

APRU Multi-Hazards (MH) Summer School
18-21 July 2017 at IRIDeS, Tohoku University

Eight Personal Characteristics Associated with
the **Power to Live** with Disasters
as Indicated by Survivors of
the 2011 Great East Japan Earthquake Disaster

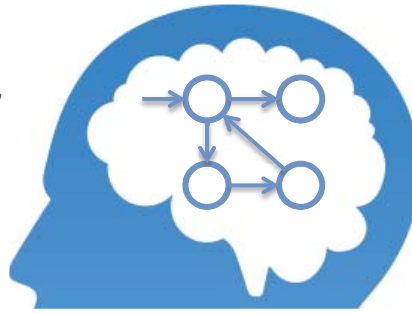
Motoaki Sugiura
Tohoku University

Cognitive Neuroscience



Why I'm in disaster science?

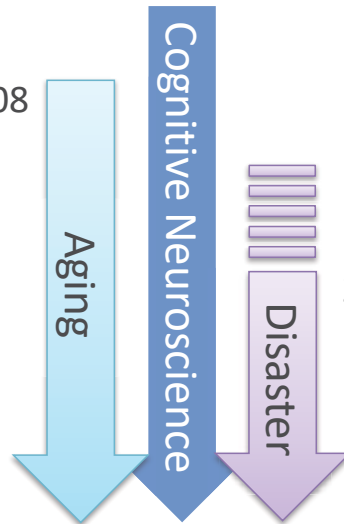
Institute of Development,
Aging and Cancer



International Research
Institute of **Disaster** Science

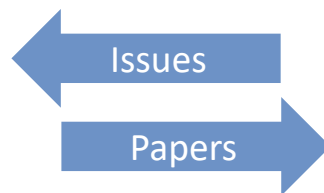


2008

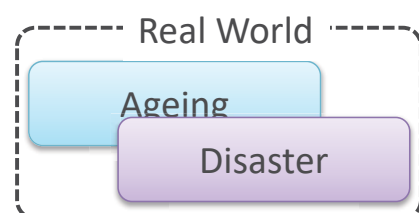
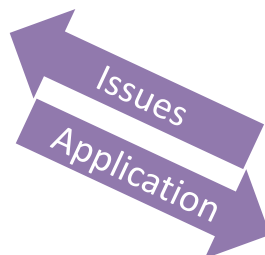


2012

Why I'm in disaster science?



Literature

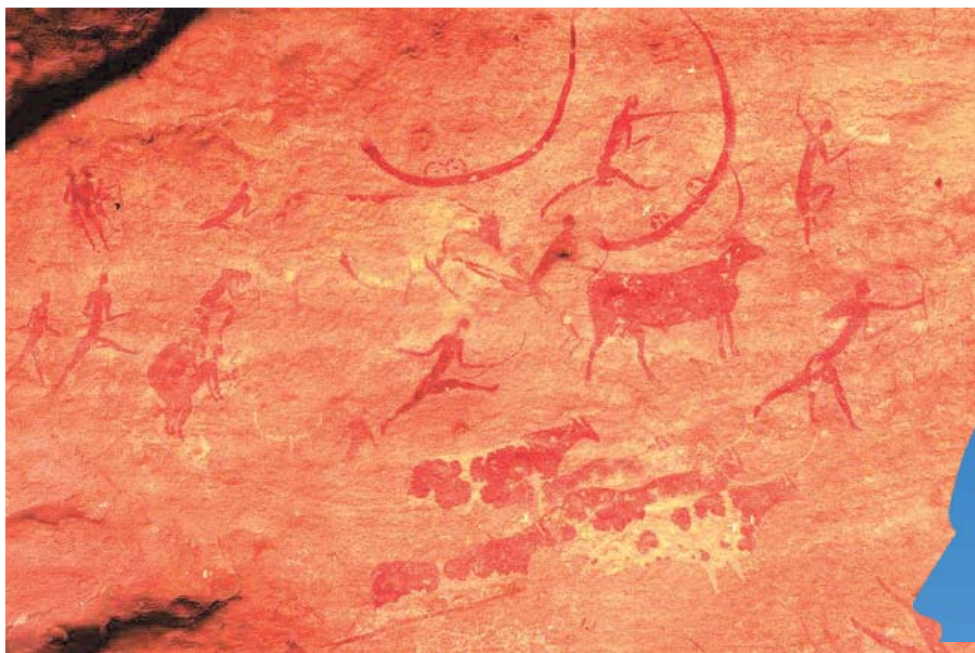


Outline

- **Power to live** with disasters
 - What is it and how was it built?
 - Educational Implications
- Cognitive science approach
 - Purpose & Application
 - Three examples

Power to live with disasters

- Environment-adaptive personal characteristics



Power to live with disasters

- Environment-adaptive personal characteristics
 - Zest for living (MEXT, Japan, 1996; 2011)
 - *Solid academic prowess*
 - *Healthy body*
 - *Well-rounded character*
 - Survivor personality (Al Siebert, 2008)
 - *Playful curiosity; Flexibility; Synergy imperative*
 - *Not a good child*
 - *Strong 'self'*
 - **Towards empirical approach**
 - Model construction in an **objective** way
 - **Measurement** tool

2011 Great East Japan Earthquake Disaster



- Some personal characteristics have advantages
 - personality trait, way of thinking, habit...
- **Power to live** => **Inventory construction!**
 - Model construction in an **objective** way
 - **Measurement** tool

Power to live with disasters

- Inventory construction

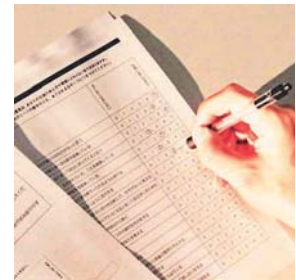
- Collection of items

- Interview with survivors (2012; n=78)
- Disaster experience and opinion about power to live
- Summarized into 40 items



- Factor analysis & validation

- Questionnaire survey (2013; n=1412)
- Self-descriptiveness on the 40 items
 - > Factor analysis (8 factors)
- Self-rating on disaster related-behavior (160 items)
 - > validation (5 items so far)



Factor analysis & validation

- Factor analysis

- Identify latent factors behind the items

	😊	😊	😊
Item1	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
Item2	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
Item3	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
Item4	0 1 2 3 4 5	0 1 2 3 4 5	0 1 2 3 4 5
Factor score	5 2	0 1	2 5

Factor 1

Factor 2

- Labeling / interpretation of each factor

- Based on the items included

- Validation of each factor

- Correlation of factor scores with external indices

Labeling / interpretation

- Factor 2:
 - When I am fretting about what I should do, I compare several alternative actions.
 - Before taking action, I think of a plan and the order of priority.
 - When talking to someone, I think about that person's personality, wishes, and abilities and choose an appropriate attitude and words accordingly.
 - The more agitated the people around me become, the calmer I somehow become.
 - In order to resolve a problem, I first of all initiate action.

F2 Problem solving

Labeling / interpretation

- Factor 4:
 - I am stubborn and always get my own way.
 - I unhesitatingly say whatever it is I want to say.
 - I clearly distinguish between black and white: what's good is good, and what's bad is bad.
 - I hate losing.
 - I am highly motivated with regard to things that I like or want to do.

F4 Stubbornness

Labeling / interpretation

- Factor 6:
 - During difficult times, I endeavor not to brood.
 - During difficult times, I endeavor to think positively, telling myself that this experience will benefit me in the future.
 - During difficult times, I compare myself with the situation around me and in society, and I think that matters cannot be helped.
 - When something happens, I try to stay calm and not panic.

F6 Emotional regulation

Power to live with disasters

- Labeling / interpretation of each factor
 - Based on the items included

F1 Leadership

F2 Problem solving

F3 Altruism

F4 Stubbornness

F5 Etiquette

F6 Emotional regulation

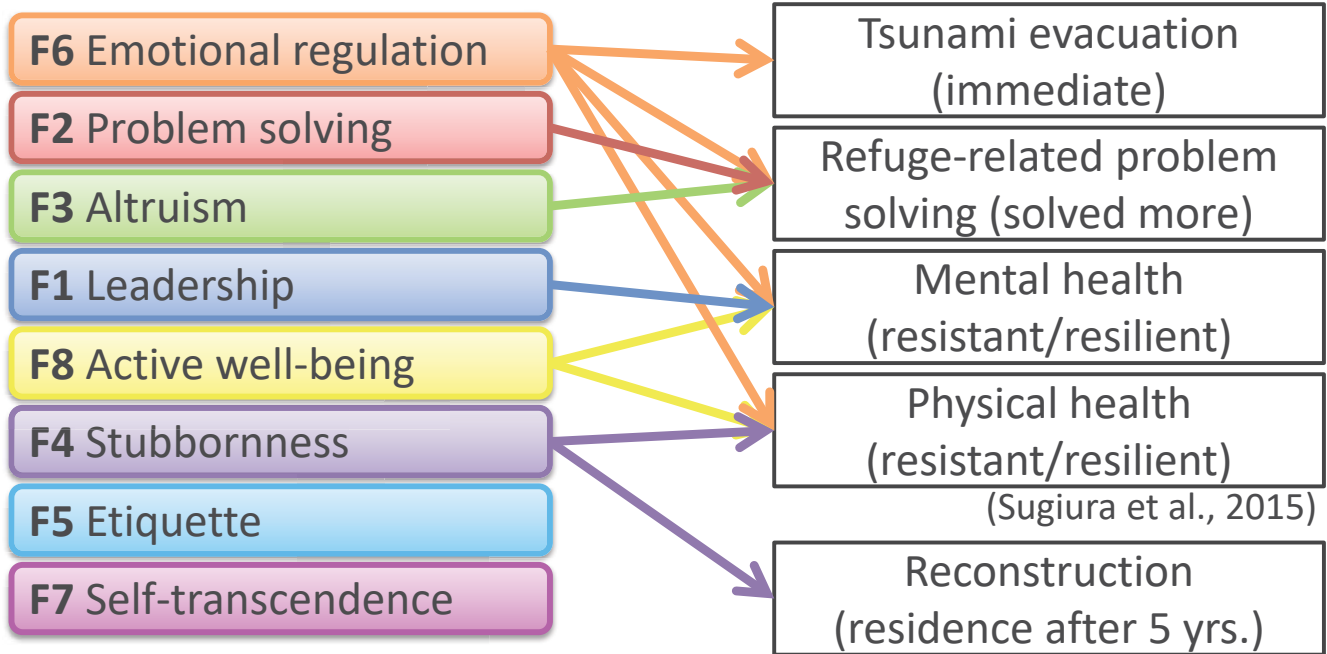
F7 Self-transcendence

F8 Active well-being

(See Appendix for the list of items)

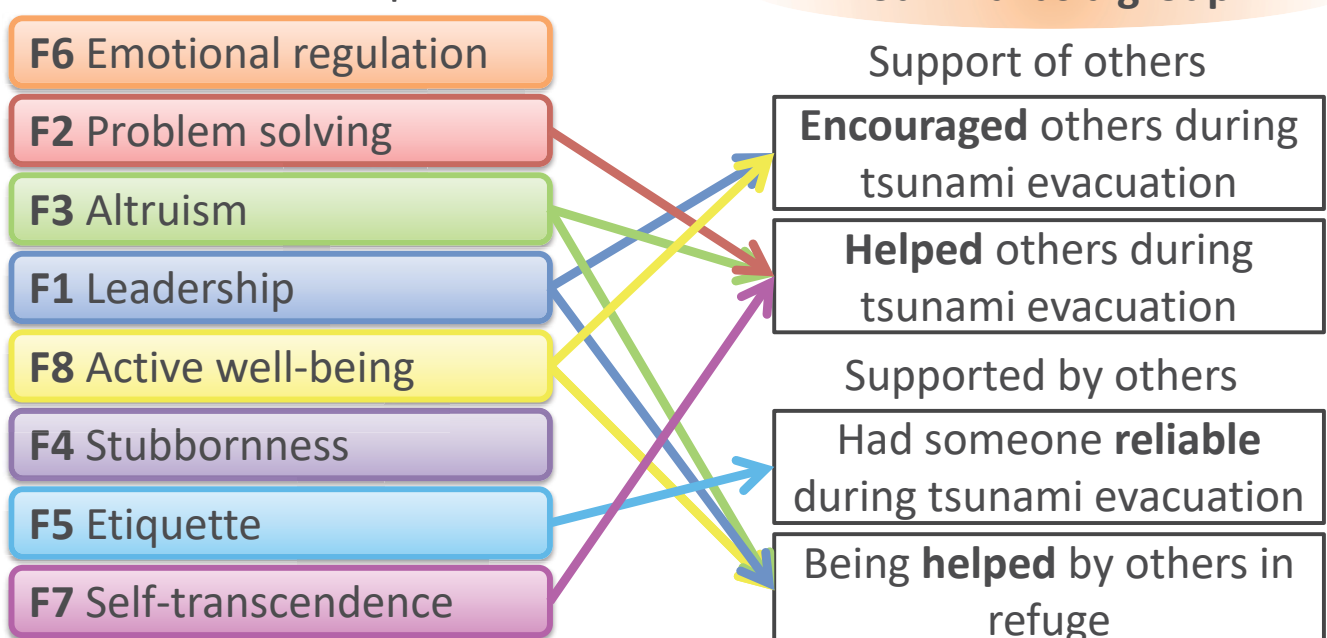
Validation of the factors

- Contribution to behaviors/experiences in Disaster
– Context dependent!



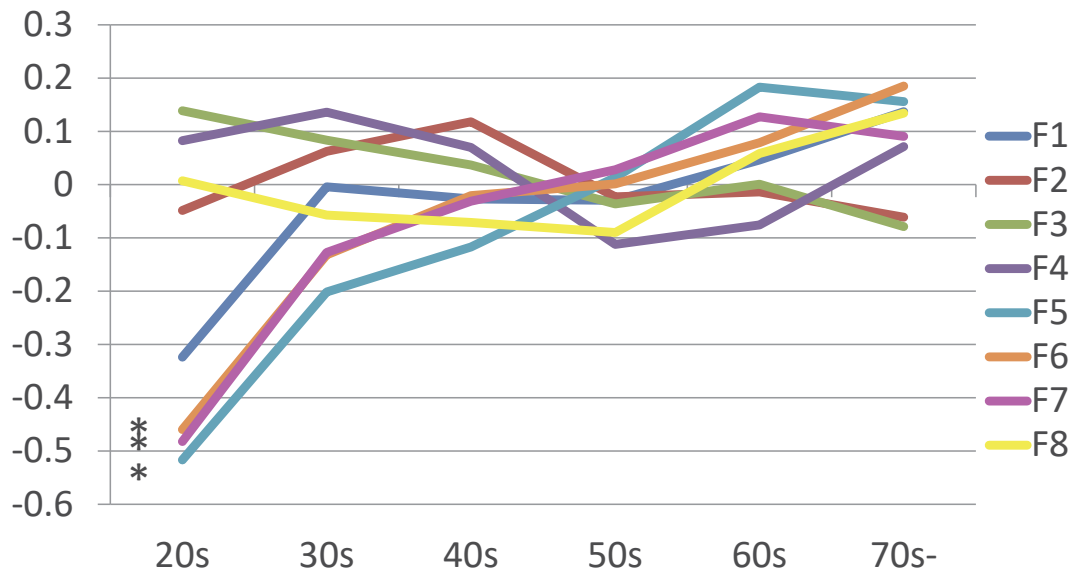
Validation of the factors

- Contribution to behaviors/experiences in Disaster
– Context dependent!



Validation of the factors

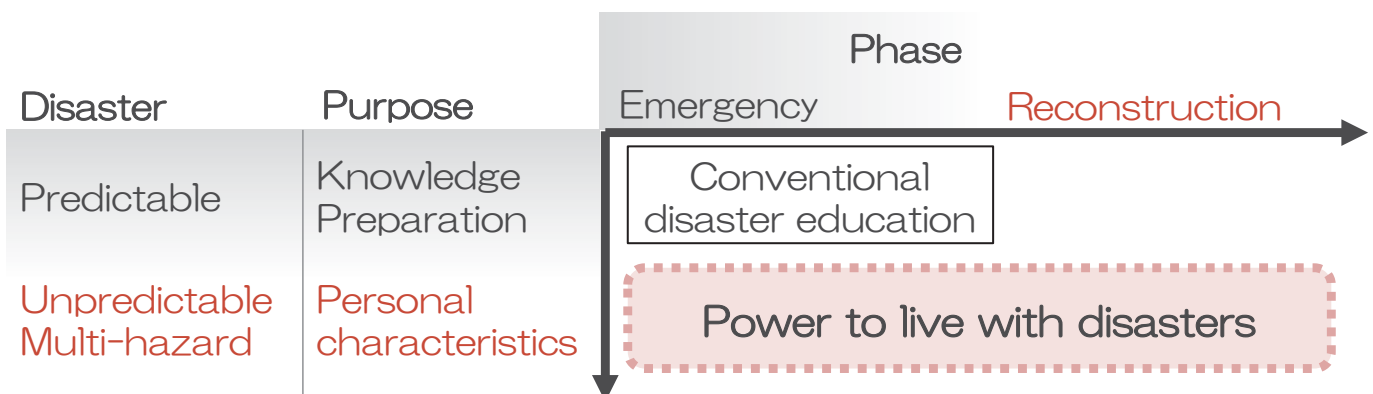
- Age-related change
 - Different across factors: different educational approach



* : $p < .05$ (F-test, Bonfferoni corrected)

Power to live with disasters

- Educational Implications
 - 1) A new framework of the disaster education
 - Difference from conventional framework \neq Advantage
 - For unpredictable, multi-hazard disasters
 - For personal characteristics
 - Including the reconstruction phase



Power to live with disasters

- Educational Implications

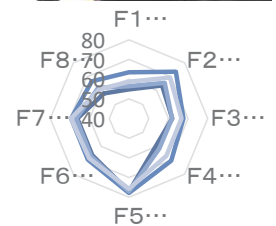
- 2) Evaluation tool

- for education programs

- vs. control group
 - Pre vs. Post

- for students / participants

- Self-evaluation
 - Program contents

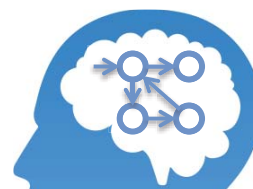


Power to live with disasters

- Educational Implications

- 3) Scientific development of the programs

- Cognitive models
 - Model-based design
 - Experiment
 - Assessment



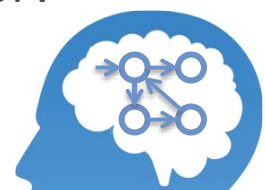
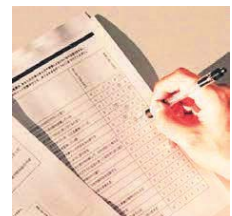
- > basic cognitive science approach

Outline

- Power to live with disasters
 - What is it and how was it built?
 - Educational Implications
- **Cognitive science** approach
 - Purpose & Application
 - Three examples

Cognitive Science Approach

- Purpose
 - **Objective evaluation**
 - Overcome the limitation of self-evaluation survey
 - Bias, causality
 - Development of objective measure
 - Accuracy, reliability
 - For children
 - What **mental process** behind each factor?
 - => Cognitive models
 - Which process is responsible?
 - Conscious/unconscious?
 - Innate/acquired?



Cognitive Science Approach

- Three example experiments
 - Participants
 - University students
 - Task:
 - Target factor
 - Cognitive hypothesis on the factor
 - Measures:
 - 1) Objective measure during the task
 - 2) Power to live inventory (factor score)
 - Analysis:
 - Correlation between 1 & 2

Cognitive Science Approach

- Target: **F2 Problem solving**
 - Contribution to
 - Refuge-related problem solving
 - Cognitive hypothesis
 - Different sensitivity to the **external pressure?**
“The more agitated the people around me become, the calmer I somehow become”
 - Task:
 - Problem solving task with **external pressure**
 - Objective measure:
 - Task completion time
 - One can arbitrary determine the ‘completion’ of the task
 - Typical situation with speed-accuracy trade-off

Cognitive Science Approach

- Target: **F4 Stubbornness**
 - Contribution to
 - Physical health
 - Reconstruction of residence
 - Cognitive hypothesis
 - Future oriented
 - “I am highly motivated with regard to things that I like or want to do”
 - => Smaller **time discount?**
 - Task:
 - Monetary choice from different amount/times

Cognitive Science Approach

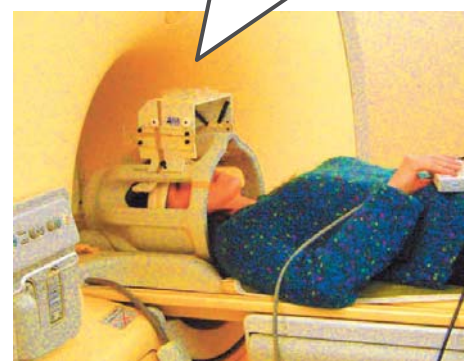
- Target: **F4 Stubbornness**
 - Objective measure
 - Choice rate of higher later options (**B**)
- | | | |
|-----|----------------------------------|-------------------------------------|
| (1) | A: Get \$3,400 this month | B: Get \$3,800 next month |
| (2) | A: Get \$100 now | B: Get \$140 a year later |
| (3) | A: Get \$100 now | B: Get \$110 within 10 years |
- Results:
 - **High F4** participants preferred options **B**
 - Interpretation:
 - F4 indeed reflects the way of thinking
 - Low time discounting
 - => Hope for the future or less anxiety?

Cognitive Science Approach

- Target: **F6 Emotional regulation**
 - Contribution to
 - Immediate tsunami evacuation
 - Refuge-related problem solving
 - Mental/ physical health
 - Cognitive hypothesis
 - **Suppression** of one's own **negative emotional** response?
"When something happens, I try to stay calm and not panic"
 - Task:
 - Presentation of **negative emotional** pictures

Cognitive Science Approach

- Target: **F6 Emotional regulation**
 - Objective measure:
 - Brain activity (Functional MRI)
 - Task
 - Viewing pictures
 - Conditions:
 - **Negative** emotional pictures
 - Neutral pictures
 - Analysis:
 - Activation [Negative – Neutral]
 - Regression with F6 score



Summary

- Power to live with disasters
 - Environment-adaptive personal characteristics
 - personality trait, way of thinking, habit
 - Inventory constructed from the opinions of disaster survivors
- Educational Implications
 - A new framework of the disaster education
 - Evaluation tool
 - Scientific development of the programs
- Cognitive Science Approach
 - Behavioral experiments, brain measurement
 - Has just begun, join us!

Acknowledgment

Collaborators

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Contact: sugiura@tohoku.ac.jp

Power to live with disasters

F1 Leadership

- 31. To resolve problems, I gather together everyone involved to discuss the matter.
- 40. In everyday life, I often take the initiative to gather people together.
- 26. I take the initiative in talking to other people.
- 30. Sophisticated words that move people's hearts come out of my mouth.
- 39. In everyday life, I make sure to keep in contact with friends and acquaintances.

F2 Problem solving

- 24. When I am fretting about what I should do, I compare several alternative actions.
- 25. Before taking action, I think of a plan and the order of priority.
- 33. When talking to someone, I think about that person's personality, wishes, and abilities and choose an appropriate attitude and words accordingly.
- 13. The more agitated the people around me become, the calmer I somehow become.
- 23. To resolve a problem, I first of all initiate action.

F3 Altruism

- 5. I like it when other people rely on me and are grateful to me.
- 1. When I see someone having trouble, I have to help them.
- 6. When someone asks me to do something for them, I cannot refuse.
- 4. Other people's good fortune makes me happy so I like to help others.
- 2. I am meddlesome and I like to do things for others.

F4 Stubbornness

- 8. I am stubborn and always get my own way.
- 11. I unhesitatingly say whatever it is I want to say.
- 12. I clearly distinguish between black and white: what's good is good, and what's bad is bad.
- 7. I hate losing.
- 9. I am highly motivated with regard to things that I like or want to do.

F5 Etiquette

- 38. On a daily basis, I take the initiative in greeting family members and people living in the neighborhood.
- 37. In everyday life, I take care of myself as much as possible.
- 28. When someone has helped me or been kind to me, I clearly convey my feelings of gratitude.

F6 Emotional regulation

- 20. During difficult times, I endeavor not to brood.
- 22. During difficult times, I endeavor to think positively, telling myself that this experience will benefit me in the future.
- 21. During difficult times, I compare my circumstances with the situation around me and in society, and I think that matters cannot be helped.
- 19. When something happens, I try to stay calm and not panic.

F7 Self-transcendence

- 17. I am aware that I am alive, and have a sense of responsibility in living.
- 18. I am aware of the path and teachings I should follow as a person.
- 15. I am aware of the role I should play in society.
- 16. I think that my actions toward others will go around and eventually come back to me.

F8 Active well-being

- 34. In everyday life, I have habitual practices that are essential for relieving stress or giving me a change of pace.
 - 36. In everyday life, I have habitual practices that are essential for maintaining my physical health.
 - 35. In everyday life, I endeavor to find opportunities to acquire new knowledge, skills, and attitudes.
-