



Anxiety over radiation exposure and psychological stress in Fukushima residents #2: Survey of 18-month-old and 3-year-old children

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研究の背景

	Duration of exposure	Features
Traumatic stress Tsunami, Earthquake, War, Terrorist Attack, Sexual Crime	Short time	Strong aversive memory trace induces continuous deterioration of mental health → PTSD
Everyday stress	Until the problem is solved	
Stress induced by anxiety over radiation exposure	Much longer period of time	Continuous exposure for longer period of time to anxiety induces mental damage What kind of influence? When would the influence be manifested? → Depression, psychosomatic disease, suicide

Two Different Surveys



	Subjects	Locations
Survey 1	<p><u>Elementary school, kindergarten, and nursery school children</u> (ages 4 to 12), and their parents</p> 	<p>Nakadori area (Fukushima City, Koriyama City)</p>
Survey 2	<p><u>Children aged 1.5 and 3 years,</u> and their parents (including parents of 4-month-old infants)</p> 	<p>All of Fukushima Pref.</p>



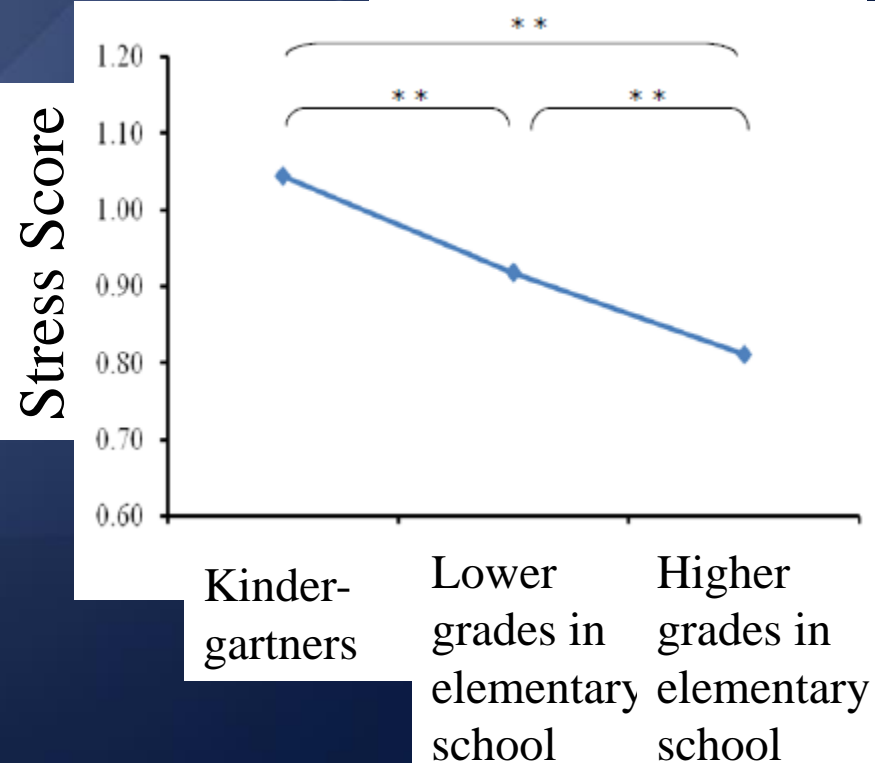
Objective of Survey 2



Results of Survey 1, conducted four months after the nuclear accident at Nakadori region, showed that younger children and students in the lower grades had higher stress.



- ➡ What was the age of the youngest child who felt stressed?
- ➡ Did psychological stress levels vary from region to region in Fukushima Prefecture?

2011年6月-7月に調査



Two Different Surveys



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Survey 1	<p><u>Elementary school, kindergarten, and nursery school children</u> (ages 4 to 12), and their parents</p> 	<p>Nakadori area (Fukushima City, Koriyama City)</p>
Survey 2	<p><u>Children aged 1.5 and 3 years</u>, and their parents (including parents of 4-month-old infants)</p> 	<p>All of Fukushima Pref.</p>



METHOD

Subjects:

Infants: aged 1.5 and 3 years

Parents: have a child aged 4 months, 1.5 years, and/or 3 years

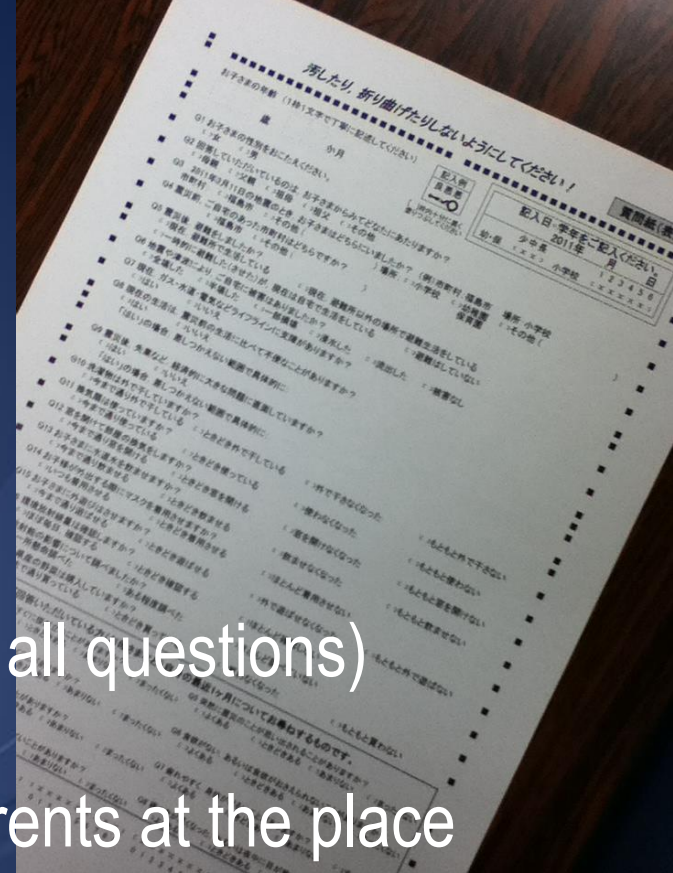
Locations:

All of Fukushima Prefecture

Period:



METHOD



Procedure:

Questionnaire method (parents answered all questions)

The questionnaires were distributed to parents at the place where health examination was conducted on their infants.

Question items (e.g., Tsutsui et al. (2011)):

Parents' stress (8 items)

Children's stress (for infants aged 1.5: 11 items;
for infants aged 3 years: 16 items)

Method

Measurement of parents' stress (8 items)

- From Tsutsui et al. (2011)
- Four-point scale: from “Often” to “Never”

Q1. Do you get irritated or get angry quickly?

Often Sometimes Rarely Never

Q2. Do you jump at sounds?

Often Sometimes Rarely Never

Q3. Do you feel down?

Often Sometimes Rarely Never

Q4. Do you have difficulty concentrating on your daily work?

Often Sometimes Rarely Never

Q5. Do you suddenly remember about the earthquake?

Often Sometimes Rarely Never

Q6. Do you have little appetite or are you unable to control your appetite?

Often Sometimes Rarely Never

Q7. Do you get tired easily or feel weak?

Often Sometimes Rarely Never

Q8. Do you have difficulty falling asleep or wake up during the night?

Often Sometimes Rarely Never

Method

Measurement of children's stress

Kindergartners and elementary school children (19 items)

	3-year-old	1.5-year-old
Gets irritated and angry, or loses his/her temper	怒ってあばれたり、癇癪（かんしゃく）を起こしたりする	怒ってあばれたり、癇癪（かんしゃく）を起こしたりする
Does not concentrate on study and play	そわそわして落ち着きがなく、集中しない	そわそわして落ち着きがなく、集中しない
Dislikes being alone (dislikes going to kindergarten or school, or follows you to the toilet or bath)	一人でいることを嫌がる（トイレお風呂についてくる、など）	一人でいることを嫌がる（トイレお風呂についてくる、など）
Jumps at sudden sounds	急な物音にびっくりする	急な物音にびっくりする
Afraid that a specific event (such as a disaster) will occur again	何か特定のできごと（地震や津波など）がまた起こるのではないかと怖がる	
Gets terrified when something happens	何かの拍子に、強くおびえる	何かの拍子に、強くおびえる
Continues to have poor appetite	食欲がない	食欲がない
Talks repeatedly about a specific event (such as the disaster)	特定のできごと（地震や津波など）について繰り返し話す	
Plays something related to a specific event (such as the disaster)	何かのできごと（地震や津波など）に関連した遊びをする	
Gets confused after remembering something	何かを思い出して、取り乱す	
Gets tongue-tied and dislikes talking	無口になり、話すことを嫌がる	発話が少なくなる
Has little interest in new activities that other children are willing to join in	他の子供がすすんで参加するような新たな活動に興味を持ちにくい	新しいおもちゃや初めてみるものに興味を持ちにくい
Shows regression after the earthquake disaster	震災を機に、「赤ちゃん返り」がある	
Looks lonely and all alone		
Follows an adult around (never strays far from his/her guardian)	親から離れられない、後追いが激しくなる	親から離れられない、後追いが激しくなる
Suppresses his/her feelings	表情が乏しくなる	表情が乏しくなる
Blames himself/herself for a specific event (such as the disaster)		
Complains of a stomachache, headache, nausea or weariness when something reminds him/her of an event (such as the disaster)	腹痛や頭痛や吐き気、だるさなどを訴える	くずることがある
Has difficulty remembering nasty events related to the disaster		

Results

Parents' stress in 1st Survey 2 (November 2011 to March 2012)

Calculation of stress score →

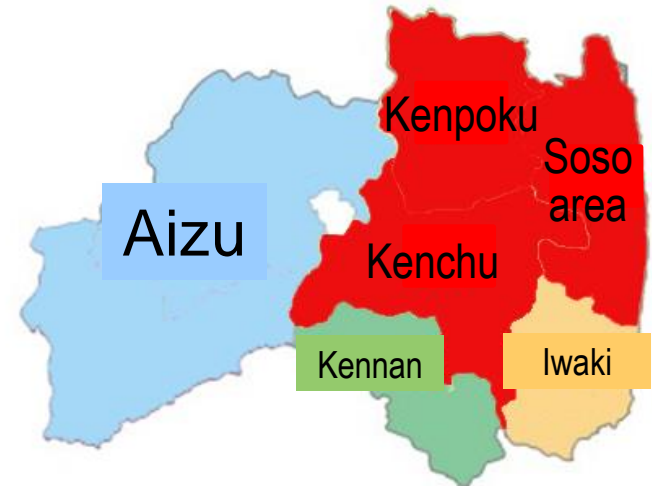
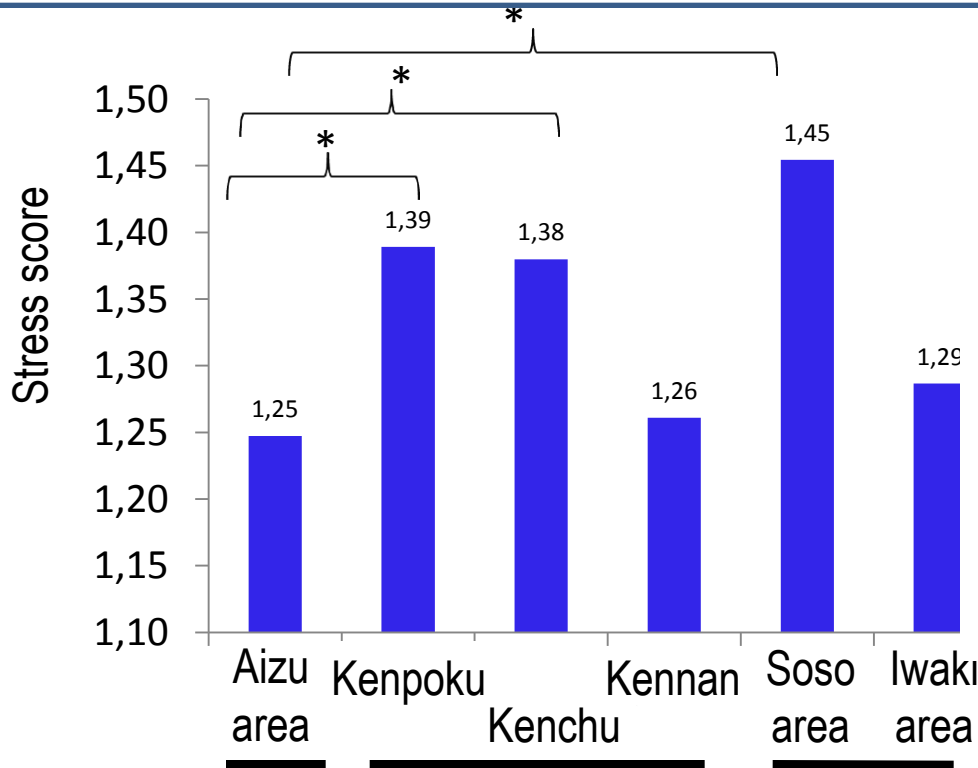
e.g., Shows regression

Never	0 points
Rarely	1 point
Sometimes	2 points
Often	3 points

Average of all items

Significance of stress score

Diversified and comprehensive assessment of children's stress based on their daily behavior



Aizu Nakadori Hamadori

Results

Parents' stress in 1st Survey 2 (November 2011 to March 2012)

Calculation of stress score →

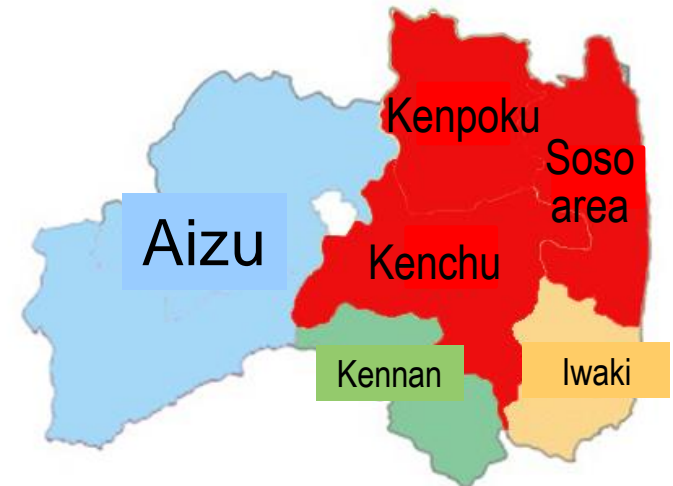
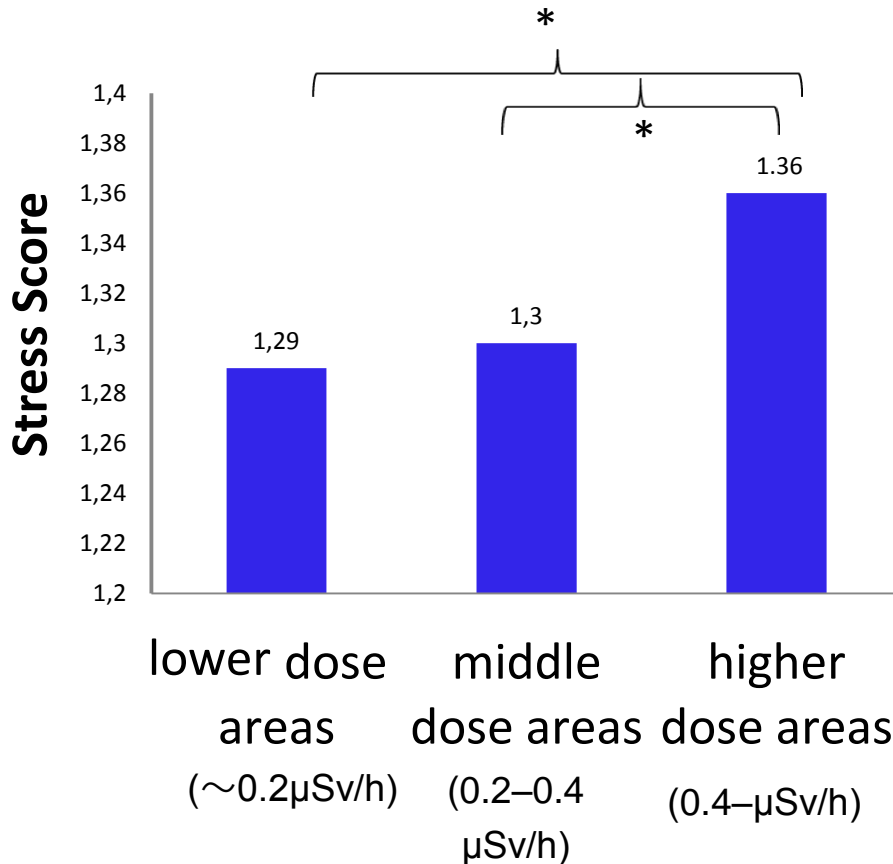
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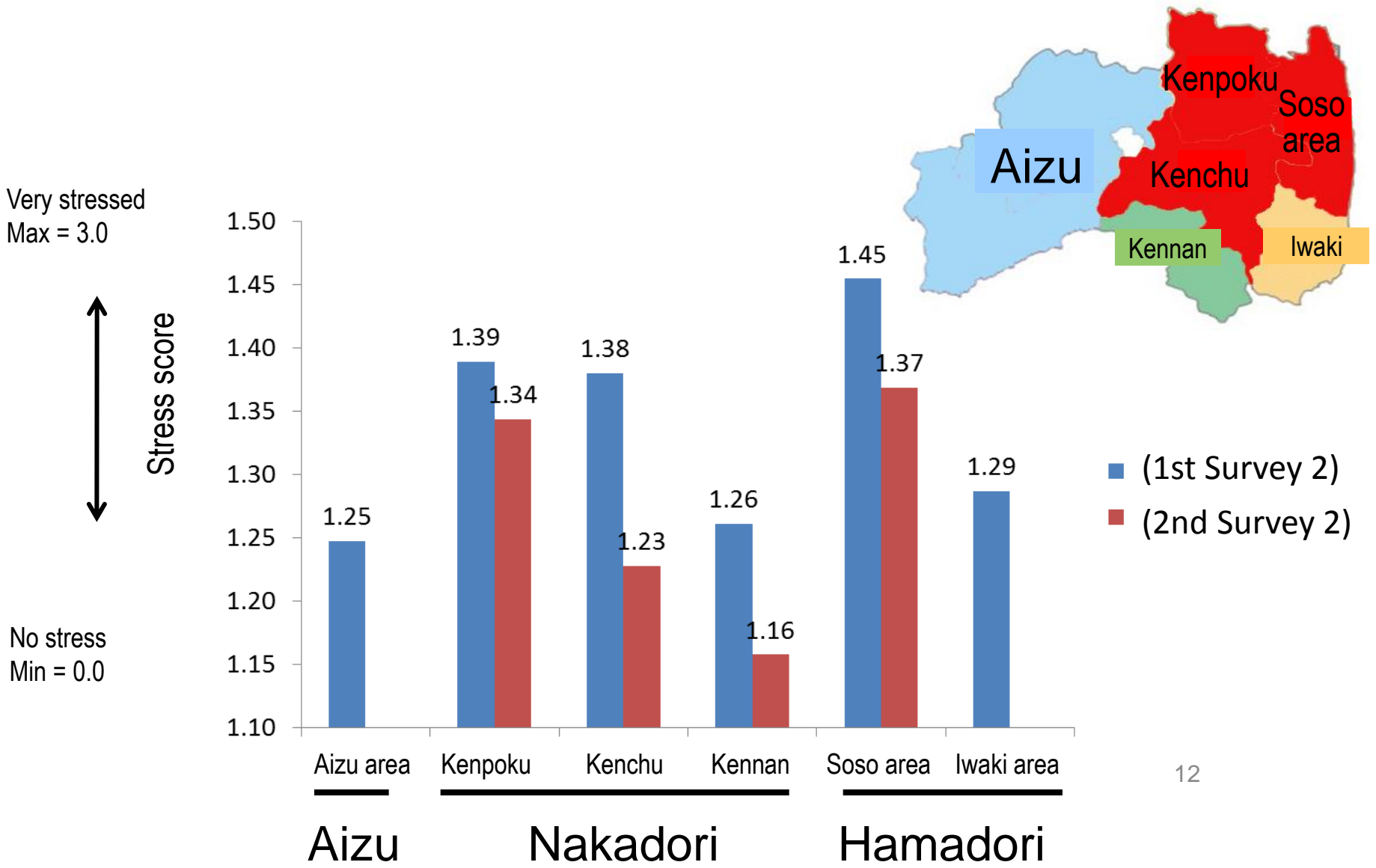
Significance of stress score

Diversified and comprehensive assessment of children's stress based on their daily behavior

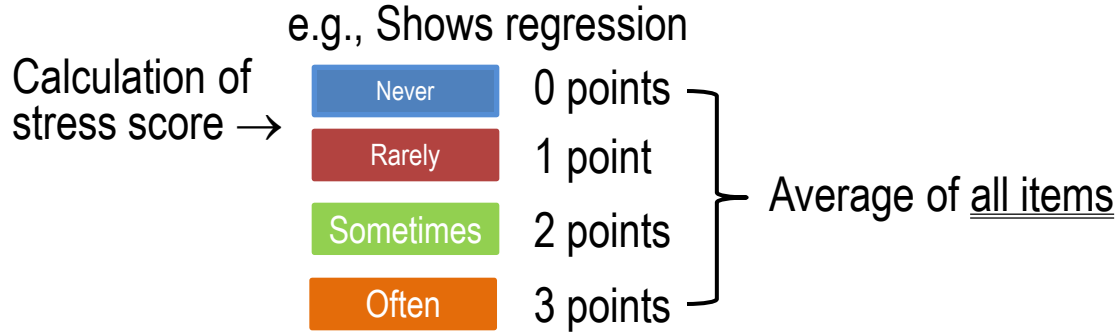


Results Parents' stress in 1st Survey 2 (November 2011 to March 2012)

& 2nd Survey 2 (November 2012 to March 2013)

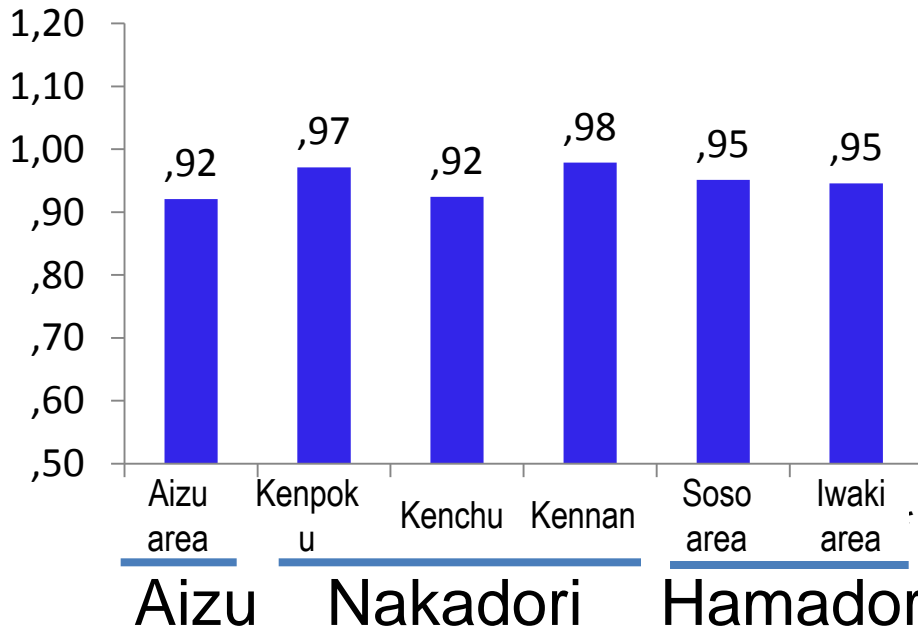


Results Children' stress in 1st Survey 2 (November 2011 to March 2012)

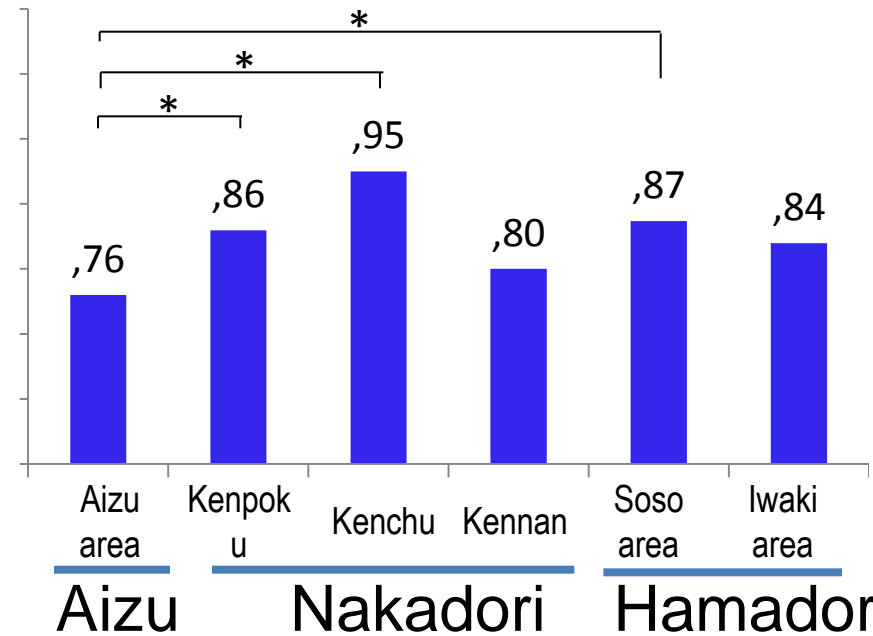


Significance of stress score
Diversified and comprehensive assessment of children's stress based on their daily behavior

1.5-year-old children



3-year-old children



Difference in 3-year-olds' stress depending on the area

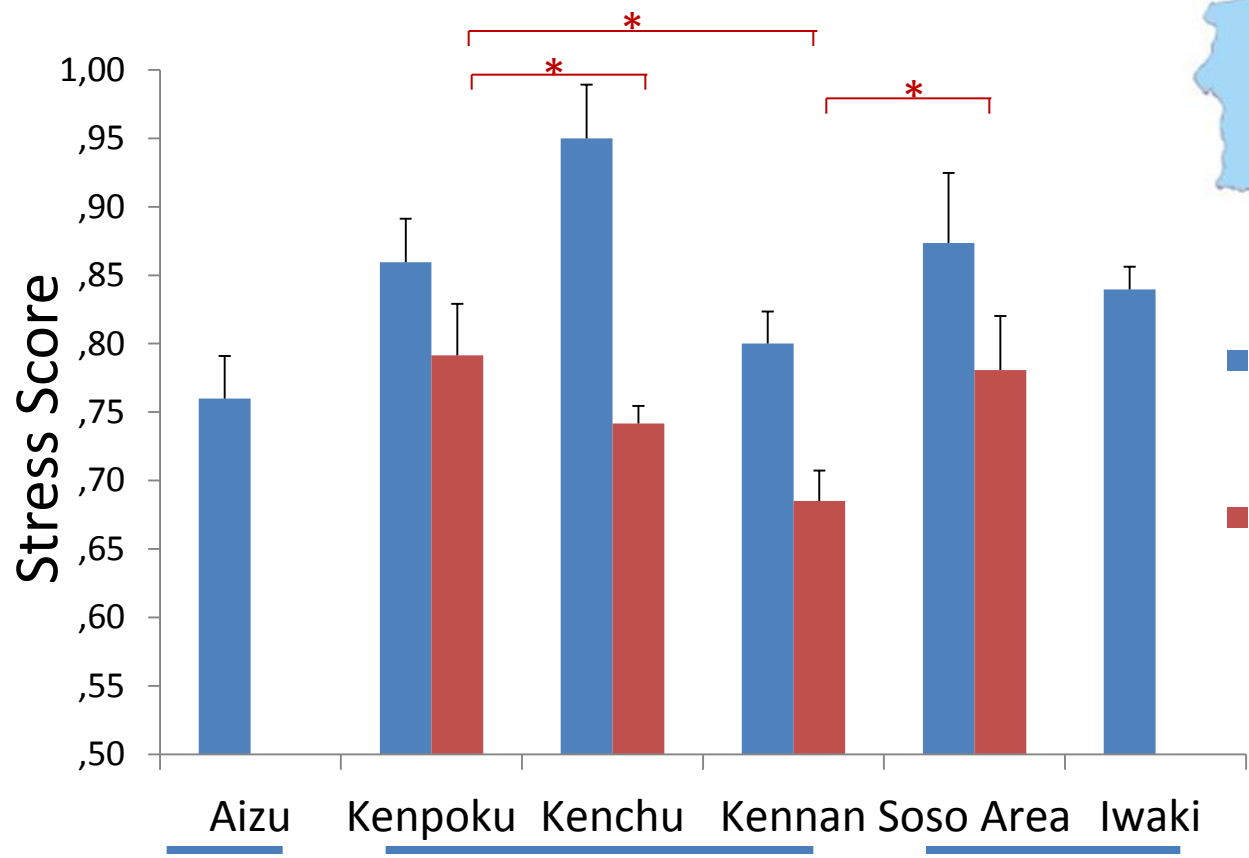
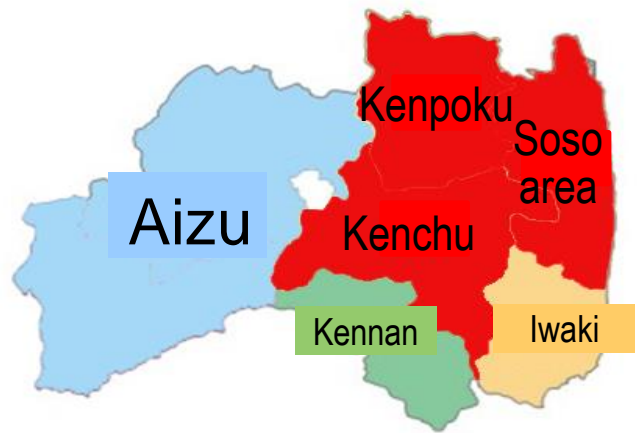


3-year-olds may have experienced stress in relation to the nuclear disaster

Results Children' stress

in 1st Survey 2 (November 2011 to March 2012)
& 2nd Survey 2 (November 2012 to March 2013)

3-year-old children



■ 1st Survey 2 (Nov. 2012-)
■ 2nd Survey 2 (Nov. 2012-)

Aizu Nakadori Hamadori

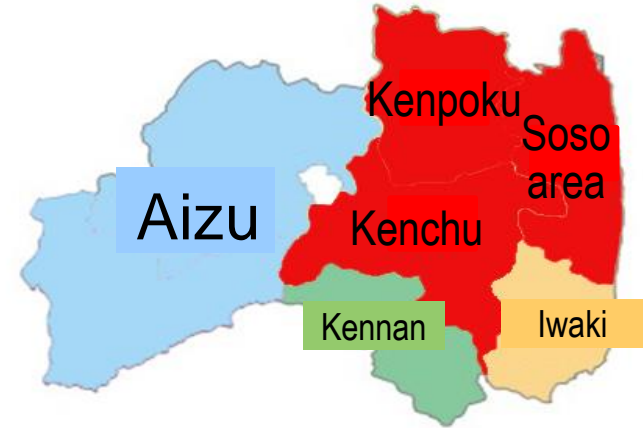
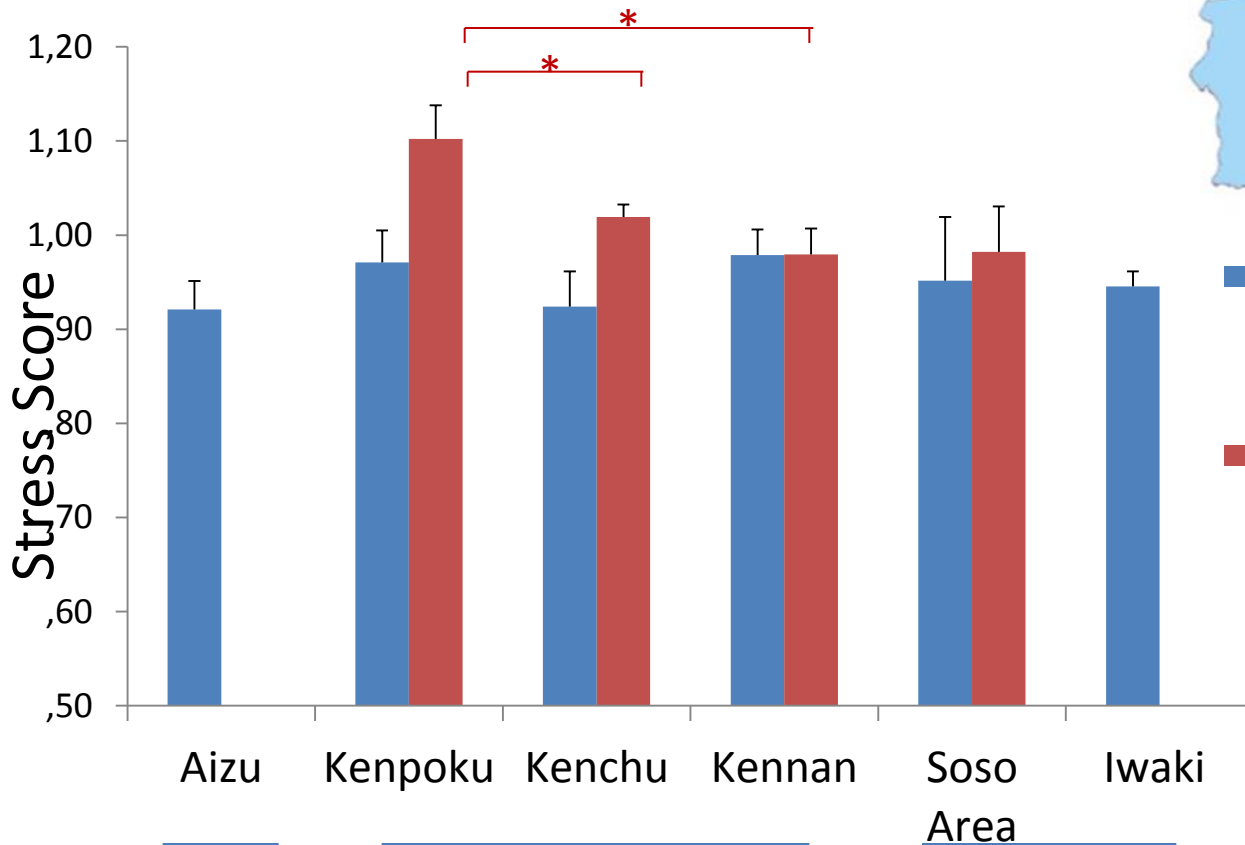
*: analysis for 2nd Survey 2

Results

Children' stress in 1st Survey 2 (November 2011 to March 2012)

& 2nd Survey 2 (November 2012 to March 2013)

1.5-year-old children



■ 1st Survey 2 (Nov. 2012-)
 ■ 2nd Survey 2 (Nov. 2012-)

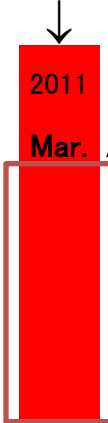
Aizu

Nakadori

Hamadori

*: analysis for 2nd Survey 2

Earthquake/ Nuclear
accident



2nd survey
(this time)

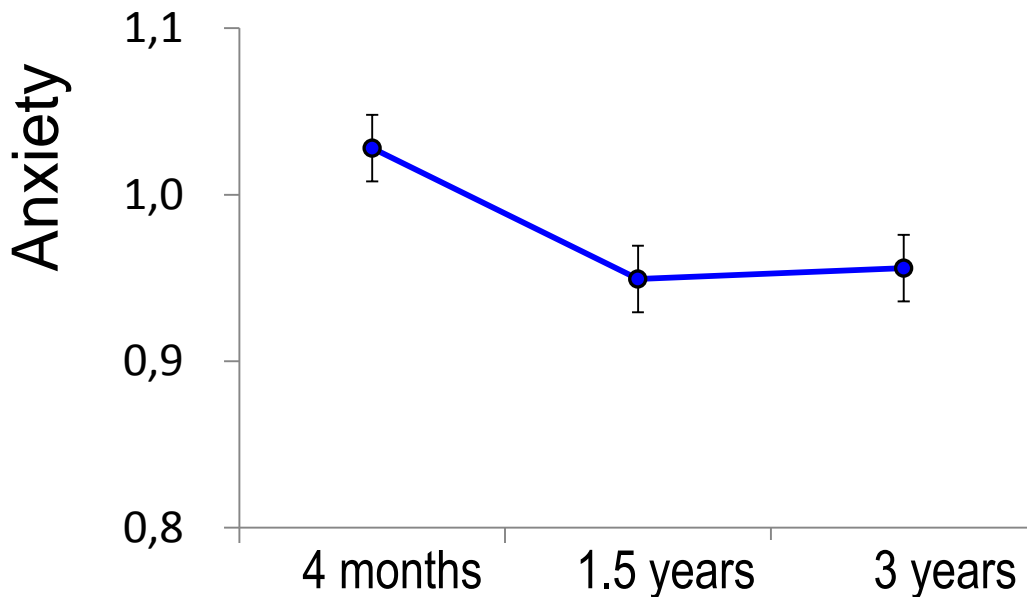
1st survey

	2011												2012												2013		
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.		
		0	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6							
			0	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6						
				0	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6					
					0	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6				
						0	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6			
6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32		
8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33		
9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34		

Reference data

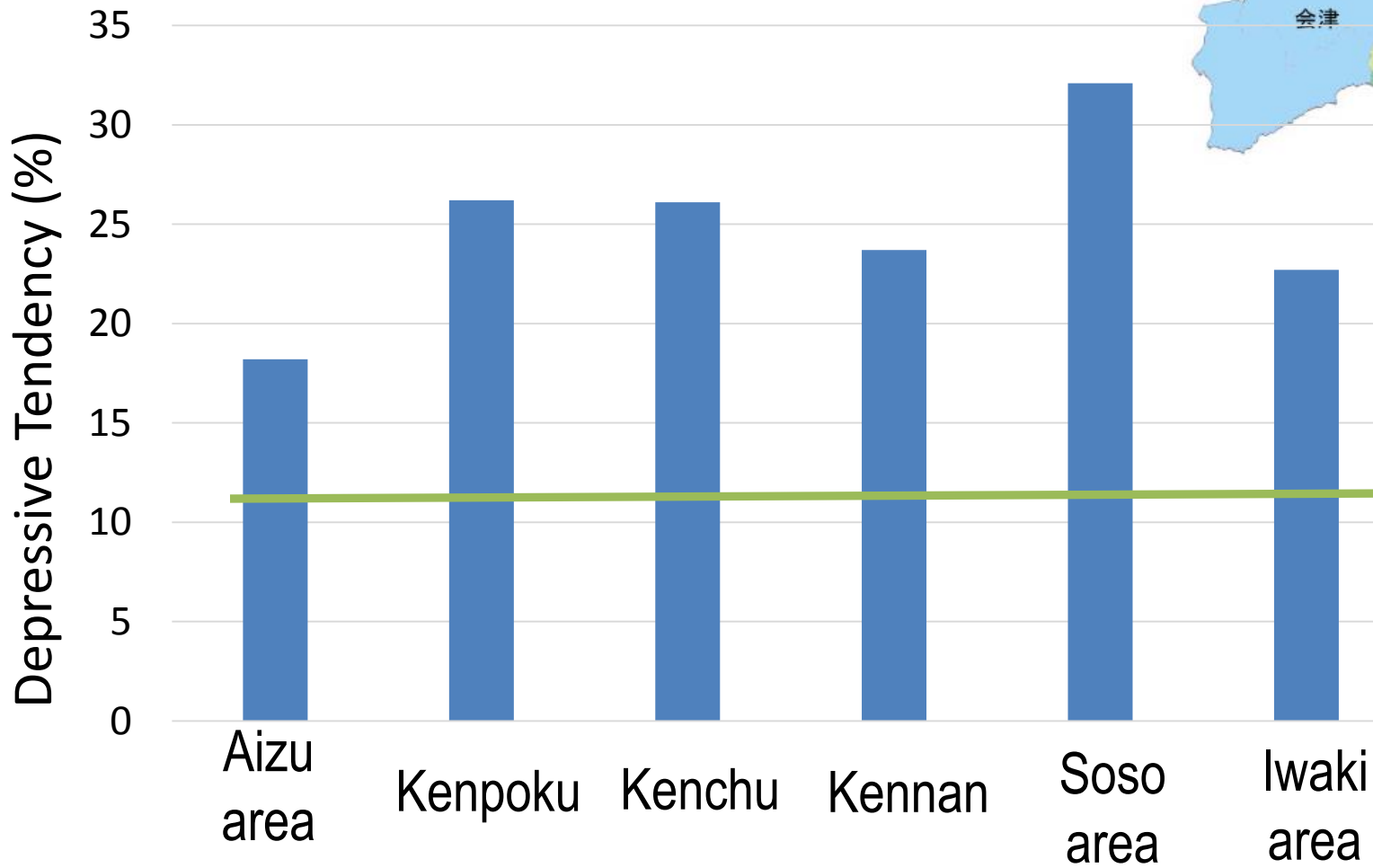
Mothers' anxiety*¹ (1st survey data)

(Mothers' anxiety was not measured in the 2nd survey)



*1: Mothers' anxiety about radiation was assessed based on their answers to questions such as: "Do you dry your laundry outside?" "Do you open a window?" "Do you worry about what your child drinks?" Possible answers were "Never" (2 points), "Sometimes" (1 point), and "Always" (0 point), respectively.

Percentage of depressive tendency in expectant and nursing mothers in Fukushima Prefecture after the March 11 disaster



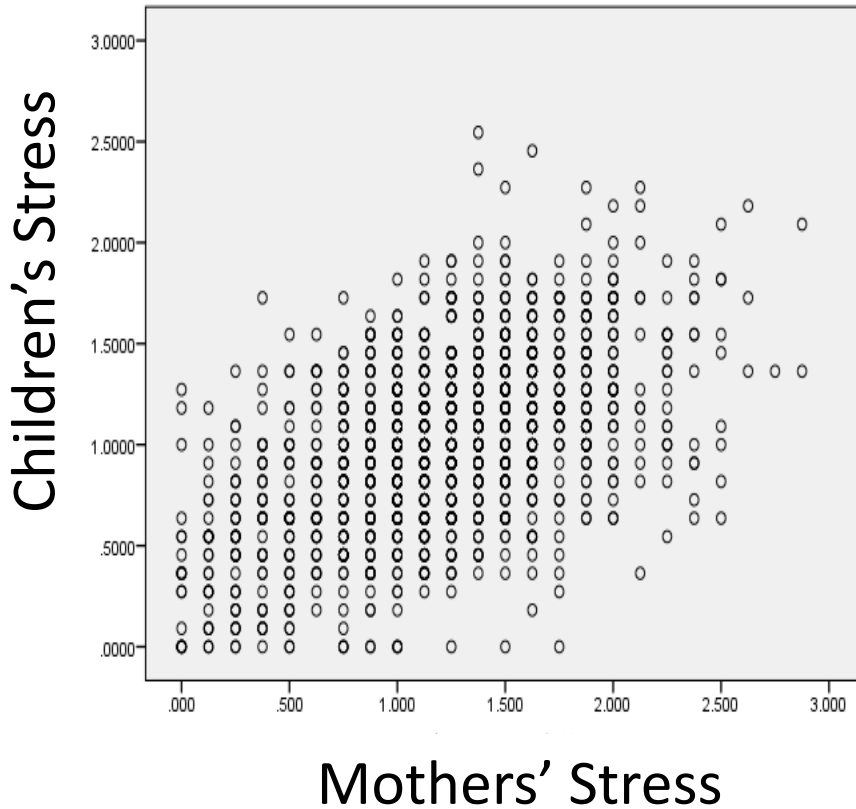
10.3%
Depressive tendency in 2009 in Japan

Correlation between mothers' stress and children's stress



1.5-year-old children

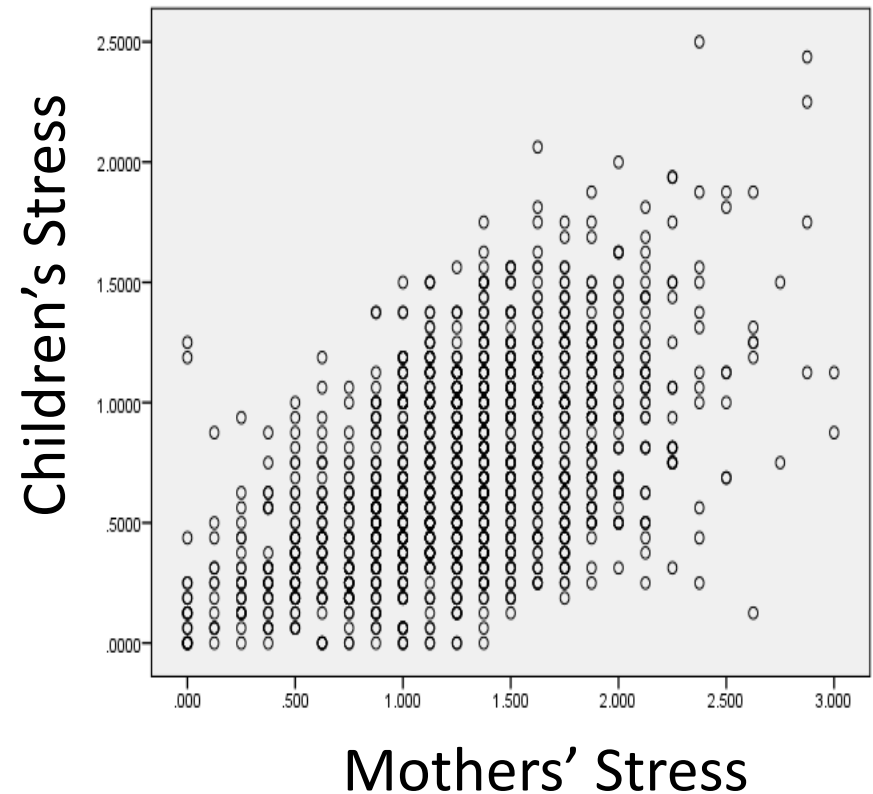
母親ストレスと1歳半児ストレスの相関
(2013年 福島県全域調査)



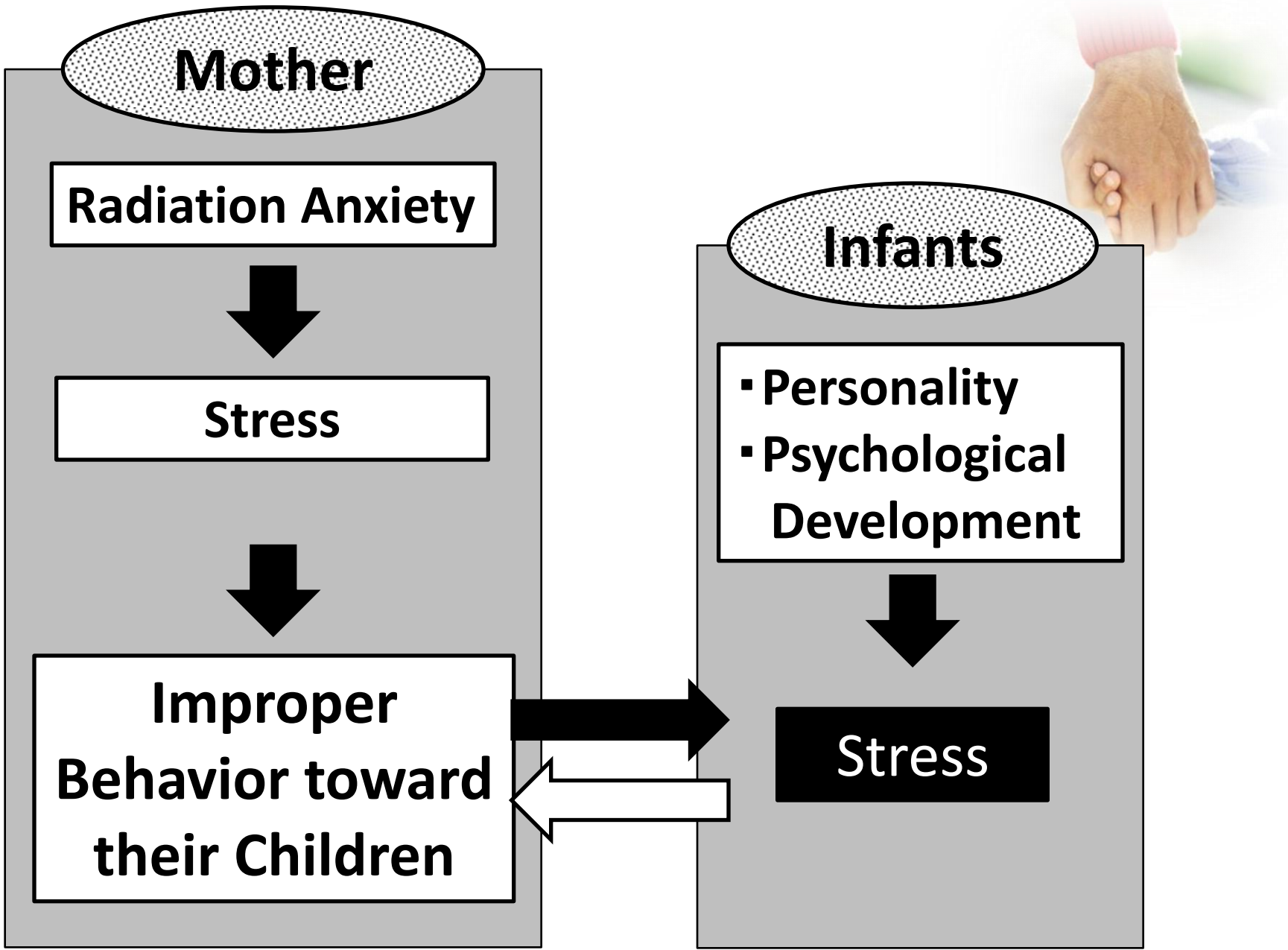
($r = 0.525$, $p < .01$)

3-year-old children

母親ストレスと3歳児ストレスの相関
(2013年 福島県全域調査)



($r = 0.530$, $p < .01$)



Psychological Stress Model for Infants