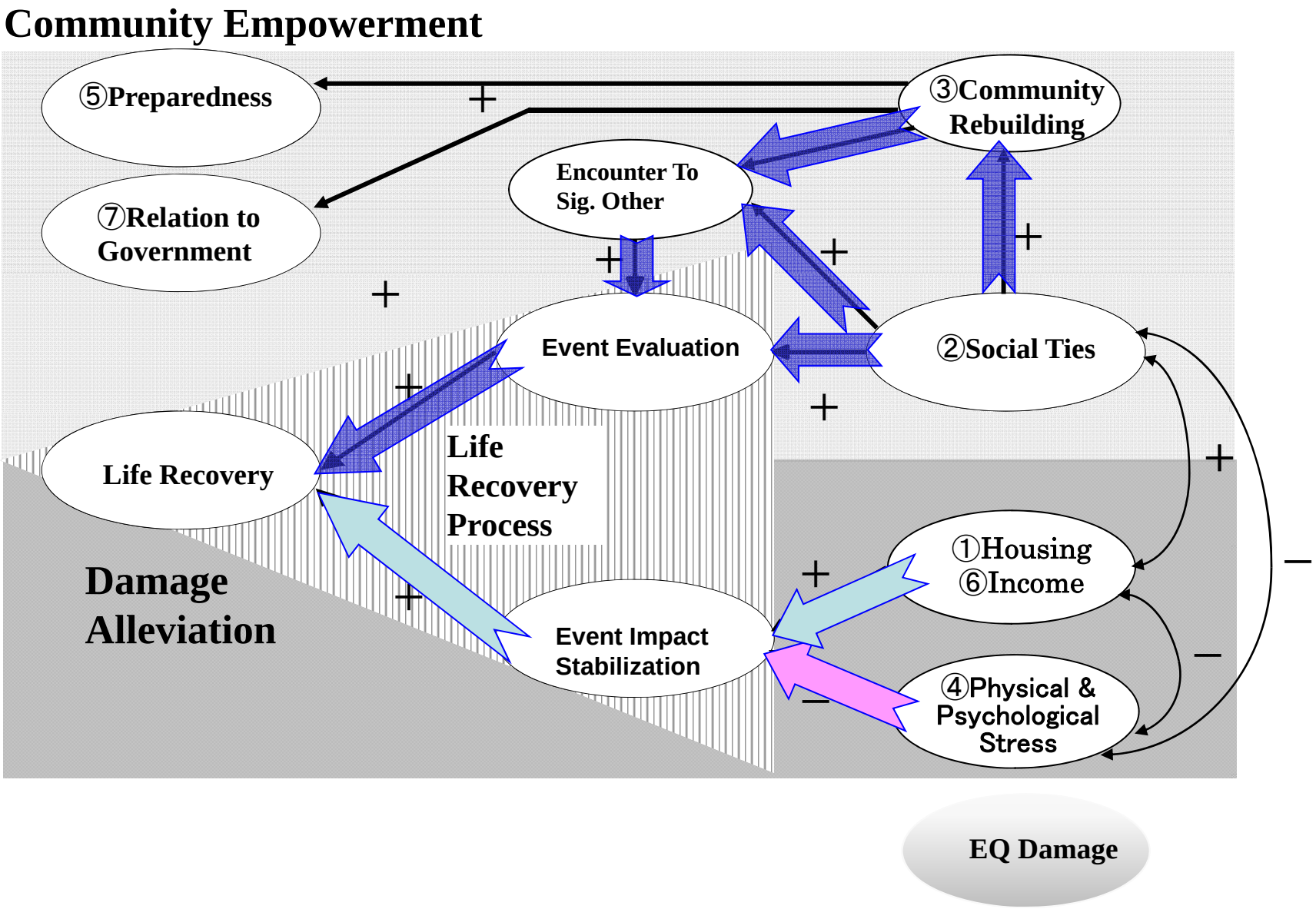


Figure 11: Bird's-eye view of life recovery process: The 2005 study results (N=1,028, Jan. 2005)

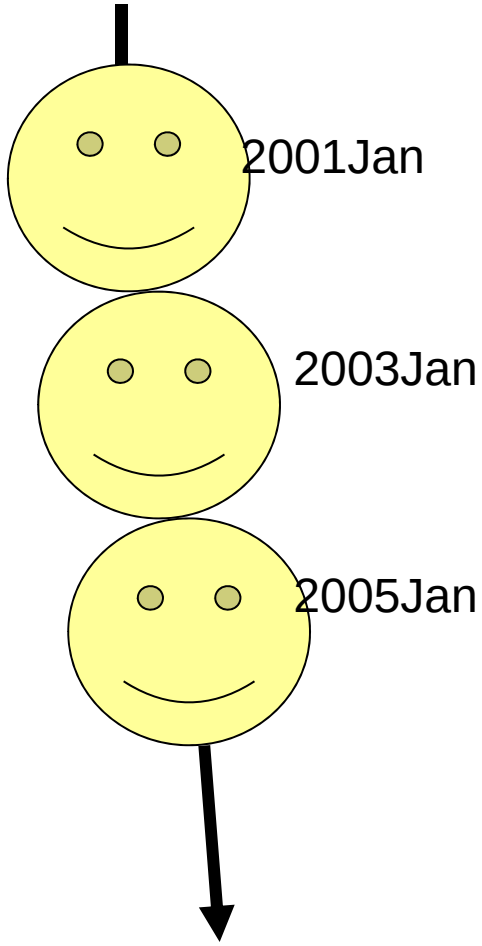
The 2001, 2003, & 2005 Hyogo Life Recovery Panel Survey:

Significance of the Study

Many studies have been made on long-term recovery of victims of natural disaster.

However, these studies' research design has been "cross-sectional" where both predictor and dependent variables were collected at the same time point.

Panel surveys make it possible to follow up the same individuals over several periods of time and are useful in identifying changes in the victims' recovery patterns within these points of time.



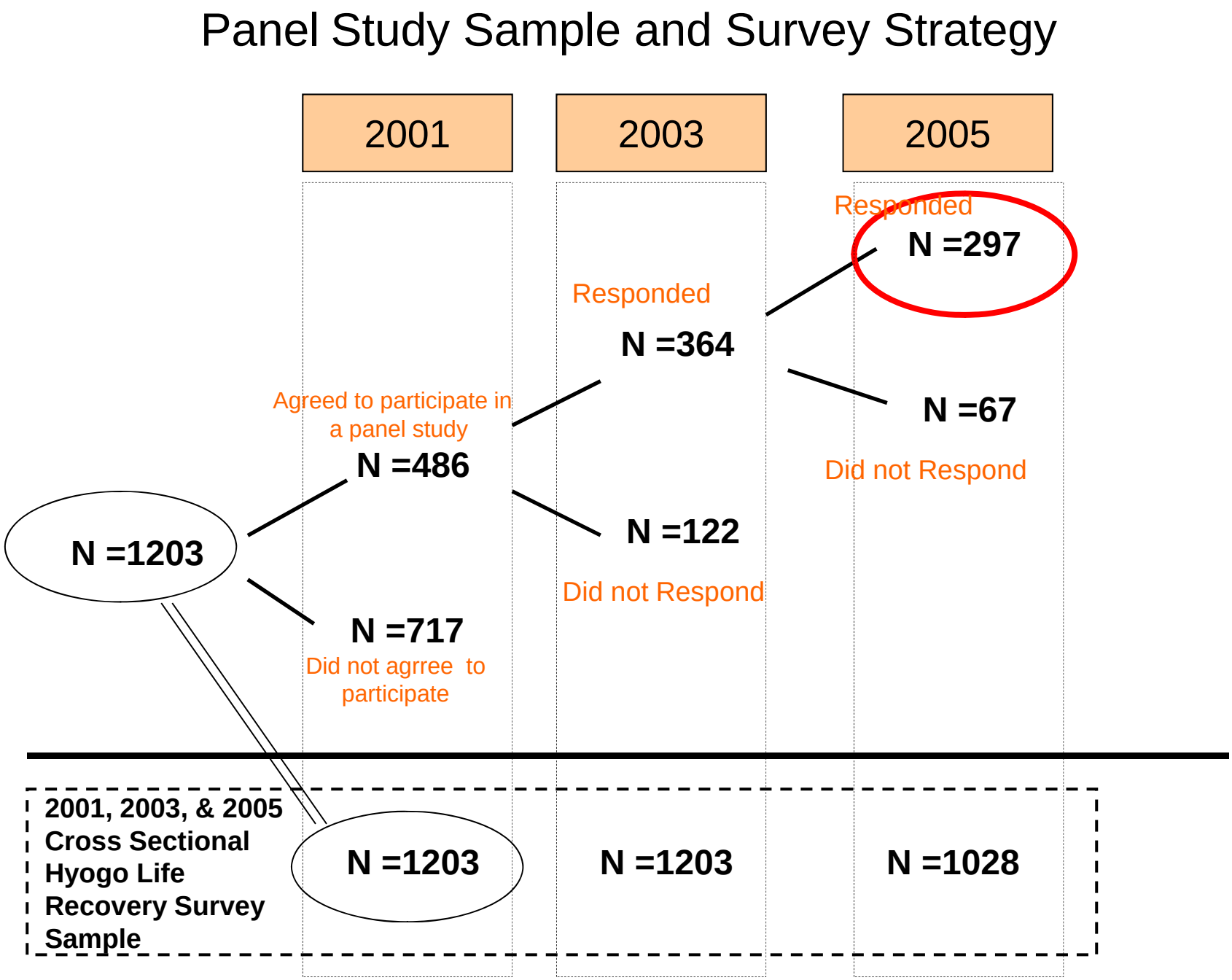
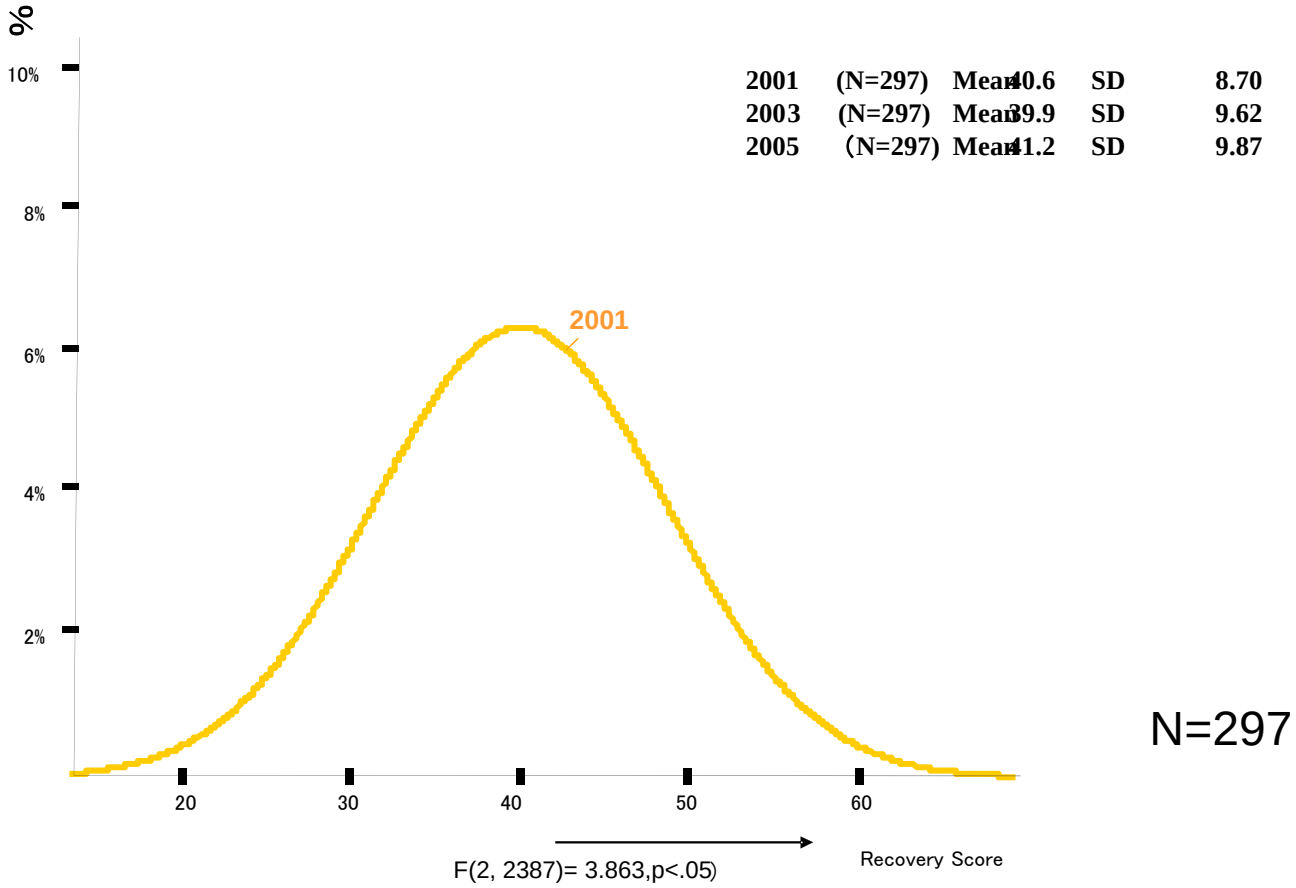


Figure 12: the 2001, 2003 and 2005 Panel Study Sample

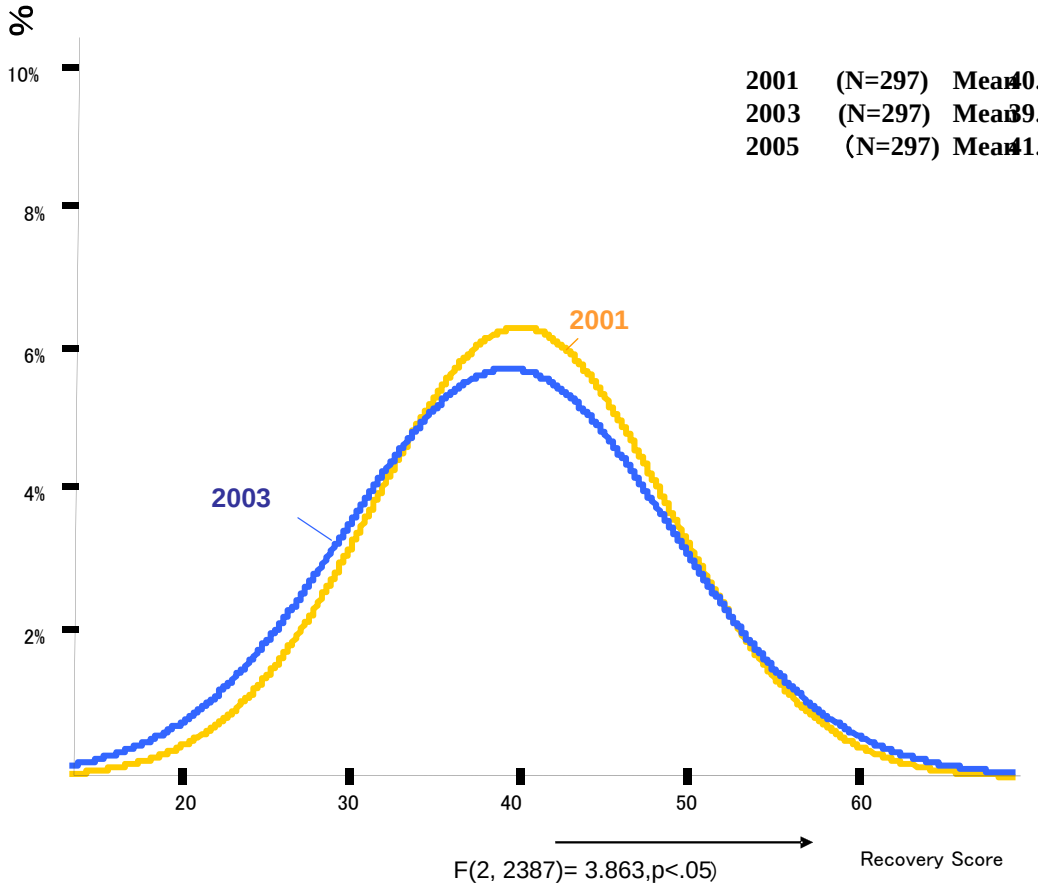
Life Recovery Panel Survey（2001･2003･2005）Results

Kuromiya, A., Tatsuki, S. et. Al. Four Recovery Patterns from the Hanshin-Awaji Earthquake: Using the 2001, 2003, & 2005 Panel Data, Journal of the Institute of Social Safety Science, 8, 2006, pp.405-414.



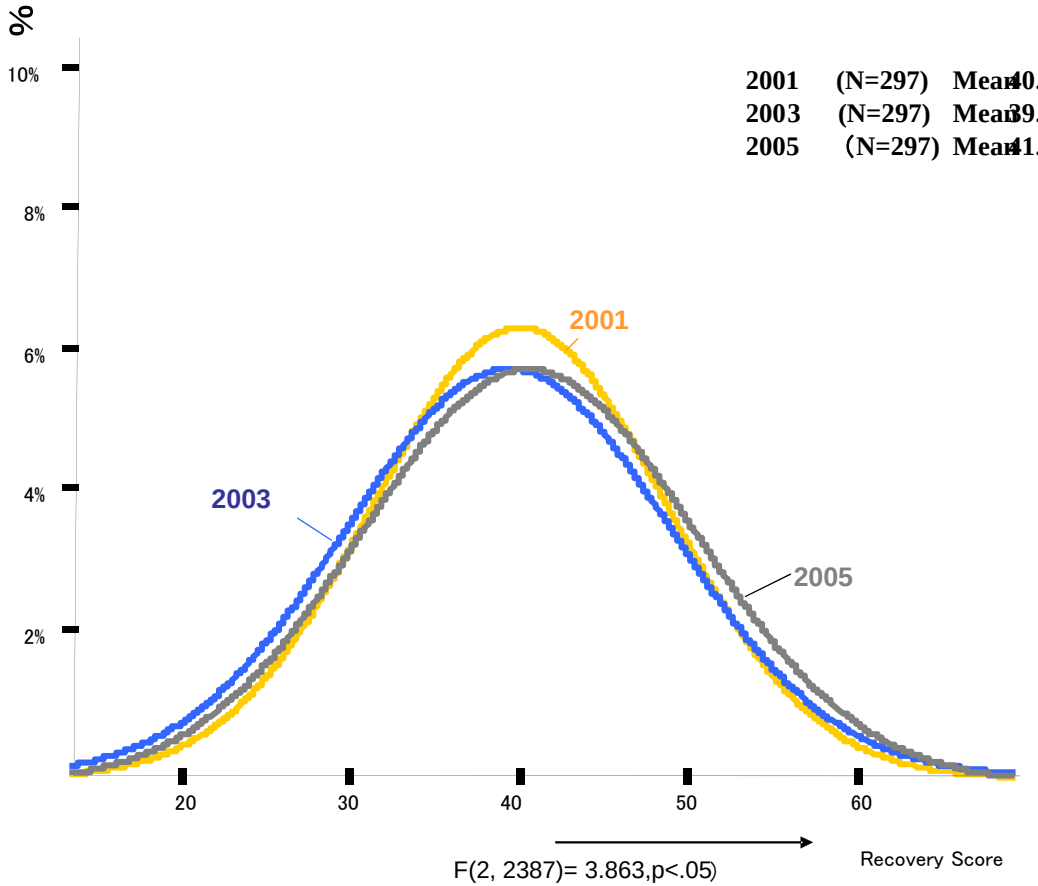
N=297

Life Recovery Panel Survey（2001･2003･2005）Results



N=297

Life Recovery Panel Survey（2001･2003･2005）Results



F(2, 2387)= 3.863,p<.05)

【Significant Lift from 2003 to 2005 (p<.05)】

N=297

Patterns of Life Recovery:
Cluster Analysis Results of 297 Respondents

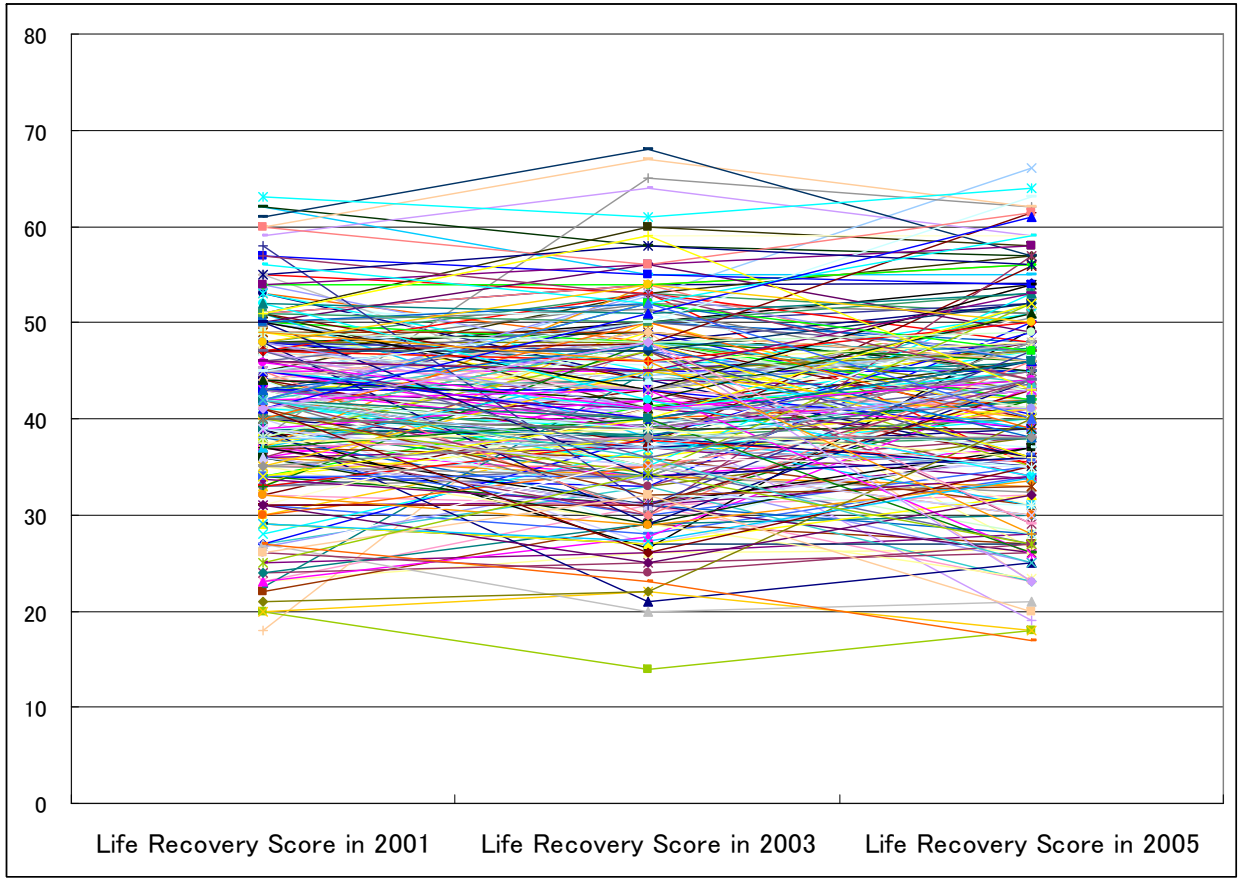


Figure 13: Change in life recovery scores in years 2001, 2003, & 2005 (N=297)

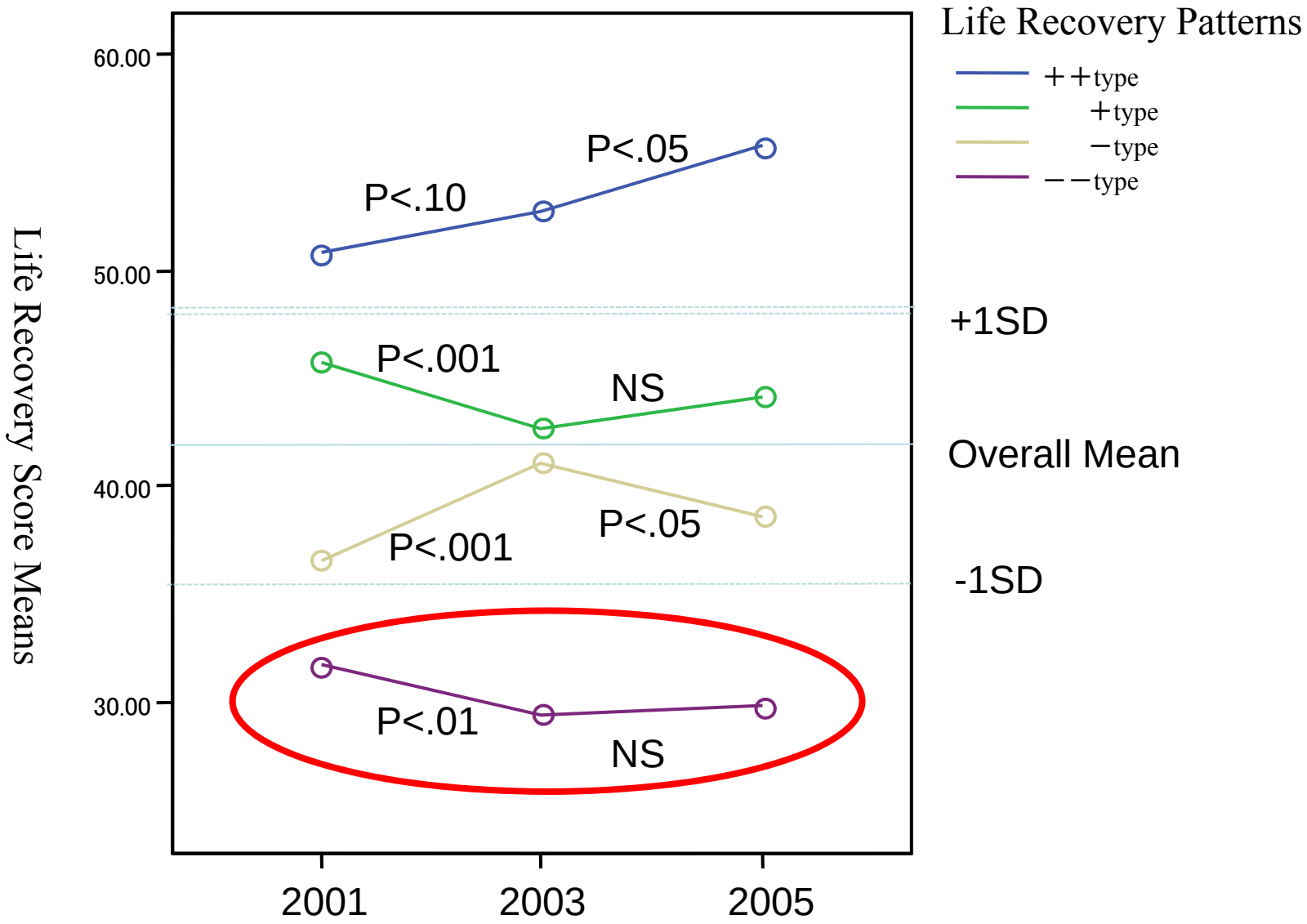
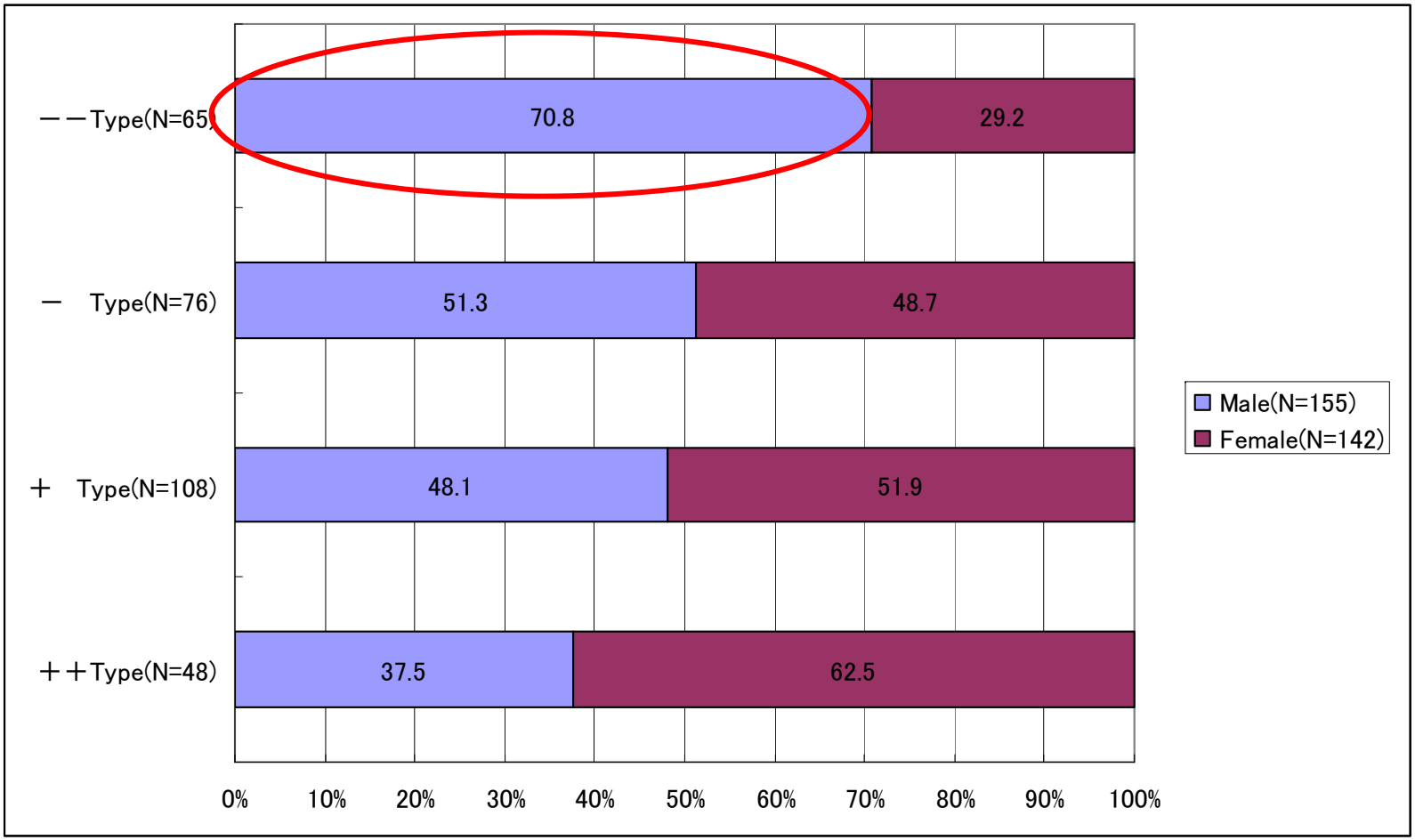


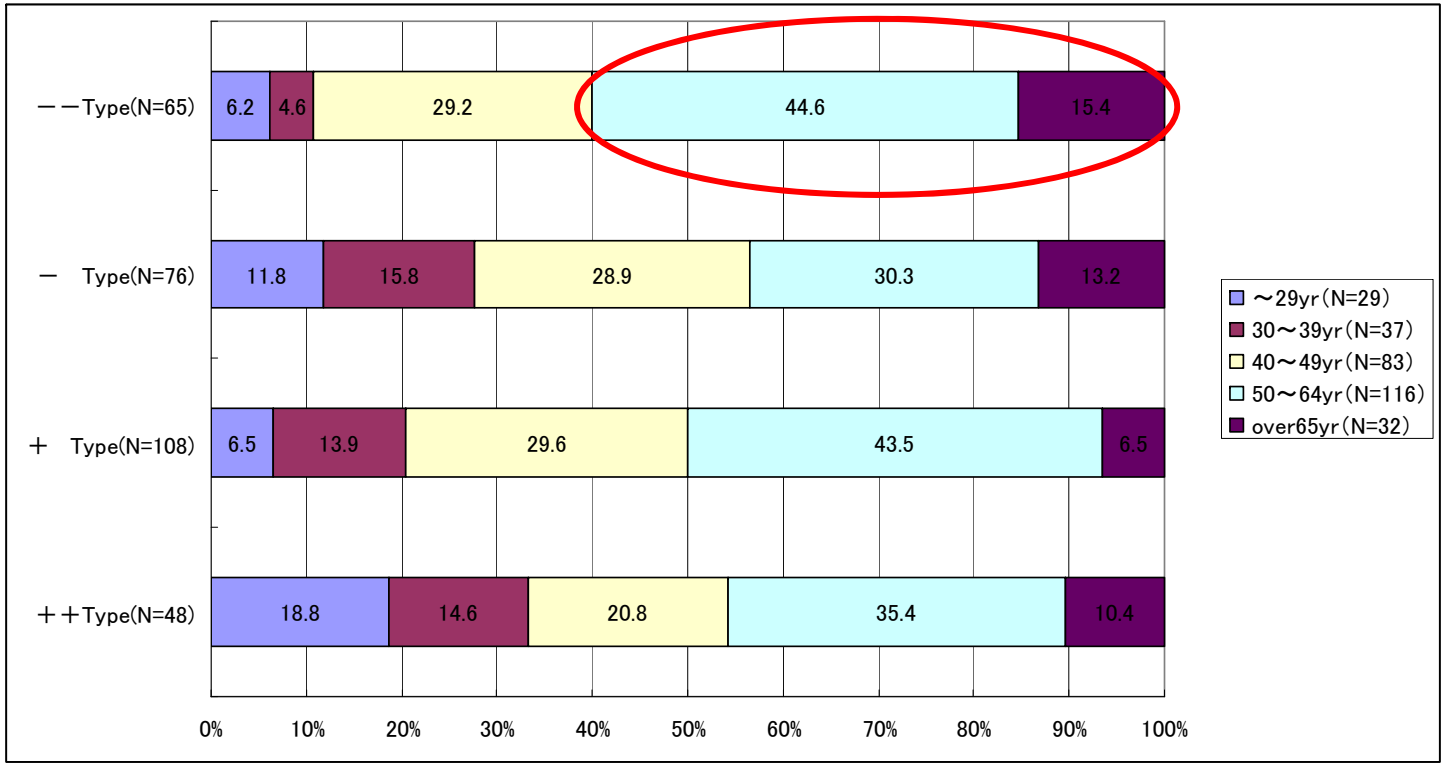
Figure 14: Cluster analysis and within-subject (repeated measure) ANOVA results

Four Life Recovery Patterns by Sex



In terms of sex of the panel respondents, there are more females in the ++Type pattern than males, while in the - - Type pattern there are more males than females.
One reason is that most of the male respondents have jobs while more females are housewives, so the burden of overcoming economic recovery falls on the breadwinner.

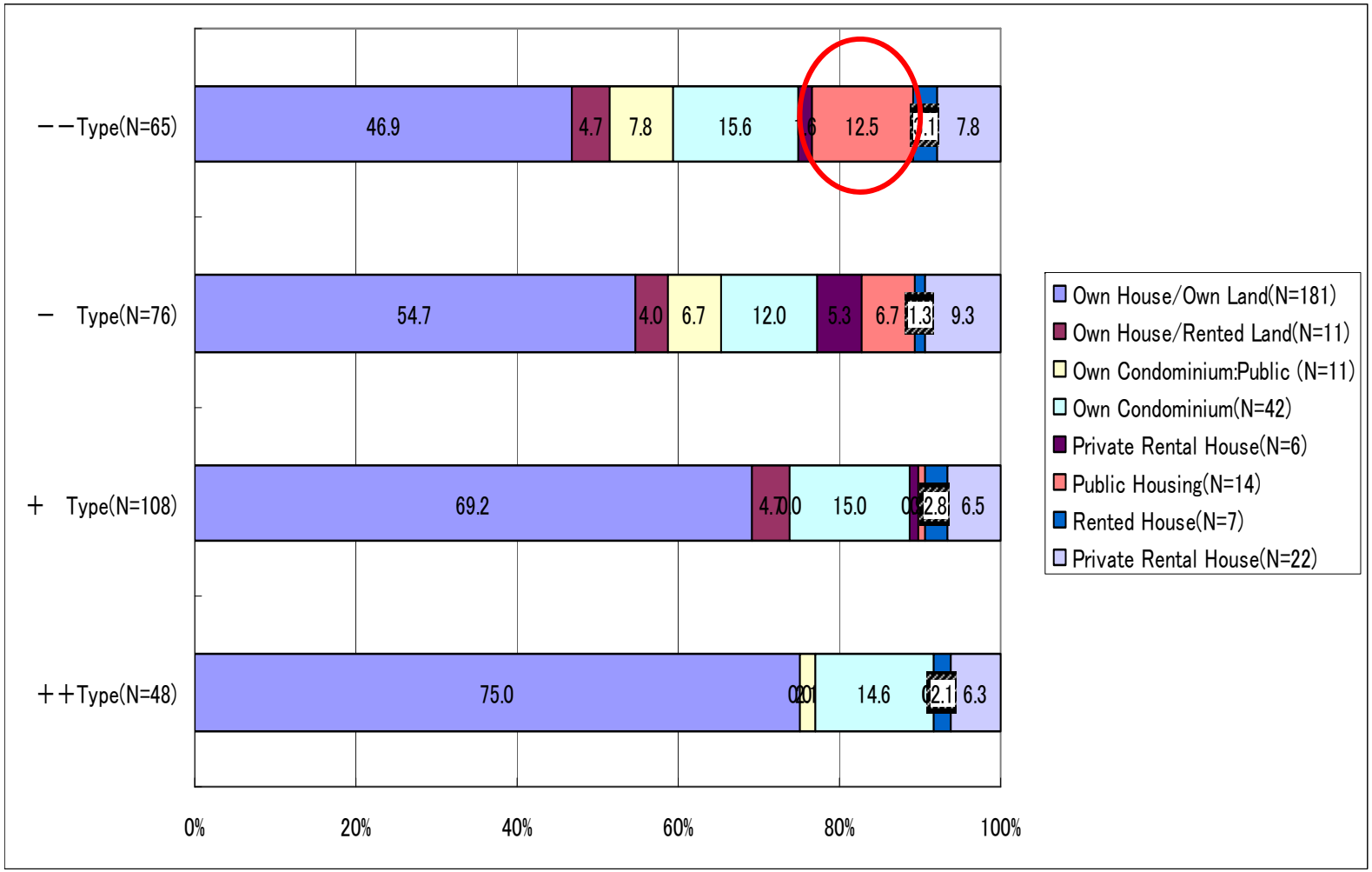
Four Life Recovery Patterns by Age



The younger the cohort the recovery is faster whereas the older the cohort the recovery is much slower or stagnant.

During the time the earthquake struck, the younger cohorts were mostly students and were dependent on their parents. The older cohorts during the time of the earthquake were near retiring age (65 years old), lost their houses and were left with the burden of having to pay their mortgage and rebuilding their houses.

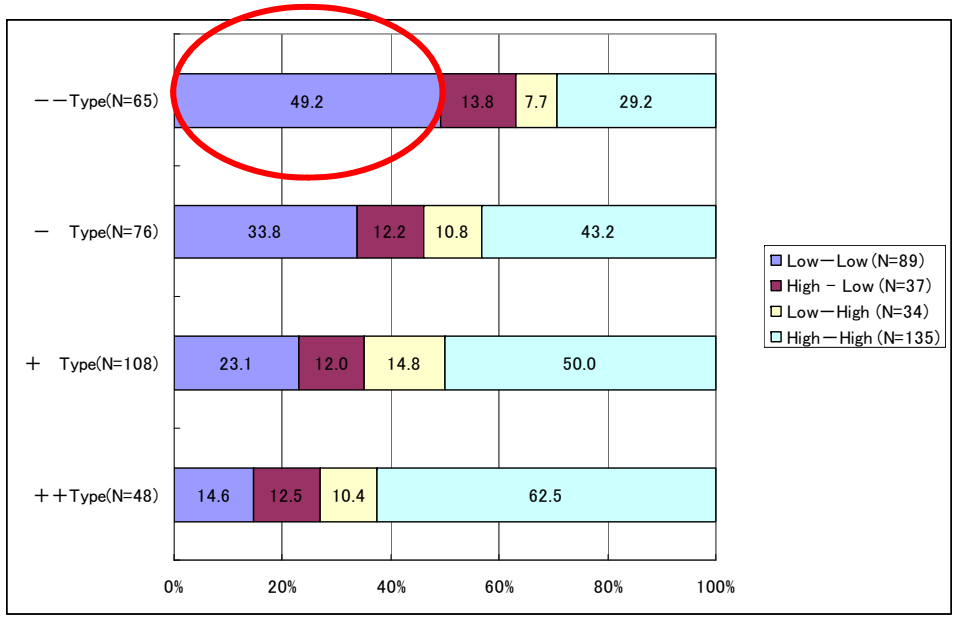
Housing: Four Life Recovery Patterns by Type of Housing



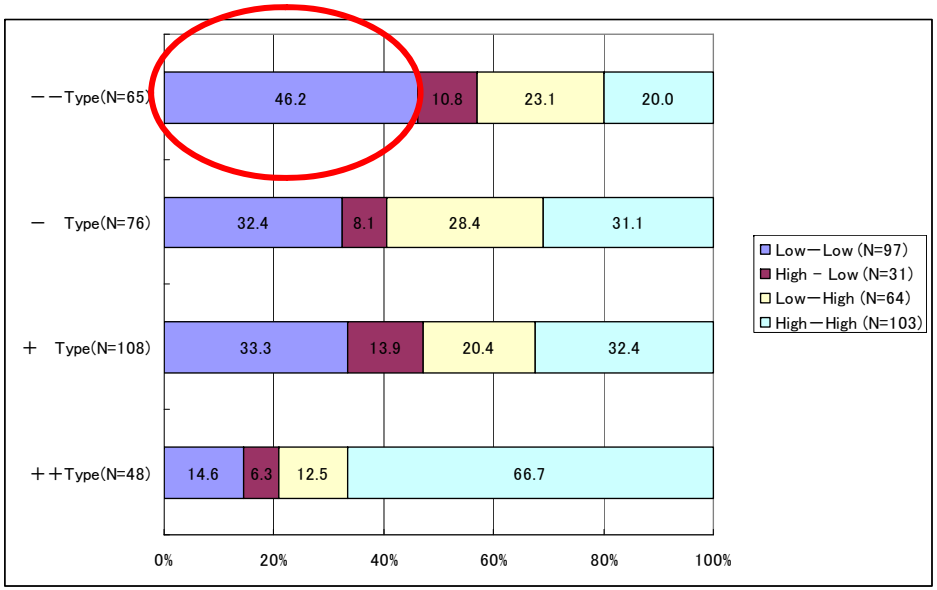
A lot of the survivors who are living in public housing belong to the - - Type, one main reason is that those who reside in public housing are also on a low income.

Those who own their own house and own land belong to the ++Type pattern.

Social Ties



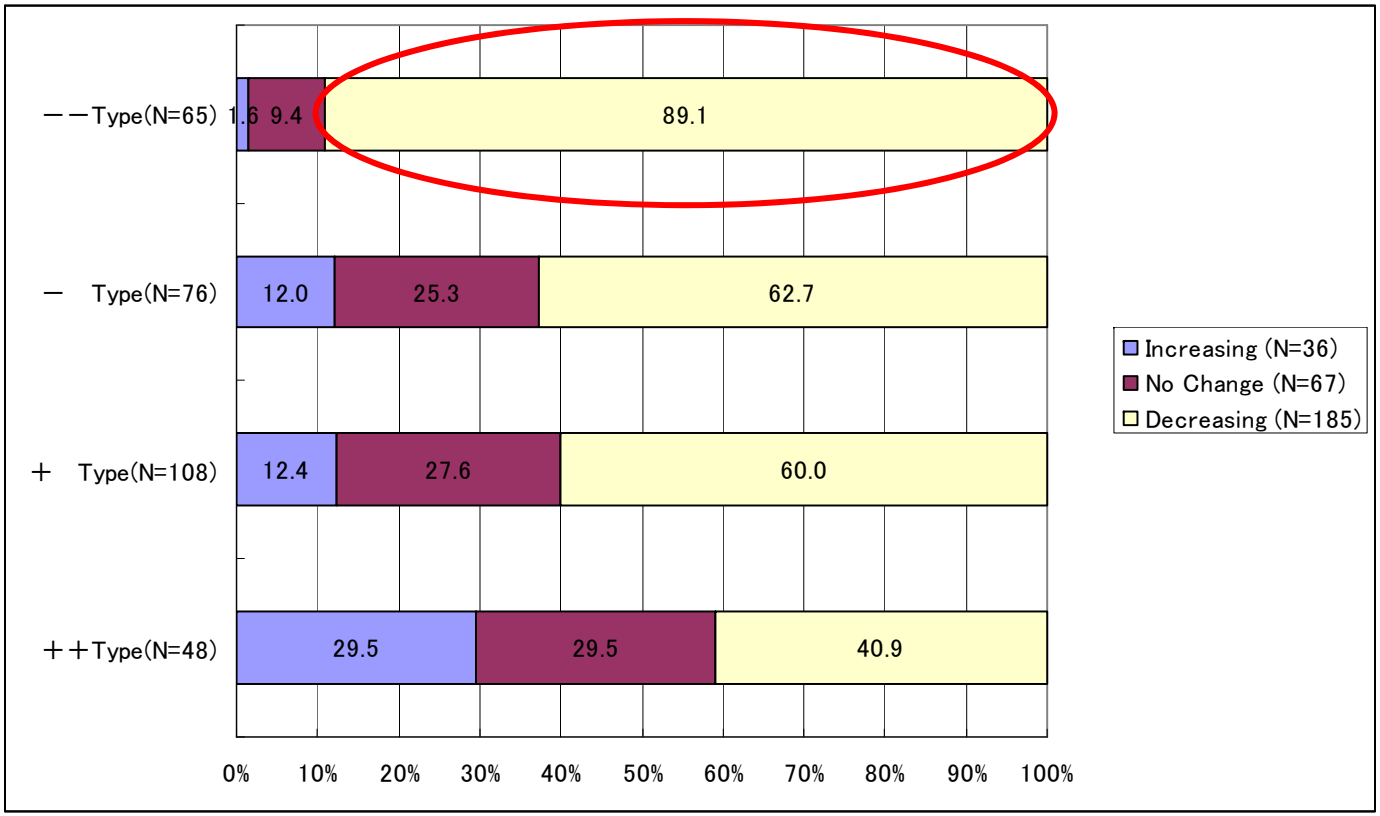
Four Life Recovery Patterns by Civic Mindedness



Four Life Recovery Patterns by Social Trust

Respondents with weak social ties belong to the - - Type group having low civic-mindedness or low social trust while those who belong to the + + Type group have strong social ties. This clearly shows that social ties have a strong effect on the respondents' recovery.

Economic/Financial Situation



Four Life Recovery Patterns by Household Income (2005)

The household income of the survivor is a major factor for economic recovery therefore, those with a low household income and declining household income since the earthquake struck tended to belong to the - - Type group.

Factors related to“- -Type ”

- **Demography**
  - Mostly male
  - 50～64years old during the earthquake.
- **Damage**
  - had personal damage at the earthquake.
  - had severe household goods damage
- **The seven critical elements of life recovery**

1) Housing：living in public housing

2) Social ties：low social ties

3) Community Rebuilding：low urban commons awareness

4) Mind and Body：highly stressed

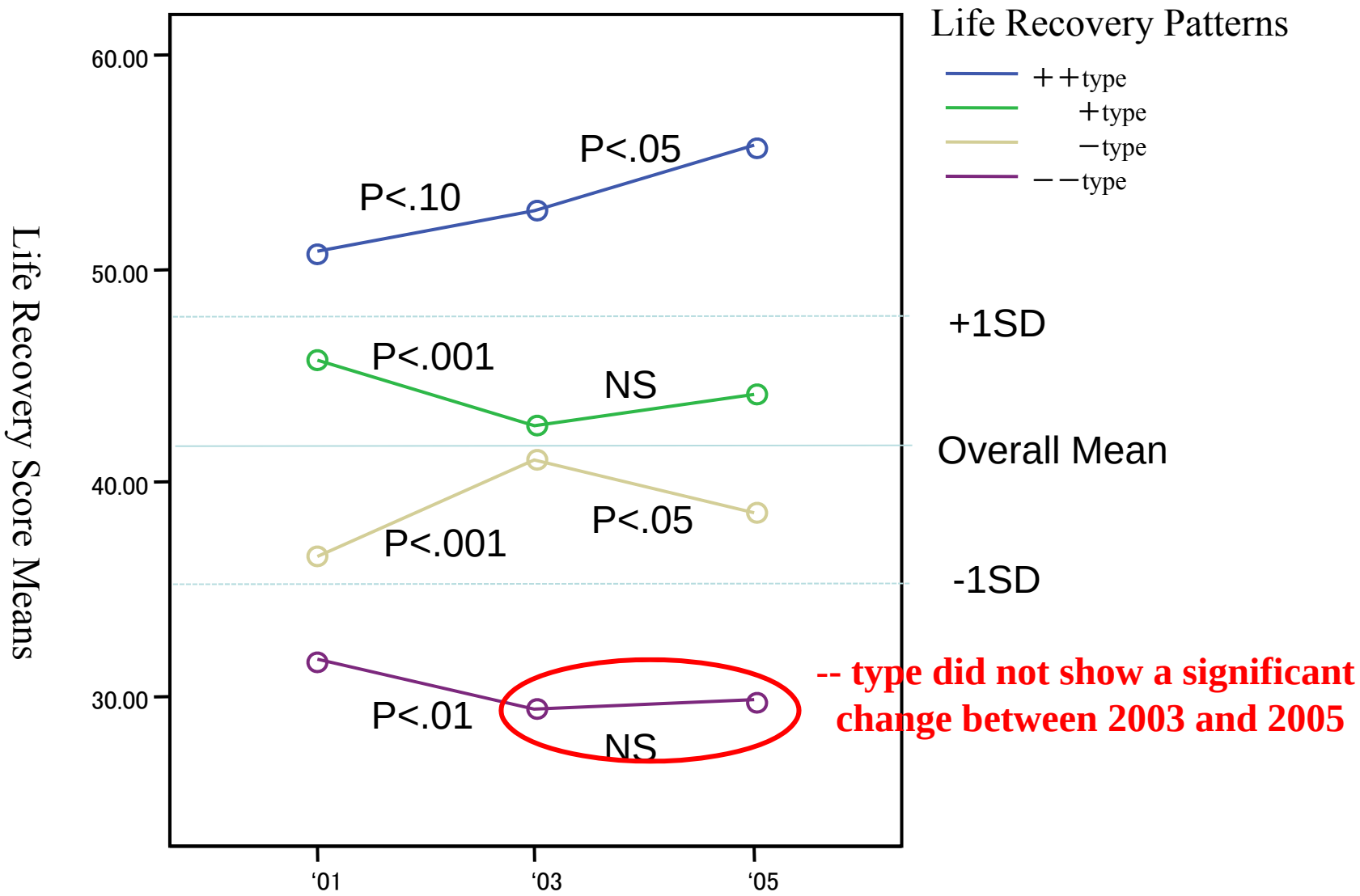
5) Economic/Financial Situation：

Engaged in small business

Shops/Offices were damaged by the earthquake.

Low and decreasing income

Repeated Measure Tests for Each Recovery Pattern



Within-Subject (Repeated Measure) ANOVA Results

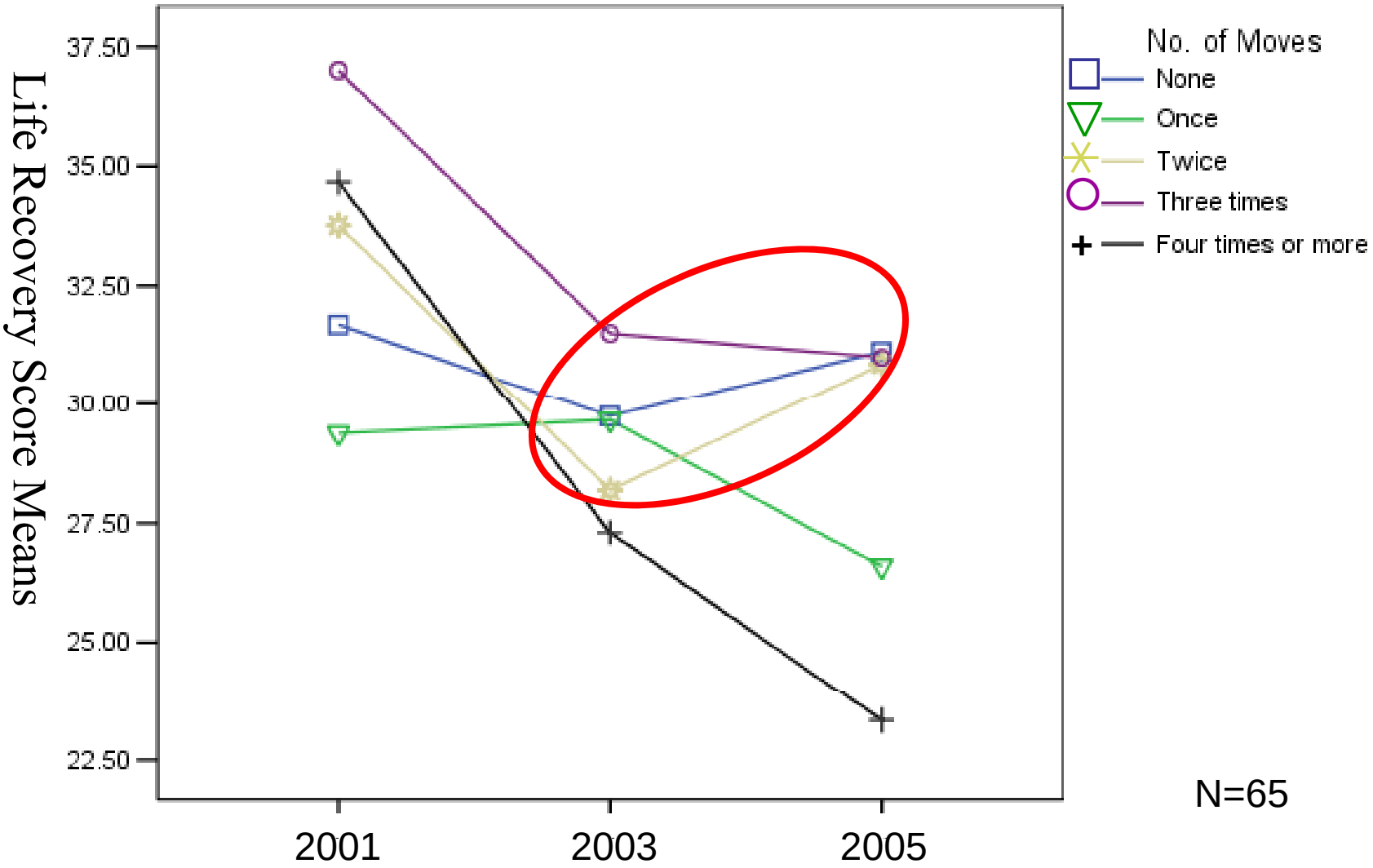
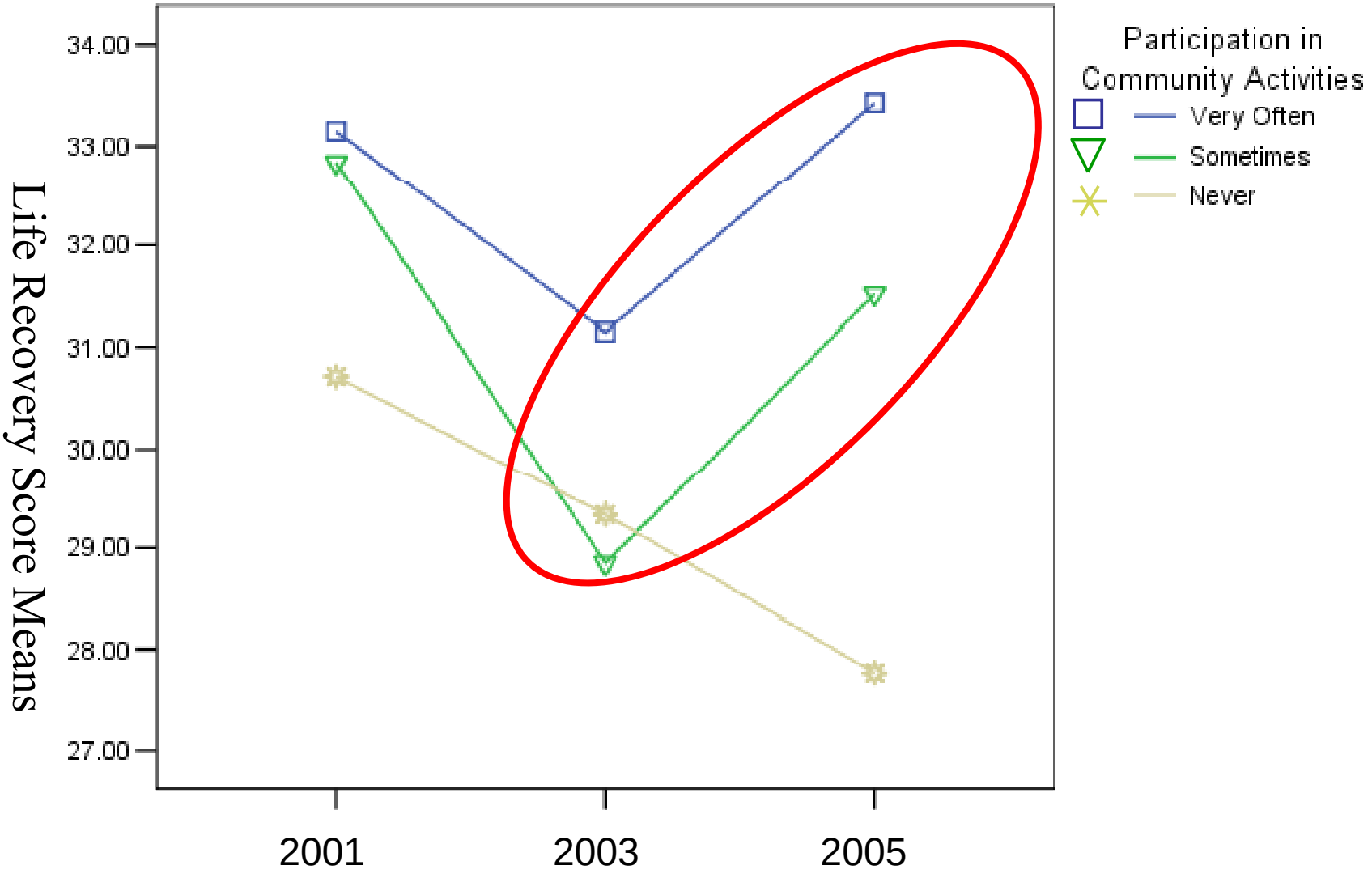


Figure 15: Number of relocations and changes in life recovery scores among "- -" type respondents



N=65

Figure 16: Participation in community activities & changes in life recovery scores among "- -" type respondents

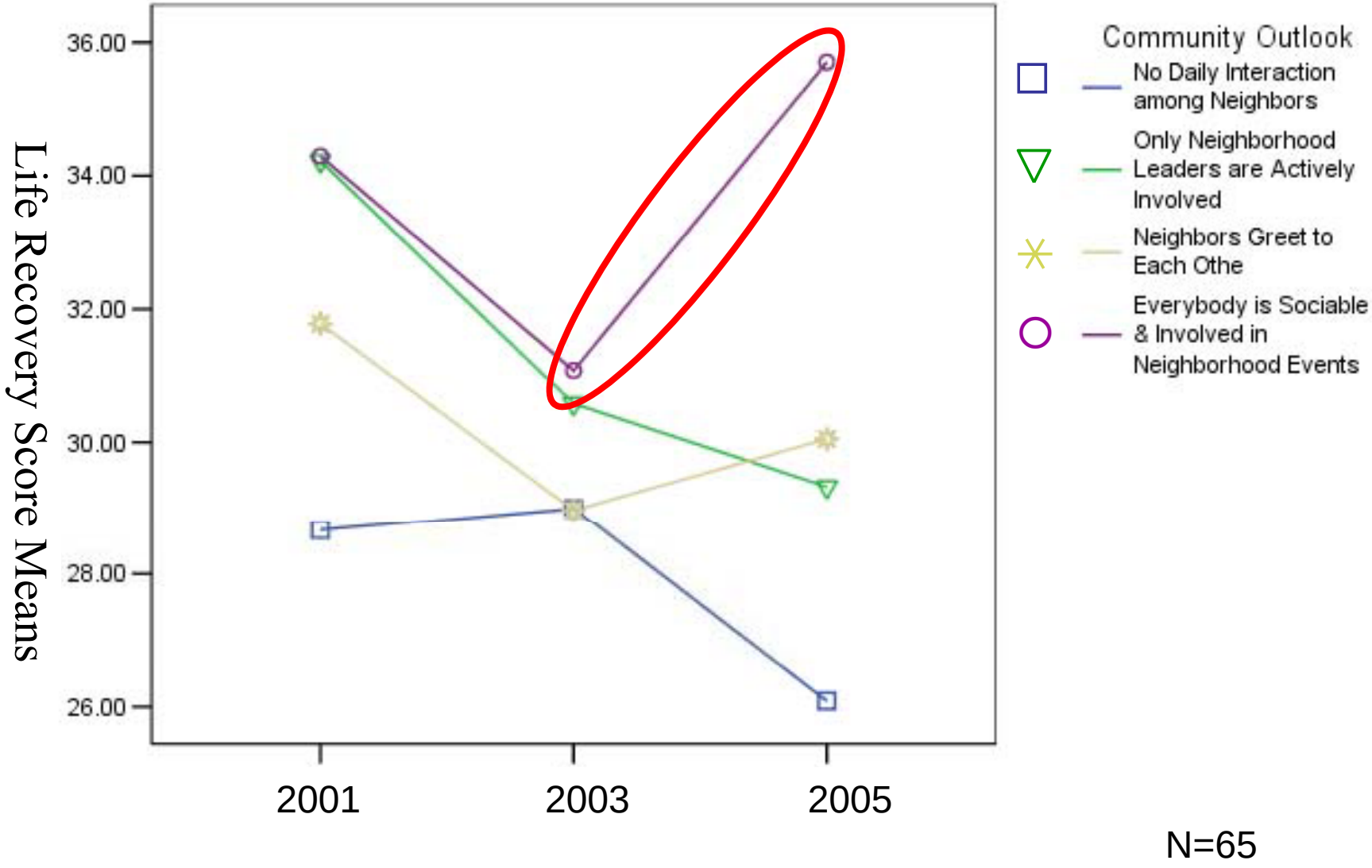
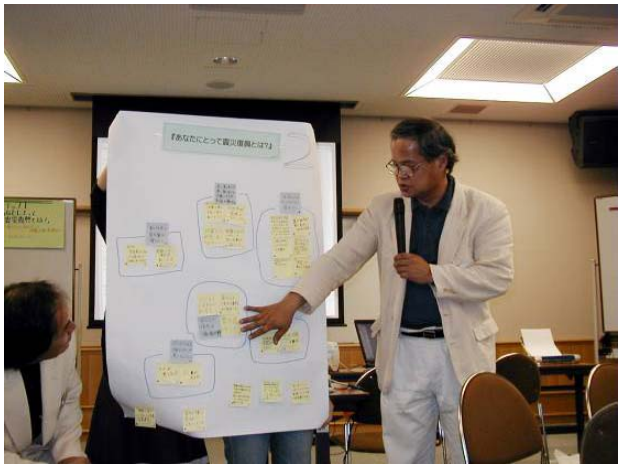
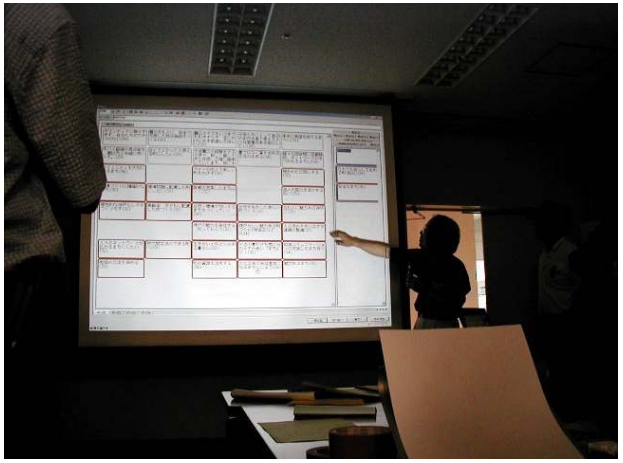


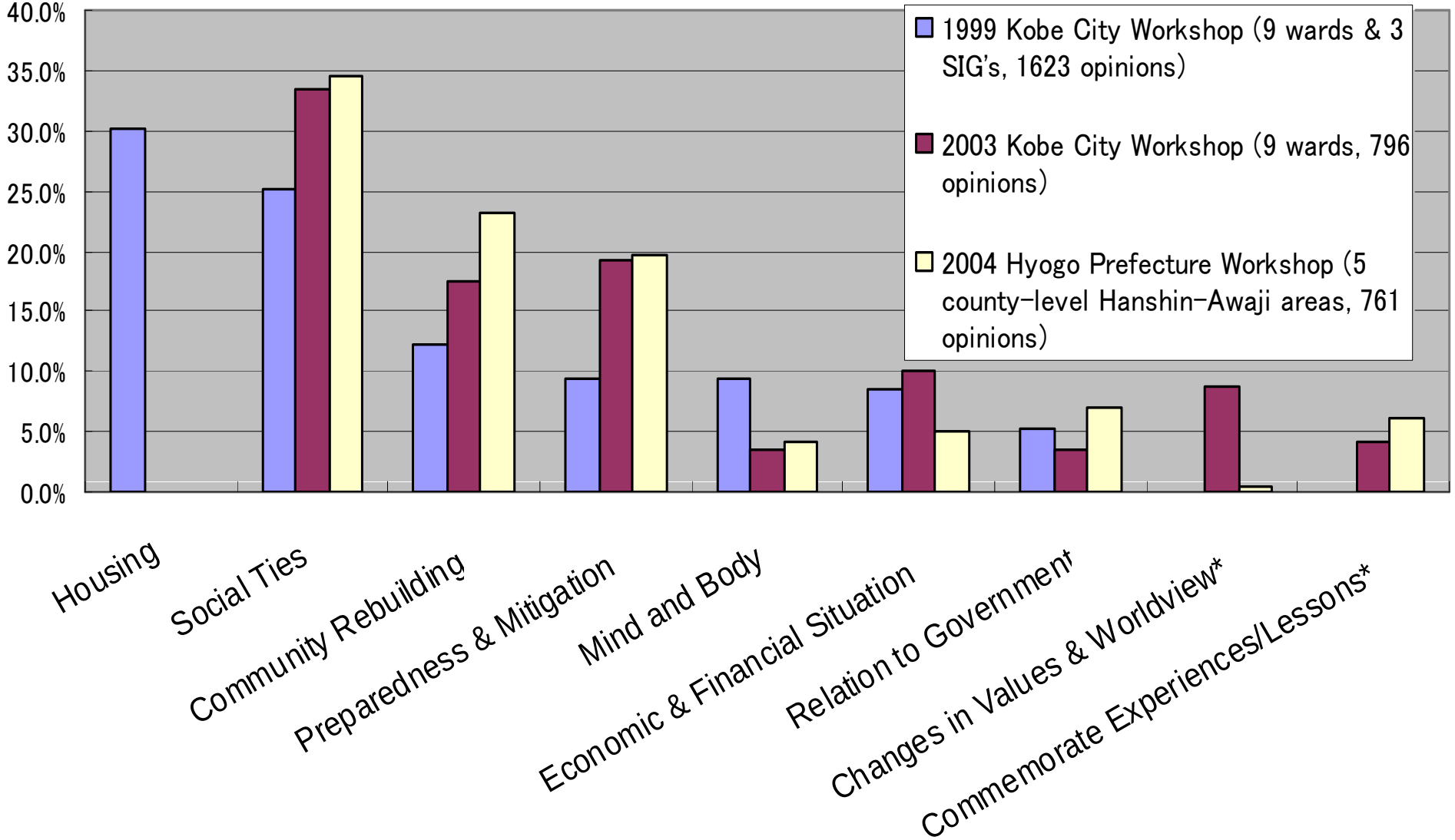
Figure 17: Community outlook & changes in life recovery scores among "- -" type respondents



The 2003/2004 Grass-root Assessment Workshops on Life Recovery(10 years after EQ)



Proportion of Life Recovery Categories in 1999, 2003 and 2004 Workshops



Tatsuki, S. (2007) Long-term Life Recovery Processes Among Survivors of the 1995 Kobe Earthquake: 1999, 2001, 2003, and 2005 Life Recovery Social Survey Results, Journal of Disaster Research, Vol.2 No.6, pp.484-501.

Two Major references

- Tatsuki, S. (2007) Long-term Life Recovery Processes among Survivors of the 1995 Kobe Earthquake: 1999, 2001, 2003, and 2005 Life Recovery Social Survey Results, Journal of Disaster Research, Vol.2 No.6, pp.484-501. http://www.fujipress.jp/finder/xslt.php?mode=present&inputfile=DSSTR000200060007.xml

- Kuromiya, A., Tatsuki, S., Hayashi, H., Noda, T., Tamura, & K., Kimura, R.(2006) Four Recovery Patterns from the Hanshin-Awaji Earthquake: Using the 2001-2003-2005 Panel Data, Journal of Natural Disaster Science, Vol.28, No. 2, pp.43-60. http://ci.nii.ac.jp/naid/110006987196