Psychological inflexibility, eating habits and changes in BMI: Results from a nationwide prospective study of mid-age NZ women

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UNIVERSITY of OTAGO
Te Whare Wānanga o Otāgo
NEW ZEALAND

Health Risks Associated with Obesity

- Physical disabilities
- Psychological issues (binge eating disorder)
- Cardiovascular disease
- Cancer (endometrial, breast, colon)
- Type 2 diabetes

World Health Organization, 2013

Weight Gain Among Adults

- Among adults ages 35-69 at baseline, women gained more weight than men over 5 years
  - Women: +2.4 kg (SD 5.2)
  - Men: +1.5 kg (SD 4.8)

Ball, Crawford, Ireland & Hodge, 2003

- Middle-aged women gain approximately 0.5-1.0 kg per year

Sternfeld et al., 2008; Sternfeld et al., 2004;
Williams et al., 2006; Brown et al., 2005

Mid-age New Zealand Women's Body Mass Index

Statistic	Year	35-44	45-54
Overweight (%)	1997	29.0	35.4
BMI 25.0 - 29.9	2003	25.4	29.4
	2006	31.6	33.2
	2011	27.3	34.0
Obese (%)	1997	18.1	28.2
BMI > 30.0	2003	23.2	26.5
	2006	26.9	30.2
	2011	30.1	30.8

Ministry of Health, NZ

Existing obesity interventions

- Dieting leads to short-term weight loss
- Regain is observed from 6 months on
- Return to baseline weight by 5.5 years

Ulen, Huizinga, Beech & Elasy, 2008

- ~30%-35% of lost weight regained in 1st year after treatment

Wadden, Butryn & Byrne, 2004

Research question

- What modifiable factors are associated with the prevention of weight gain among mid-age women?

Psychological Flexibility & Eating Behavior

- Ability to experience the present moment (difficult emotions, thoughts, memories – eg. about food or body, or body sensations – eg. cravings, hunger) while engaging in behavior that is consistent with one's chosen values

Sandoz, Wilson, Merin & Kellum, 2013;
Hayes, Luoma, Bond, Masuda & Lillis, 2006

Intuitive Eating

- Eating in response to hunger and satiety cues and unconditional permission to eat when hungry

  Tribole & Resch, 2003; Tylka, 2006, 2013

- Associated with lower BMI

  Madden, Leong, Gray & Horwath, 2012

- Associated with weight maintenance

  Bacon, Stern, Van Loan & Keim, 2005

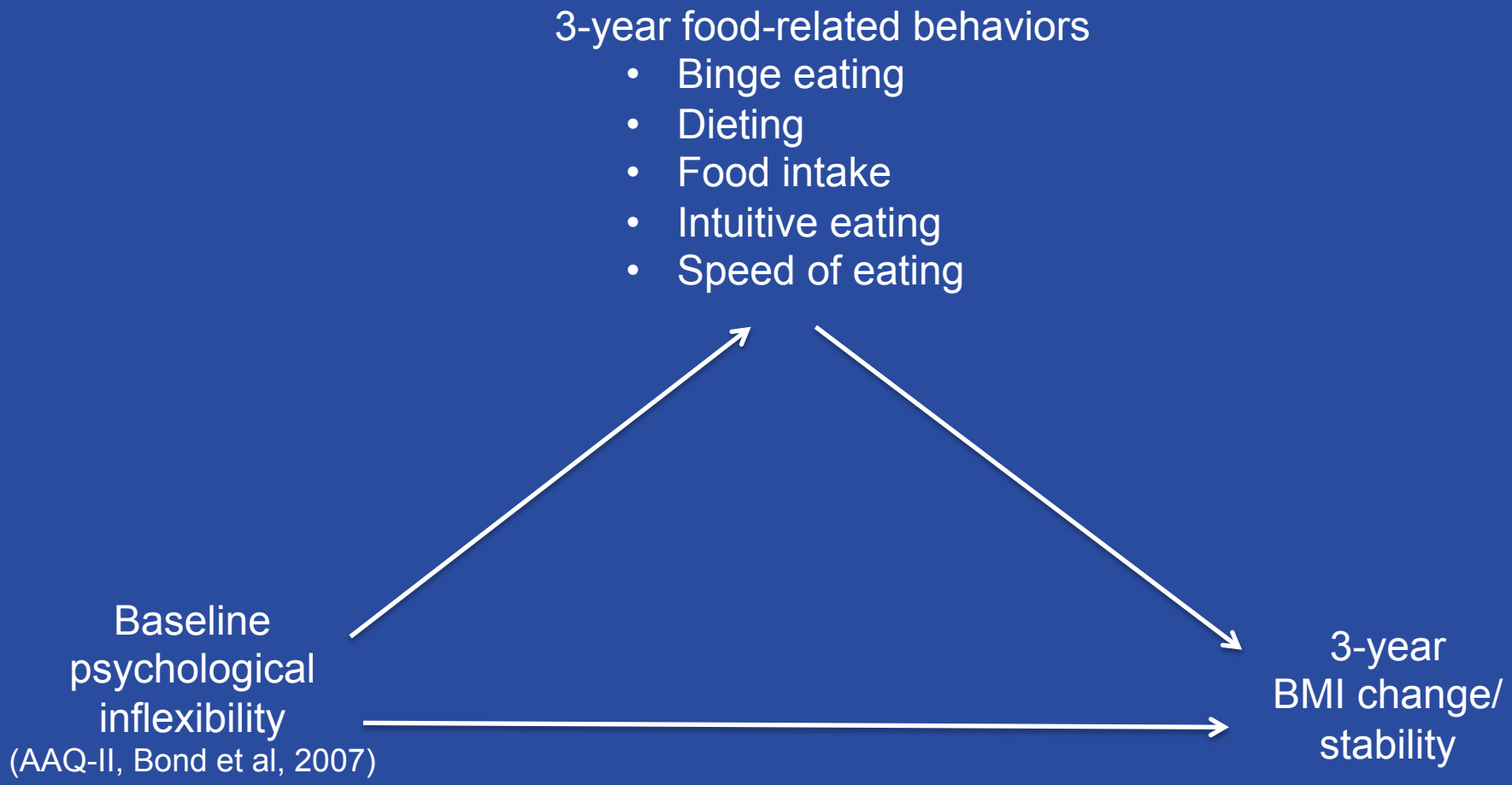
- Prevents 2-year weight gain

  Hawley et al., 2008

Women's Lifestyle, Eating Habits and Wellbeing Study

- Does psychological flexibility predict women's BMI change or BMI stability?

Proposed Model



Women's Lifestyle, Eating Habits and Wellbeing Study

- Postal survey
  - 2009
    - 2,500 women ages 40-50 randomly selected from NZ electoral rolls to participate in a nationwide survey of lifestyle, eating habits and wellbeing
    - 1,601 responders (66% response rate)
    - 1,435 consented to participate in longitudinal study
  - 2012
    - 1,025 women participated in 3-year follow-up survey (78% retention rate)

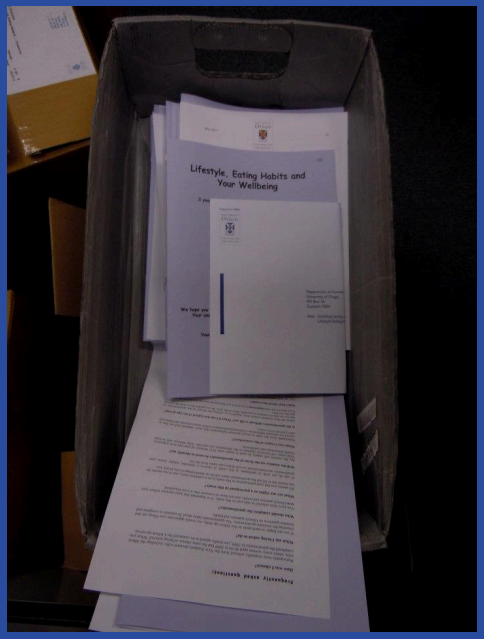
Design and study methods:
Leong, Madden, Gray, Horwath, *J of the Academy of Nutrition and Dietetics,* 2012
Leong, Madden, Gray, Horwath, *J of the American Dietetic Association*,2011
Madden, Leong, Gray & Horwath, *Public Health Nutrition*,2012

Self-reported Measures

Measure	Baseline	2-year follow-up	3-year follow-up
Height and weight [1]	✔	✔	✔
Demographics	✔	✔	✔
Psychological flexibility (AAQ-II) Bond, Hayes, Baer, Carpenter, Orcutt & Zettle, 2007	✔		
Intuitive eating Tylka, 2006	✔		✔
Speed of eating Otsuka et al., 2006	✔		✔
Binge eating	✔		✔
Food intake Russell, Parnell & Wilson, 1999	✔		✔
Physical activity, smoking status	✔	✔	✔
Menopause status	✔	✔	✔
Thyroid condition	✔	✔	✔

[1] Agreement between measured and self-reported height and weight described in Sharples, Crutchley, Garcia, Gray & Horwath, *NZ Med J* 2012

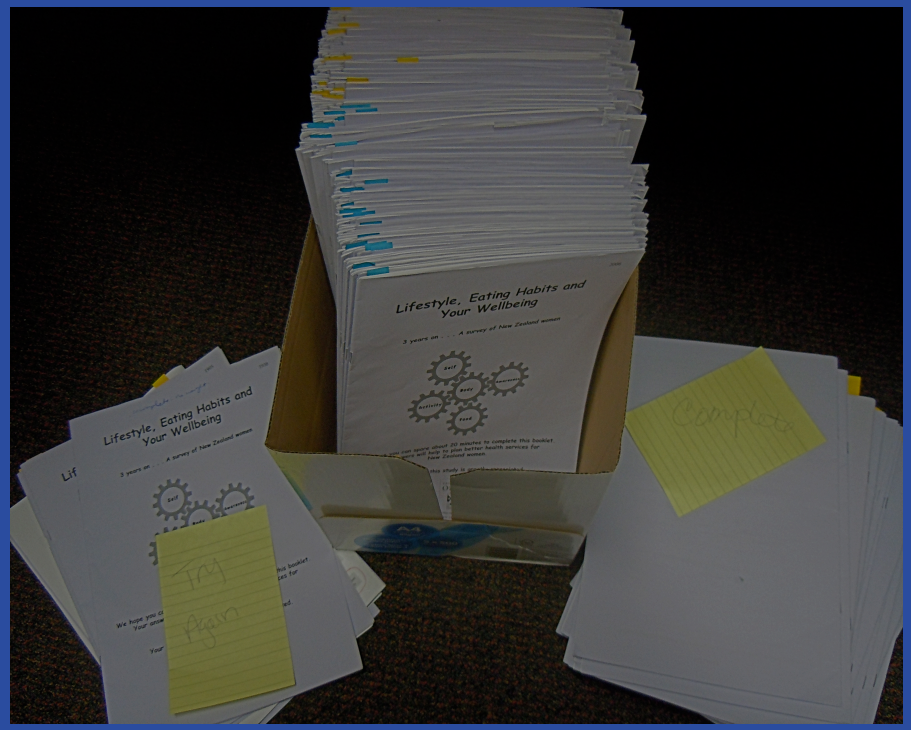
Data Collection



Survey Procedures

Dillman's Validated Tailored Design Method

1. Questionnaire mailing
2. Thank you/reminder postcard
3. Replacement questionnaire to non-respondents
4. Final thank you/reminder postcard



Effectiveness of $5 incentive described in
Boucher, Leong, Sharples, Gray & Horwath submitted *Australian & NZJournal of Public Health* (April 2013)

Sample Characteristics

	Baseline (n=1,601)	3-year follow-up (n=1,015)	National data[2]
Age (yrs)	45.5 (±3.2)	48.5 (±3.2)	-
BMI[1]	25.8 (±1.2)	26.0 (±1.2)	27.1
Overweight	28.9%	29.9%	33.2%
Obese	20.9%	22.0%	30.2%
NZ European/other	80.5%	83.8%	73.4%
Māori	11.4%	9.8%	12.1%
University degree	32.2%	33.9%	17.7%
NZSEI 30-59	66.8%	65.3%	60.0%
AAQ-II[3]	27.9 (±10.27)	-	-

[1] Geometric mean for BMI

[2] Population estimates for mean BMI of all adult women and rates of obesity among women aged 45-54 from New Zealand Health Survey 2006/07, ethnicity and education level from New Zealand 2006 Census, and total population New Zealand Socioeconomic Index distribution from New Zealand 1991 census

[3] Higher AAQ-II scores indicate higher psychological inflexibility

Baseline Results

- Higher levels of psychological inflexibility were associated with
  - Increased odds of binge eating one or more times per week (OR 1.67/10 units, 95% CI: 1.48, 1.88, $p < 0.001$)
  - Increased odds of dieting (OR 1.33/10 units, 95% CI: 1.19-1.48, $p < 0.001$)

Regression models adjusted for age, ethnicity, socioeconomic status, thyroid condition, menopause status, physical activity, and smoking status

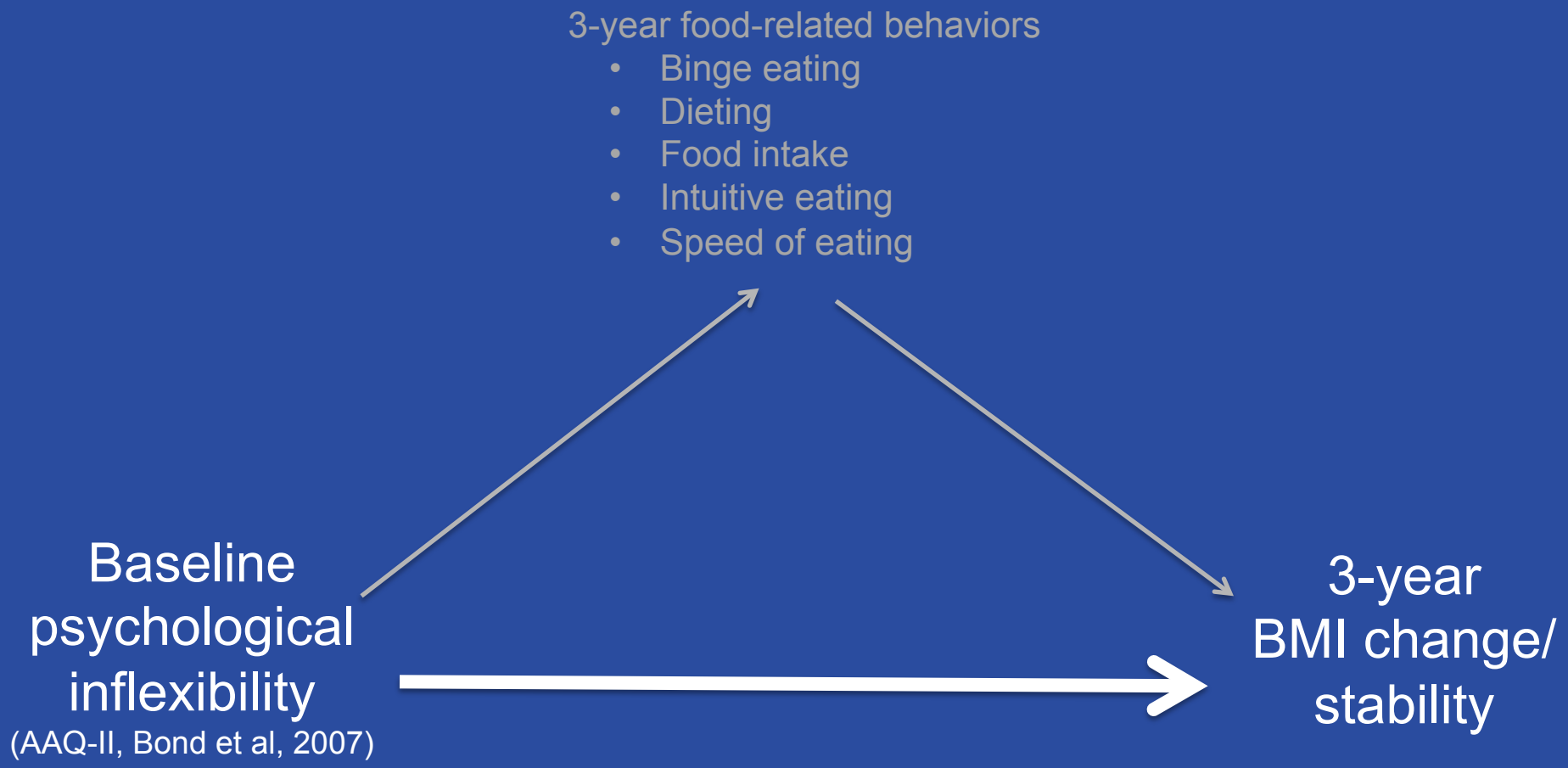
Baseline Results

- BMI was statistically significantly higher by 1.7% (95% CI: 0.7%-2.7%; p=0.001) for each 10-unit increase in psychological inflexibility.
- Total effect of AAQ on BMI
  - 85% mediated by binge eating
  - 8% mediated by burger consumption

Regression models adjusted for age, ethnicity, socioeconomic status, thyroid condition, menopause status, physical activity, and smoking status

Madden, Leong, Gray, Ciarriochi & Horwath, unpublished manuscript

Proposed Model



Psychological Inflexibility & 3-year Changes in BMI

- No association between AAQ-II scores and changes in women's BMI (adjusted p=0.875) or BMI stability (adjusted p=0.058)

Regression models adjusted for baseline weight, ethnicity, socioeconomic status, and changes in thyroid condition, menopause status, physical activity, and smoking status

Proposed Model

3-year food-related behaviors

- Binge eating
- Dieting
- Food intake
- Intuitive eating
- Speed of eating

Baseline Psychological Inflexibility & 3-year Food-related Behavior

Food-related Behaviors	n	Effect of 10-unit increase in AAQ-II score[1] (95% CI)	p-value
Binge eating	843	OR 1.63 (1.34, 1.97)	< 0.001
Trying to lose weight [2]	845	OR 1.32 (1.12, 1.55)	0.001
Intuitive eating	845	3.0 unit decrease (-3.70, -2.37)	< 0.001
Speed of eating	845	0.25 unit decrease (-0.51, 0.02)	0.066

[1] Adjusted for baseline BMI, ethnicity, NZSEI score, and changes in thyroid condition status, menopause status, physical activity and smoking

[2] Additional adjustment for quadratic term for baseline BMI

Baseline Inflexibility & 3-year Food-related Behavior

3-year Food-related Behavior	n	Effect of 10-unit increase in AAQ-II score[1] (95% CI)	p-value
Food intake increased with higher inflexibility			
Biscuits (chocolate or cream filled)	843	0.11 (0.01, 0.21)	0.032
Low-calorie soft drinks	843	0.20 (0.08, 0.32)	0.001
Meat pies or sausage rolls [2]	844	0.33 (0.06, 0.61)	0.019
Fish (deep fried, battered, crumbed) [2]	843	0.52 (0.23, 0.81)	0.001
Food intake decreased with higher inflexibility			
Fruit	845	-0.08 (-0.15, -0.003)	0.041
Vegetable	844	-0.08 (-0.16, -0.01)	0.018
Fish (baked, grilled, tinned)	843	-0.09 (-0.17, -0.10)	0.029
Processed meat (salami, ham, bacon)	844	-0.13 (-0.23, -0.04)	0.004
Alcohol intake			
6+ drinks on one occasion in past year	845	OR 1.18 (1.01, 1.37)	0.038

[1] Adjusted for baseline BMI, ethnicity, NZSEI score, and changes in thyroid condition status, menopause status, physical activity and smoking

[2] Additional adjustment for quadratic term for AAQ-II score

Conclusions

- Tendency for an association between inflexibility and BMI stability
- Associations with food-related behaviors at 3-year follow-up
- Psychological inflexibility may influence predisposition to a higher BMI, but not stability/changes to BMI later in life
- Psychological flexibility associated with eating in accordance with hunger and satiety signals

Strengths

- Longitudinal data
- Good response and retention rates
- Representative
  - Māori
  - Socioeconomic status

Limitations

- Self-report data
- Less representative
  - Education
  - Non-Māori / non-NZ Euro
  - BMI > 30

Future Research

- Weight gain prevention intervention with ACT components
  - Increase awareness and acceptance of food-related thoughts/feelings and bodily sensations
  - Increase food-related behaviors that support one's value of overall health and wellbeing

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- Other team members: Heidi Sharples and Lindsay Bemelmans
- All survey participants

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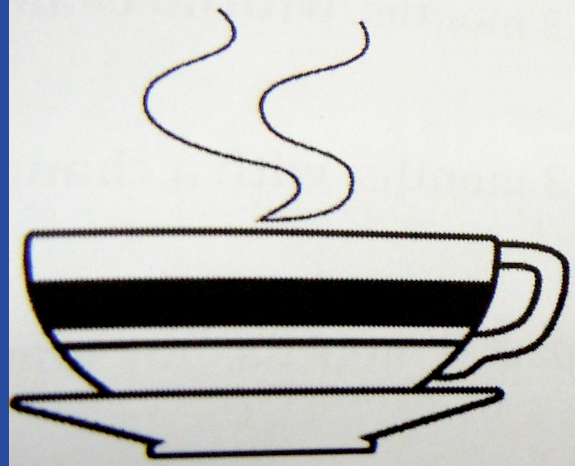
1. Never 2. Seldom 3. Sometimes 4. Often 5. Always



You're almost there! ☺
You may like to enjoy a
cuppa while you do the rest.
and a TIMTAM ?