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

Measures
Life Recovery, SCEM, Damage, & Demographic Variables

Sampling Areas & Subjects
1999 Survey
Seismic Intensity JMA 7 and/or City Gas Supply Disrupted for more than 2 mo. (250 areas)
Head of Household

'01, '03, & '05 Surveys
The 1999 Survey Areas (250 areas) + West & North Words of Kobe (80 areas)
Both Men & Women 20 Yr. +

Methods
Stratified Two-Stage Random Sampling

Population
The 1995 Kobe EQ Survivors

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

Public (Gov’t)

Public Interest

Private

Private Interest

Public (Gov’t)

Public Interests

Civil Society

Private

(Private Interests)
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

Low
High

Low
High
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

<table>
<thead>
<tr>
<th>Recovery Element</th>
<th>Number of Cards</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>489</td>
<td>(30.1%)</td>
</tr>
<tr>
<td>Social Ties</td>
<td>407</td>
<td>(25.1%)</td>
</tr>
<tr>
<td>Community Rebuilding</td>
<td>197</td>
<td>(12.1%)</td>
</tr>
<tr>
<td>Physical &amp; Mental Health</td>
<td>154</td>
<td>(9.5%)</td>
</tr>
<tr>
<td>Mitigation/Preparedness</td>
<td>154</td>
<td>(9.5%)</td>
</tr>
<tr>
<td>Economic &amp; Financial Situations</td>
<td>138</td>
<td>(8.5%)</td>
</tr>
<tr>
<td>Relation to Government</td>
<td>84</td>
<td>(5.2%)</td>
</tr>
</tbody>
</table>

N = 1623 Statements
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

<table>
<thead>
<tr>
<th>Variables/Factors</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Acceptance/Satisfaction of the current housing condition</td>
</tr>
<tr>
<td>Social Ties</td>
<td>Self-Governance, Community Solidarity, Community Participation, Family Cohesion &amp; Adaptability</td>
</tr>
<tr>
<td>Townscape</td>
<td>Awareness of Urban Commons</td>
</tr>
<tr>
<td>Preparedness</td>
<td>Awareness/Preparedness for the next major earthquake</td>
</tr>
<tr>
<td>Physical &amp; Mental Health</td>
<td>Physical and Mental stress symptom checklist</td>
</tr>
<tr>
<td>Economic &amp; Financial Situation</td>
<td>Increase/decrease in household income, expenditure, and savings</td>
</tr>
<tr>
<td>Relation to Government</td>
<td>Paternalistic, liberal, &amp; communitarian views of government</td>
</tr>
<tr>
<td>Life Recovery</td>
<td>Life satisfaction, Life fulfillment(QOL in daily activity), Future prospect</td>
</tr>
<tr>
<td>Social Desirability</td>
<td>MMPI lie scale</td>
</tr>
</tbody>
</table>
Table 2. The 2001 life recovery survey general linear model analysis results

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>Type III SS</th>
<th>df</th>
<th>MS</th>
<th>F value</th>
<th>p</th>
<th>partial (\eta^2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>702.311</td>
<td>293</td>
<td>2.397</td>
<td>4.360</td>
<td>***</td>
<td>0.584</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.000</td>
<td>1</td>
<td>0.000</td>
<td>0.001</td>
<td>n.s.</td>
<td>0.000</td>
</tr>
<tr>
<td>Damage</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House Damage</td>
<td>0.955</td>
<td>3</td>
<td>0.318</td>
<td>0.579</td>
<td>n.s.</td>
<td>0.002</td>
</tr>
<tr>
<td>Furniture Damage</td>
<td>2.116</td>
<td>9</td>
<td>0.235</td>
<td>0.428</td>
<td>n.s.</td>
<td>0.004</td>
</tr>
<tr>
<td>Economic Damage</td>
<td>2.736</td>
<td>4</td>
<td>0.684</td>
<td>1.244</td>
<td>n.s.</td>
<td>0.005</td>
</tr>
<tr>
<td>Demography</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locality</td>
<td>7.817</td>
<td>16</td>
<td>0.489</td>
<td>0.889</td>
<td>n.s.</td>
<td>0.015</td>
</tr>
<tr>
<td>Locality*Economic Damage</td>
<td>81.829</td>
<td>119</td>
<td>0.688</td>
<td>1.251</td>
<td>**</td>
<td>0.141</td>
</tr>
<tr>
<td>Sex</td>
<td>0.984</td>
<td>1</td>
<td>0.984</td>
<td>1.790</td>
<td>n.s.</td>
<td>0.002</td>
</tr>
<tr>
<td>Generation</td>
<td>15.848</td>
<td>2</td>
<td>7.924</td>
<td>14.15</td>
<td>***</td>
<td>0.031</td>
</tr>
<tr>
<td>Occupation</td>
<td>16.149</td>
<td>9</td>
<td>1.794</td>
<td>3.264</td>
<td>***</td>
<td>0.031</td>
</tr>
<tr>
<td>House Damage*Sex</td>
<td>4.222</td>
<td>3</td>
<td>1.407</td>
<td>2.560</td>
<td>*</td>
<td>0.008</td>
</tr>
<tr>
<td>House Damage<em>Generation</em>Occupation</td>
<td>69.058</td>
<td>86</td>
<td>0.803</td>
<td>1.461</td>
<td>***</td>
<td>0.121</td>
</tr>
</tbody>
</table>

① Housing
- Relocation Experience | 2.332 | 1 | 2.332 | 4.242 | * | 0.005 |

② Social 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 |

③ Community Rebuilding
- Urban Common.s. | 2.025 | 1 | 2.025 | 3.684 | * | 0.004 |

④ Physical 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 |

⑤ Preparedness
- Future Earthquake Damage | 3.581 | 1 | 3.581 | 6.515 | *** | 0.007 |

⑥ Economic/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 |

⑦ Relation 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

House Damage \textit{BY} Generation

House Damage \textit{BY} Occupation

Generation \textit{BY} Occupation

Gender

House Damage \textit{BY} Generation

House Damage \textit{BY} Occupation

Generation \textit{BY} Occupation

Settled-ness

Self-Governance

Community Solidarity

Community Participation

Family Cohesion

Family Adaptability

Local Commons

Physical Stress

Mental Stress

Household Saving

Preparedness

Communitarianism

Social Desirability

\( P < .0001 \)

\( P < .005 \)

\( P < .05 \)

\( P < .10 \)

\( P < .20 \)
Comparisons of Adjusted R-Squared among the General Linear Models

Adjusted R squared

1. Housing Damage Model
2. Economic Damage Model
3. Demography Model
4. Models 1 to 3
5. Models 1 to 3 plus Interaction
6. SCEM Alone
7. Models 5 & SCEM
The integrated model accounted for 58.4% of the total variance of Life Recovery.
Anomie

Low Self-Governance

Conformism

Civic-Mindedness Scale

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

- Do not tell a lie
- I try to keep my word
- Always want my conduct to be something that my children would feel proud
- Do not do to others what I do not wish them to do to me
- Collaborate with everyone to solve problems
- Hardship is a challenge that help me grow in the future
- Initiate conversations with neighbors
- Do not initiate conversations with neighbors
- Someone else will solve problems
- I avoid hardship
- Wish good luck
- Continues
- Nobody helps solve one’s problem
- My needs come always first
- Lies are necessary sometimes
- Sometimes I do not keep my word
- Do not wish to show my conduct to my children

Egoism

Civic-Mindedness Scale

High Self-Governance

High Solidarity
Relationship between Civic-Mindedness and Life Recovery

Hyogo Life Recovery Survey (N=1,203, Jan. 2001)
Relating-to-Government Scale

- **Laissez-faire**
  - ▲ I’ll leave when things fall apart
  - ■ Take care of yourself in a disaster
    - ● Civic engagement should be voluntary
  - ◆ Sorting garbage is each individual’s responsibility

- **Paternalist**
  - ■ Government will take care of me in a disaster
    - ▲ Government will take care of community development
  - ◆ We’ll ask city hall to enforce garbage rules
    - ● Government should guide civic activities

- **Communitarian**
  - ■ We neighbors will help in a disaster
    - ▲ Community members decide the future of our community
  - ◆ We’ll recruit garbage volunteers to enforce the rules
  - ● Civic engagement is our duty

Hyogo Life Recovery Survey (N=1,203, Jan. 2001)
Relation-to-Government and Life Recovery

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

Laissez-faire

Paternalist

Take care of yourself in a disaster
Government will take care of me in a disaster
Civic engagement should be voluntary
Government should guide civic activities
We'll recruit garbage volunteers to enforce the rules

I'll leave when things fall apart
Sorting garbage is each individual's responsibility
We'll recruit garbage volunteers to enforce the rules
We neighbors will help in a disaster
Community members decide the future of our community
Civic engagement is our duty

Paternalist

Laissez-faire

Communitarian

Life Recovery

Civic engagement should be voluntary
Government should guide civic activities
We'll recruit garbage volunteers to enforce the rules
We neighbors will help in a disaster
Community members decide the future of our community
Civic engagement is our duty
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

Exogenous Factors
- Damage Factors
- Dmgrphc. Factors
- Socio-Economic Factors

Life Recovery Process (Life Change Appraisal)
- Event Impact
- Event Evaluation

Endogenous Factors

Outcome
- Life Satisfaction
- Life Fulfillment
- Future Prospect
Table 7: The 2003 study second-order factor analysis results of 5 factors (promax rotation)

<table>
<thead>
<tr>
<th>First-order Factors</th>
<th>Event Evaluation</th>
<th>Event Impact</th>
<th>Communality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Struggle for Meaning</td>
<td>0.789</td>
<td>0.055</td>
<td>0.629</td>
</tr>
<tr>
<td>Life Change Direction</td>
<td>0.784</td>
<td>0.015</td>
<td>0.617</td>
</tr>
<tr>
<td>Retreat</td>
<td>-0.534</td>
<td>0.474</td>
<td>0.493</td>
</tr>
<tr>
<td>Sense of Life Change</td>
<td>0.267</td>
<td>0.740</td>
<td>0.633</td>
</tr>
<tr>
<td>Return to Normalcy</td>
<td>0.150</td>
<td>-0.668</td>
<td>0.463</td>
</tr>
<tr>
<td><strong>Eigenvalues</strong></td>
<td><strong>1.621</strong></td>
<td><strong>1.214</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Variance Accounted For (%)</strong></td>
<td><strong>32.4%</strong></td>
<td><strong>24.3%</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 8: The 2005 study second-order factor analysis results of 5 factors (promax rotation)

<table>
<thead>
<tr>
<th>First-order Factors</th>
<th>Event Evaluation</th>
<th>Event Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Struggle for Meaning</td>
<td>0.803</td>
<td>-0.102</td>
</tr>
<tr>
<td>Life Change Directon</td>
<td>0.632</td>
<td>-0.418</td>
</tr>
<tr>
<td>Sense of Life Change</td>
<td>0.629</td>
<td>0.620</td>
</tr>
<tr>
<td>Return to Normalcy</td>
<td>0.089</td>
<td>-0.682</td>
</tr>
<tr>
<td>Retreat</td>
<td>-0.165</td>
<td>0.628</td>
</tr>
<tr>
<td>Eigenvalues</td>
<td>1.611</td>
<td>1.302</td>
</tr>
<tr>
<td>Variance Accounted For (%)</td>
<td>32.2%</td>
<td>26.0%</td>
</tr>
</tbody>
</table>
Figure 8: The final SEM life recovery model for the 2003 study data
Community Empowerment

Active Citizenship
③Preparedness
⑦Rltn to Gov.

Encounter To Sig. Other

Event Evaluation

①Housing
⑥Income
④Stress Manag’t

Life Recovery Process

Life Recovery

②Social Ties

Community Rebuilding

Event Impact Stabilization

EQ Damage

Damage Alleviation

Impact Stabilization/Alleviation through improvements in
①housing, ②stress mngmnt. & ③household fincance

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)
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


![Graph showing recovery scores over time with data points for 2001, 2003, and 2005.](image)

- 2001 (N=297) Mean 40.6 SD 8.70
- 2003 (N=297) Mean 39.9 SD 9.62
- 2005 (N=297) Mean 41.2 SD 9.87

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

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>297</td>
<td>40.6</td>
<td>8.70</td>
</tr>
<tr>
<td>2003</td>
<td>297</td>
<td>39.9</td>
<td>9.62</td>
</tr>
<tr>
<td>2005</td>
<td>297</td>
<td>41.2</td>
<td>9.87</td>
</tr>
</tbody>
</table>

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

N = 297
Life Recovery Panel Survey (2001·2003·2005) Results

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
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<td>2001</td>
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<td>2005</td>
<td>297</td>
<td>41.2</td>
<td>9.87</td>
</tr>
</tbody>
</table>

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

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

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
  – 50～64 years 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

Life Recovery Patterns

- **++ type**
- **+ type**
- **- type**
- **-- type**

Overall Mean

- **+1SD**
- **-1SD**

-- type did not show a significant change between 2003 and 2005
Figure 15: Number of relocations and changes in life recovery scores among “- -” type respondents
Figure 16: Participation in community activities & changes in life recovery scores among “- -” type respondents

N=65
Figure 17: Community outlook & changes in life recovery scores among “- -” type respondents

N=65
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

- 1999 Kobe City Workshop (9 wards & 3 SIG’s, 1623 opinions)
- 2003 Kobe City Workshop (9 wards, 796 opinions)
- 2004 Hyogo Prefecture Workshop (5 county-level Hanshin-Awaji areas, 761 opinions)

Two Major references
