Nutritional Psychiatry: recent advances in evidence for diet and nutrition for mental and brain health

Prof Felice N Jacka
Food & Mood Centre, Deakin University
Murdoch Childrens Research Institute
The Black Dog Institute

f.jacka@deakin.edu.au

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A DEAKIN IDEA

Global Burden of Disease study

Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016

*GBD 2016 Risk Factors Collaborators**

***Lancet 2017;* 390: 1345–422**

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Poor diet?

- Diets low in:
  - Fruits
  - Vegetables
  - Wholegrains
  - Nuts and seeds
  - Fibre
  - Healthy fats

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Poor diet?

- Diets high in:
  - Red meat
  - Processed meat
  - Added sugars
  - Sugar Sweetened Beverages
  - Trans fats
  - Sodium

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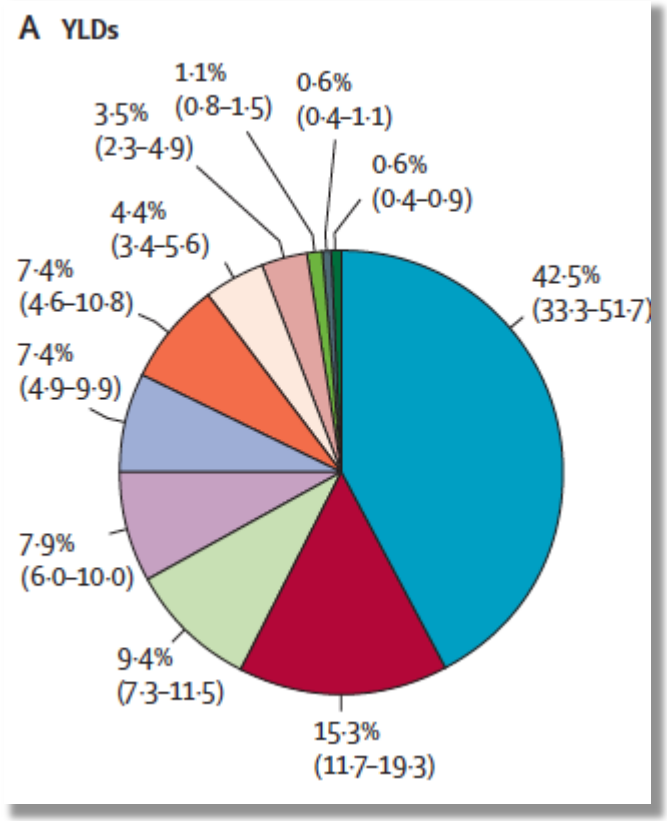
Mental and Substance Use Disorders



Leading cause of global disability

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Overview of Nutritional Psychiatry: what do we know so far?

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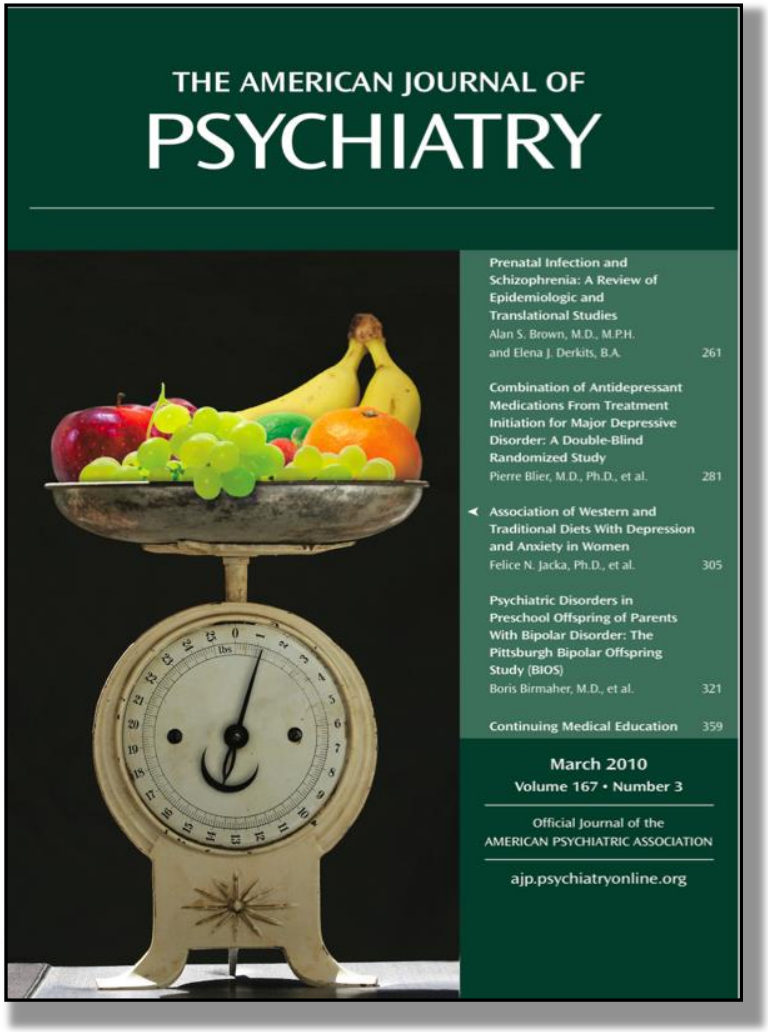

AJP in Advance. Published January 4, 2010 (doi: 10.1176/appi.ajp.2009.09060881)

Article

Association of Western and Traditional Diets With Depression and Anxiety in Women

Felice N. Jacka, Ph.D.
Julie A. Pasco, Ph.D.
Arnstein Mykletun, Ph.D.
Lana J. Williams, Ph.D.
Allison M. Hodge, Ph.D.
Sharleen Linette O'Reilly, Ph.D.
Geoffrey C. Nicholson, M.D., Ph.D.
Mark A. Kotowicz, M.D.
Michael Berk, M.D., Ph.D.

Objective: Key biological factors that influence the development of depression are modified by diet. This study examined the extent to which the high-prevalence mental disorders are related to habitual diet in 1,046 women ages 20–93 years randomly selected from the population.

Method: A diet quality score was derived from answers to a food frequency questionnaire, and a factor analysis identified habitual dietary patterns. The 12-item General Health Questionnaire (GHQ-12) was used to measure psychological symptoms, and a structured clinical interview was used to assess current depressive and anxiety disorders.

Results: After adjustments for age, socioeconomic status, education, and health behaviors, a "traditional" dietary pattern characterized by vegetables, fruit, meat, fish, and whole grains was associated with lower odds for major depression or dysthymia and for anxiety disorders. A "western" diet of processed or fried foods, refined grains, sugary products, and beer was associated with a higher GHQ-12 score. There was also an inverse association between diet quality score and GHQ-12 score that was not confounded by age, socioeconomic status, education, or other health behaviors.

Conclusions: These results demonstrate an association between habitual diet quality and the high-prevalence mental disorders, although reverse causality and confounding cannot be ruled out as explanations. Further prospective studies are warranted.

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Images sourced from Pixabay

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Diet and Depression in Adulthood

Molecular Psychiatry
https://doi.org/10.1038/s41380-018-0237-8

REVIEW ARTICLE

Healthy dietary indices and risk of depressive outcomes: a systematic review and meta-analysis of observational studies

Camille Lassale[1,2] · G. David Batty[1] · Amaria Baghdadli[3,4] · Felice Jacka[5] · Almudena Sánchez-Villegas[6,7] · Mika Kivimäki[1,8] · Tasnime Akbaraly[1,3,9]

Received: 10 May 2018 / Revised: 26 July 2018 / Accepted: 2 August 2018

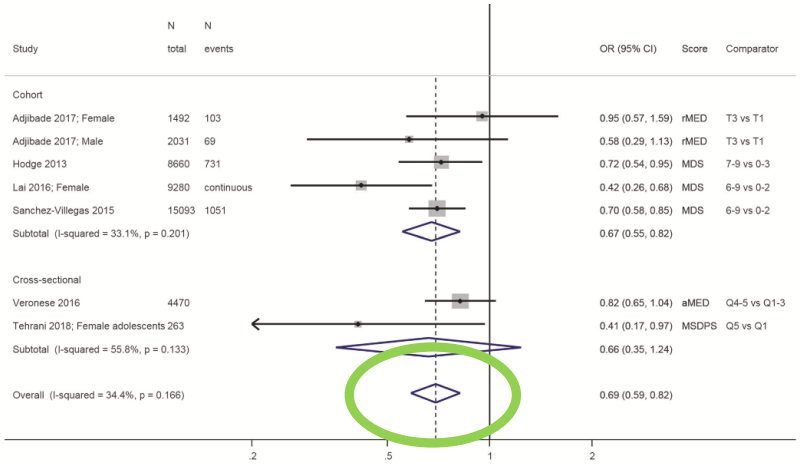

Fig. 1 Meta-analysis of studies investigating the association between a traditional Mediterranean diet and depressive outcomes. Estimates are ORs, RRs or HRs of depression for people with highest adherence compared to lowest adherence (categories or quantiles specified). MDS Mediterranean diet score, rMED relative MDS, aMED alternative MDS, T tertile, Q quintile

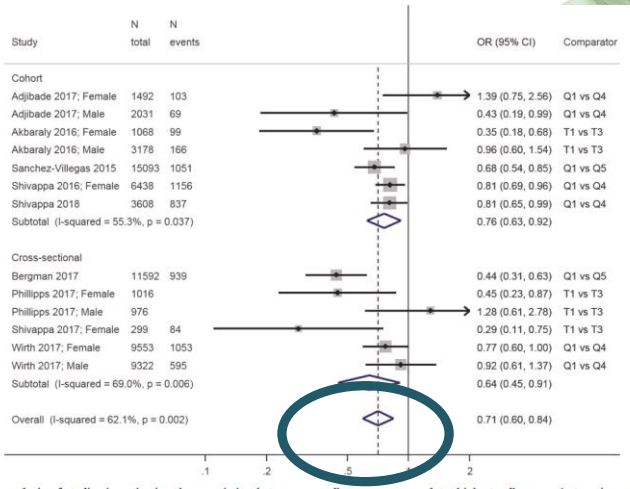

Fig. 4 Meta-analysis of studies investigating the association between the Dietary Inflammatory Index DII and depressive outcomes. Estimates are ORs, RRs, or HRs of depression for people with lowest adherence compared to highest adherence (categories or quantiles specified). T tertile, Q5 quintile, Q4 quartile

Decreased incidence of depression:
Adherence to a Mediterranean diet: 0.67 (95% CI 0.55–0.82)
Lower Dietary Inflammatory Index: 0.76 (95% CI 0.63–0.92).

Lassale et al. *Molec Psychiat.* 2018.

Diet and Mood in Adolescents

Associations between diet quality and depressed mood in adolescents: results from the Australian Healthy Neighbourhoods Study

Felice N. Jacka, Peter J. Kremer, Eva R. Leslie, Michael Berk, George C. Patton, John W. Toumbourou, Joanne W. Williams

Healthy Neighbourhoods Study
n = 7114
Age 10 - 14 years

Jacka et al. *Aust N Z J Psychiatry.* 2010.

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DEAKIN IDEA

Diet and Mental Health in Early Life

NEW RESEARCH

Maternal and Early Postnatal Nutrition and Mental Health of Offspring by Age 5 Years: A Prospective Cohort Study

Felice N. Jacka, Ph.D., Eivind Ystrom, Ph.D., Anne Lise Brantsaeter, Ph.D., Evalill Karevold, Ph.D., Christine Roth, M.Sc., Margaretha Haugen, Ph.D., Helle Margrete Meltzer, Ph.D., Synnve Schjolberg, M.A., Michael Berk, Ph.D.

Impact of early life nutritional exposures extends from physical to mental health

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Jacka et.al. *J. Am. Acad. Child Adolesc. Psychiatry.* 2013.

A DEAKIN IDEA

State of the evidence in 2017

Consistent observational data across countries, cultures and age groups

- fulfill Bradford Hill criteria for causality
- largely independent of SES, education, body weight, other health behaviours
- Not apparently explained by reverse causality

Very extensive data from animal studies

NEED for RCTs

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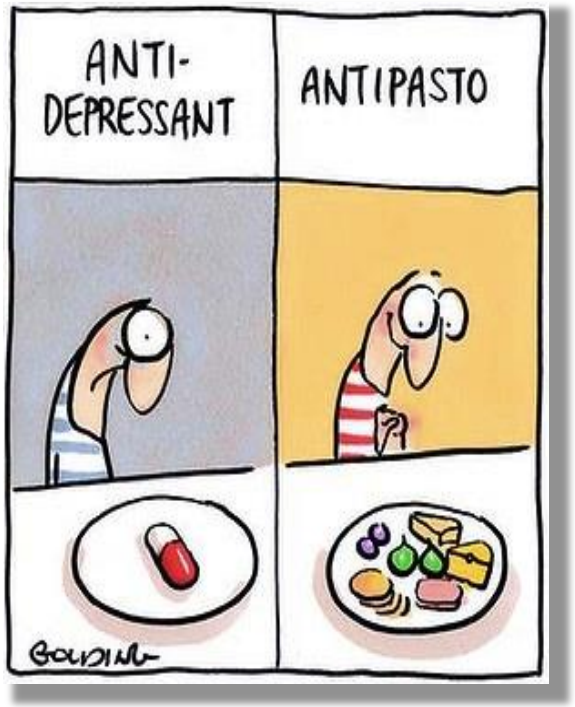
Dietary improvement as a treatment strategy in major depression: the SMILES trial



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O'Neil A…Jacka F. A randomised, controlled trial of a dietary intervention for adults with major depression (the SMILES trial): study protocol **BMC Psychiatry** 2013 13:114

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Study aim

To investigate the efficacy and cost-effectiveness of dietary improvement in the treatment of major depression

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Participants randomly assigned to receive either……

Dietary support (clinical dietitian) or Social support (RA)

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Protein	AND	Cereals and Starchy Vegetables	AND	Vegetables
Tinned sardines 		with **wholegrain biscuits** 		plus **avocado, tomato** and **cucumber** 
Tinned salmon 		with **tinned chickpeas** 		and **salad** 
Tinned tuna 		plus **instant brown** or **basmati rice** 		with **tinned corn, peas** and **beetroot** 
Egg 		on **wholemeal toast** 		with **avocado, tomato** and **mushrooms** 
Supermarket rotisserie chicken (skin removed) 		with **couscous** 		and **frozen vegetables** 

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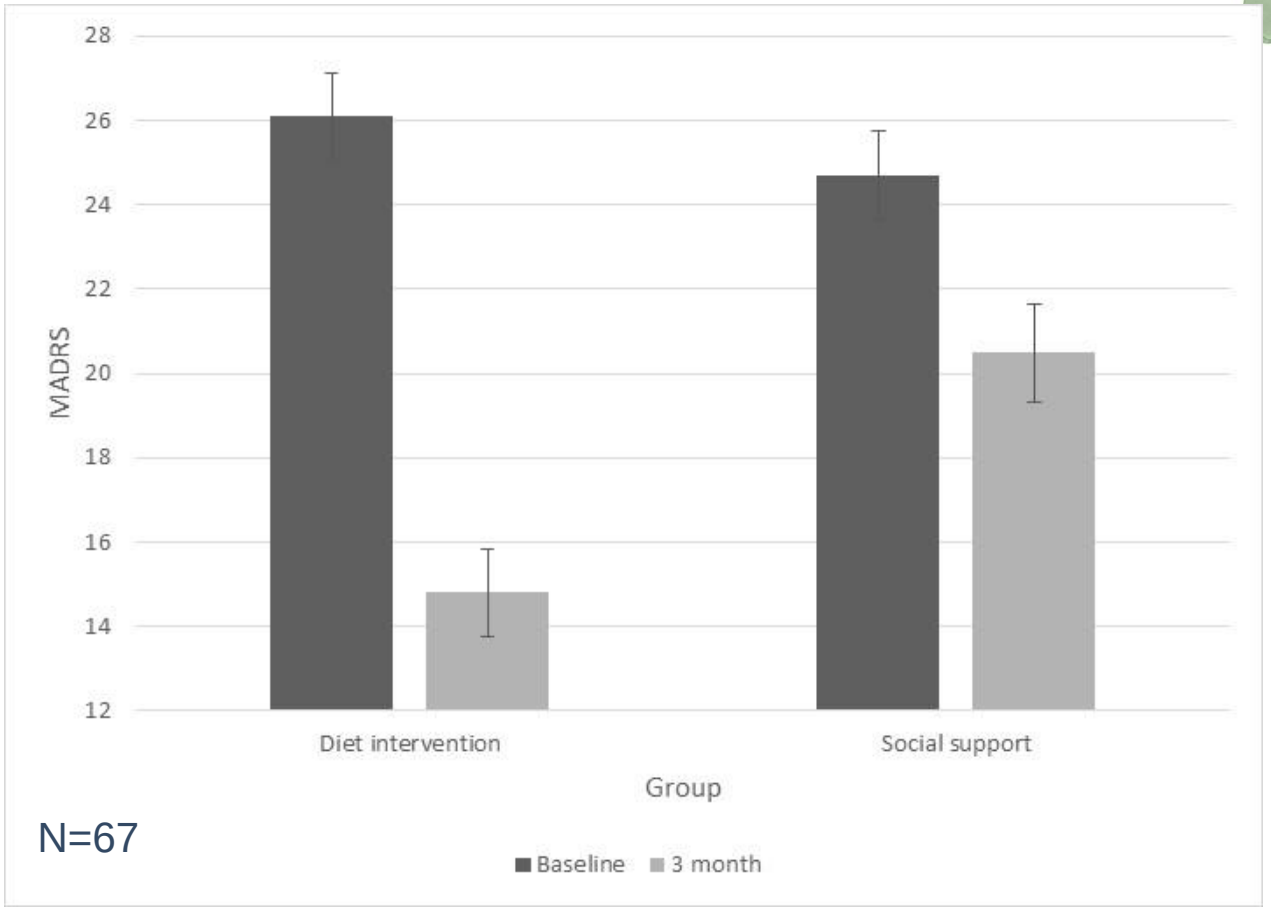
RESULTS

Effect size:
Cohen's d = -1.16
(95% CI -1.73, -0.59)

NNT= 4.1



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Jacka et.al. 2017 BMC Medicine

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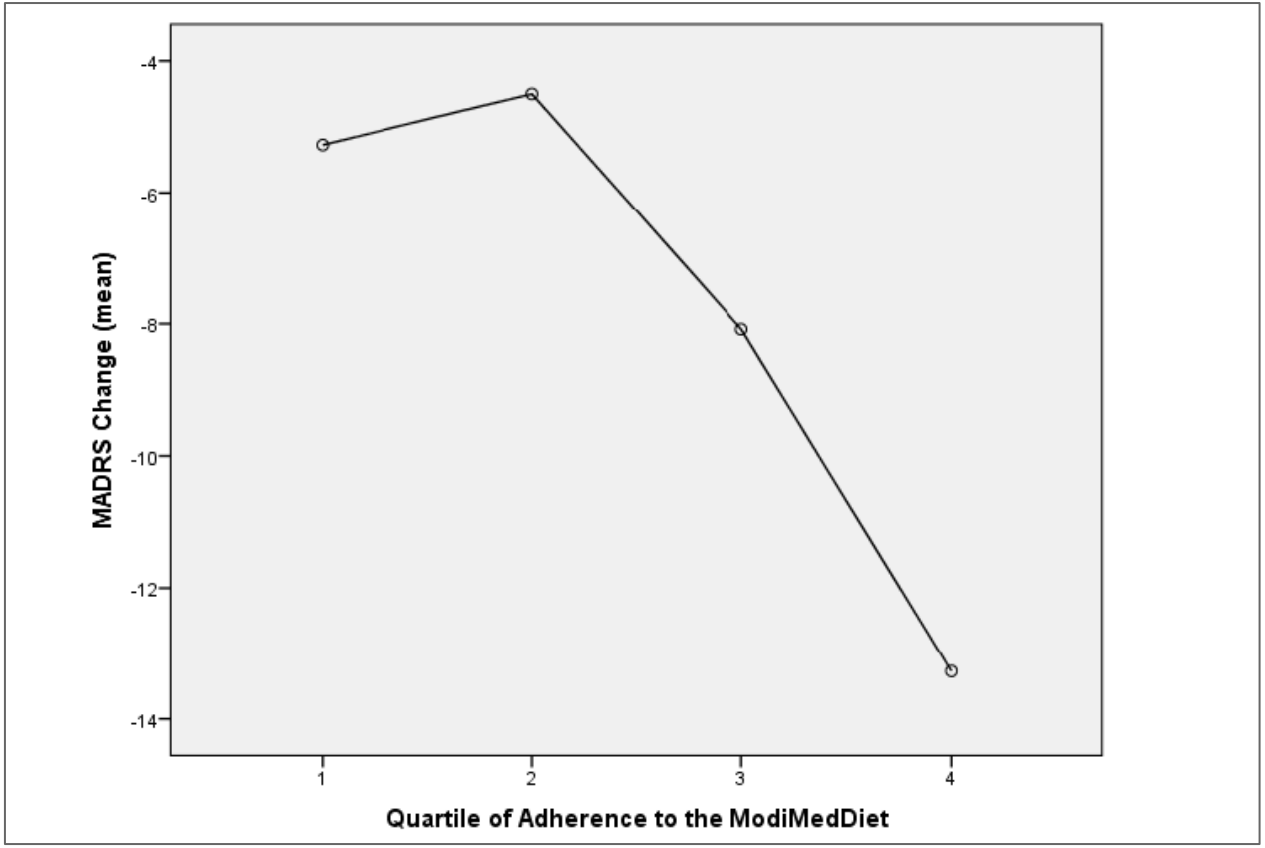

Change in MADRS over 3 months across quartiles of adherence to Mod*i*MedDiet

Jacka et.al. 2017 BMC Medicine

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Is it cheaper to eat an unhealthy vs a healthy diet?

academicJournals
Vol. 7(5), pp. 159-169, May 2015
DOI: 10.5897/JPHE2014.0668
Article Number: 213D23952222
ISSN 2006-9723

http://www.academicjournals.org/JPHE

Journal of Public Health and Epidemiology

Full Length Research Paper

Assessing healthy diet affordability in a cohort with major depressive disorders

Rachelle S. Opie[1]*, Leonie Segal[2], Felice N. Jacka[3], Laura Nicholls[3], Sarah Dash[3], Josephine Pizzinga[3] and Catherine Itsiopoulos[1]

- Trial participants spent an estimated mean of **$138** per week on food and beverages for personal consumption at the start of the trial
- Total food and beverage costs per person per week for the recommended modified Mediterranean diet was estimated at **$112**
- The modified Mediterranean diet at $1.54 per mega-joules (MJ) was cheaper per energy unit than the cost of the current dietary intake of the SMILES participants at a mean of $2.35 per MJ

$138 vs $112 per week

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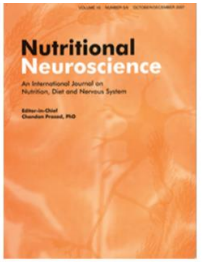
Economic Evaluation

- We measured time lost (absenteeism) from paid and unpaid work (volunteering, study, house-keeping)
- We measured visits to health care professionals
- We measured the costs of delivering the interventions and the diet itself
- Compared with the social support condition, average total health sector costs were $856 lower and average societal costs were $2591 lower for those receiving dietary support.
- These differences were driven by lower costs arising from fewer allied and other health professional visits and lower costs of unpaid productivity (*Chatterton et al. 2018 BMC public health*)



Taylor & Francis
Taylor & Francis Group

Nutritional Neuroscience

An International Journal on Nutrition, Diet and Nervous System

ISSN: 1028-415X (Print) 1476-8305 (Online) Journal homepage: http://www.tandfonline.com/loi/ynns20

A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFIMED)

Natalie Parletta, Dorota Zarnowiecki, Jihyun Cho, Amy Wilson, Svetlana Bogomolova, Anthony Villani, Catherine Itsiopoulos, Theo Niyonsenga, Sarah Blunden, Barbara Meyer, Leonie Segal, Bernhard T. Baune & Kerin O'Dea

To cite this article: Natalie Parletta, Dorota Zarnowiecki, Jihyun Cho, Amy Wilson, Svetlana Bogomolova, Anthony Villani, Catherine Itsiopoulos, Theo Niyonsenga, Sarah Blunden, Barbara Meyer, Leonie Segal, Bernhard T. Baune & Kerin O'Dea (2017): A Mediterranean-style dietary intervention supplemented with fish oil improves diet quality and mental health in people with depression: A randomized controlled trial (HELFIMED), Nutritional Neuroscience, DOI: 10.1080/1028415X.2017.1411320

To link to this article: https://doi.org/10.1080/1028415X.2017.1411320

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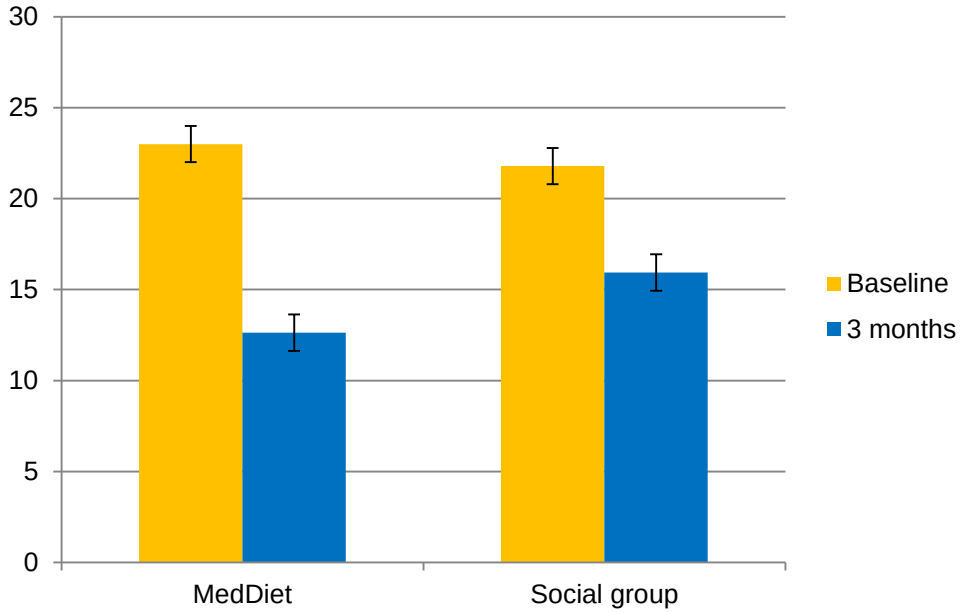
HELFIMED study: effect of Mediterranean diet on mental health in people with depression



DASS Depression Score (*P*=0.027 for treatment interaction, N=152)

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Parletta, Zarnowiecki, Cho, Bogomolova, Wilson, Villani, Itsiopoulos, Segal, Niyonsenga, O'Dea et al., under review

Whole Diet-Focused Treatment

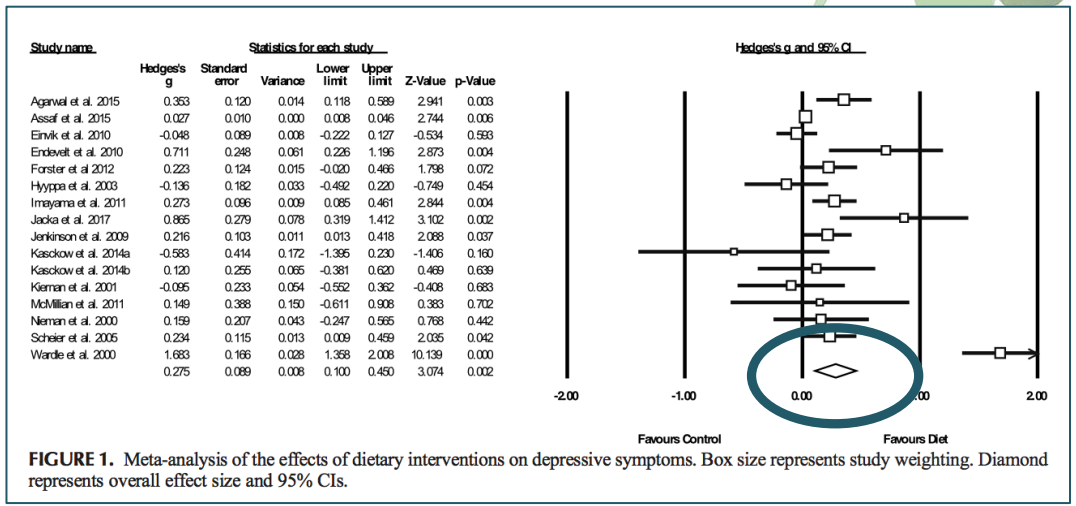
SYSTEMATIC REVIEW/META-ANALYSIS

OPEN

The Effects of Dietary Improvement on Symptoms of Depression and Anxiety: A Meta-Analysis of Randomized Controlled Trials

Joseph Firth, PhD, Wolfgang Marx, PhD, Sarah Dash, PhD, Rebekah Carney, PhD, Scott B. Teasdale, PhD, Marco Solmi, MD, Brendon Stubbs, PhD, Felipe B. Schuch, PhD, André F. Carvalho, MD, Felice Jacka, PhD, and Jerome Sarris, PhD

Psychosomatic Medicine (2019)



Study name	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Agarwal et al. 2015	0.353	0.120	0.014	0.118	0.589	2.941	0.003
Assaf et al. 2015	0.027	0.010	0.000	0.008	0.046	2.744	0.006
Einvik et al. 2010	-0.048	0.089	0.008	-0.222	0.127	-0.534	0.593
Endevelt et al. 2010	0.711	0.248	0.061	0.226	1.196	2.873	0.004
Forster et al 2012	0.223	0.124	0.015	-0.020	0.466	1.798	0.072
Hyyppa et al. 2003	-0.136	0.182	0.033	-0.492	0.220	-0.749	0.454
Imayama et al. 2011	0.273	0.096	0.009	0.085	0.461	2.844	0.004
Jacka et al. 2017	0.865	0.279	0.078	0.319	1.412	3.102	0.002
Jenkinson et al. 2009	0.216	0.103	0.011	0.013	0.418	2.088	0.037
Kasckow et al. 2014a	-0.583	0.414	0.172	-1.395	0.230	-1.406	0.160
Kasckow et al. 2014b	0.120	0.255	0.065	-0.381	0.620	0.469	0.639
Kiernan et al. 2001	-0.095	0.233	0.054	-0.552	0.362	-0.408	0.683
McMillan et al. 2011	0.149	0.388	0.150	-0.611	0.908	0.383	0.702
Nieman et al. 2000	0.159	0.207	0.043	-0.247	0.565	0.768	0.442
Scheier et al. 2005	0.234	0.115	0.013	0.009	0.459	2.035	0.042
Wardle et al. 2000	1.683	0.166	0.028	1.358	2.008	10.139	0.000
	0.275	0.089	0.008	0.100	0.450	3.074	0.002

FIGURE 1. Meta-analysis of the effects of dietary interventions on depressive symptoms. Box size represents study weighting. Diamond represents overall effect size and 95% CIs.

- N=16 RCTs with 45,826 participants
- Dietary interventions significantly reduced depressive symptoms
- No effect was observed for anxiety (but few studies)
- Greater benefits in females for both depression and anxiety

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Firth et al. 2019 In Press

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Take-home message

Diet matters to mental and brain health

DIET IS MODIFIABLE – TARGET FOR PREVENTION AND TREATMENT

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Current Clinical Practice Guidelines

RANZCP Guidelines

ANZJP

Australian & New Zealand Journal of Psychiatry
2015, Vol. 49(12) 1087–1206
DOI: 10.1177/0004867415617657

Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for mood disorders

Gin S Malhi[1,2], Darryl Bassett[3,4], Philip Boyce[5], Richard Bryant[6], Paul B Fitzgerald[7], Kristina Fritz[8], Malcolm Hopwood[9], Bill Lyndon[10,11,12], Roger Mulder[13], Greg Murray[14], Richard Porter[13] and Ajeet B Singh[15]

The Royal Australian & New Zealand College of Psychiatrists

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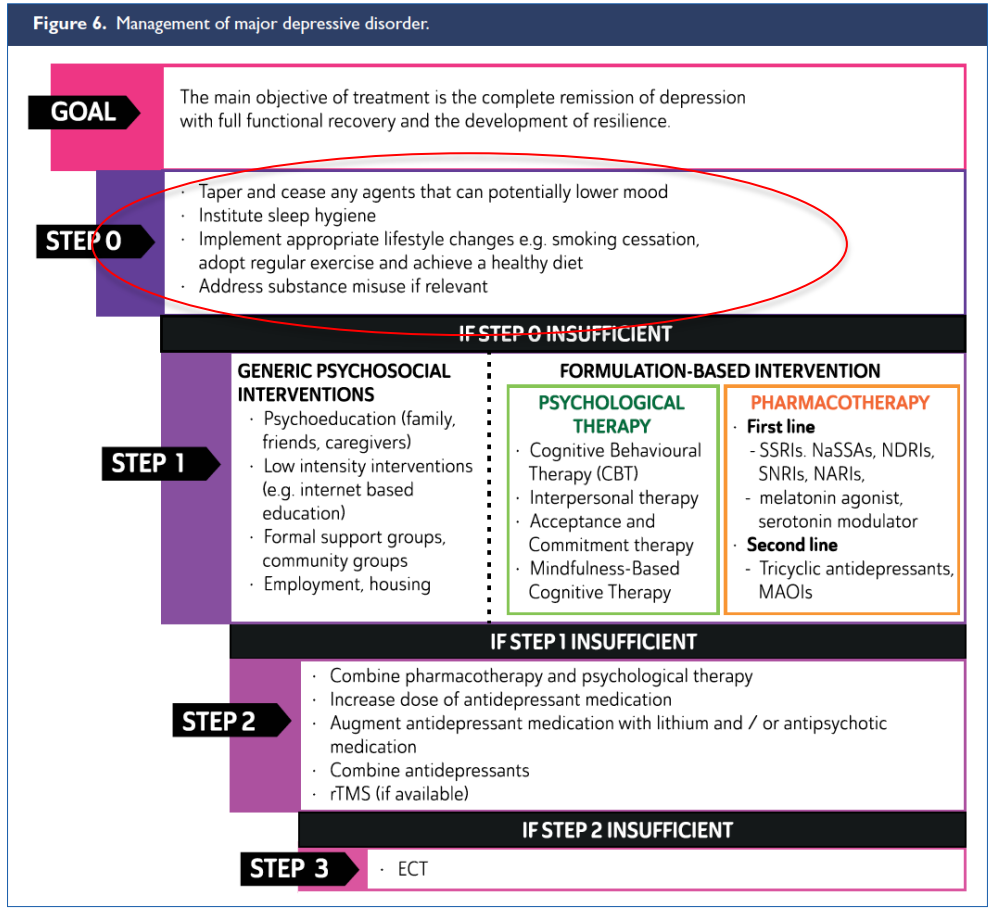
Current Clinical Practice Guidelines



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The Lancet Psychiatry Commission

The *Lancet Psychiatry* Commission: a blueprint for protecting physical health in people with mental illness

Joseph Firth, Najma Siddiqi, Ai Koyanagi*, Dan Siskind*, Simon Rosenbaum*, Cherrie Galletly*, Stephanie Allan, Constanza Caneo, Rebekah Carney, Andre F Carvalho, Mary Lou Chatterton, Christoph U Correll, Jackie Curtis, Fiona Gaughran, Adrian Heald, Erin Hoare, Sarah E Jackson, Steve Kisely, Karina Lovell, Mario Maj, Patrick D McGorry, Cathrine Mihalopoulos, Hannah Myles, Brian O'Donoghue, Toby Pillinger, Jerome Sarris, Felipe B Schuch, David Shiers, Lee Smith, Marco Solmi, Shuichi Suetani, Johanna Taylor, Scott B Teasdale, Graham Thornicroft, John Torous, Tim Usherwood, Davy Vancampfort, Nicola Veronese, Philip B Ward, Alison R Yung, Eoin Killackey†, Brendon Stubbs†*

***Lancet Psychiatry* 2019; 6: 675–712**

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Where to next?

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www.foodandmoodcentre.org.au

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Food & Mood Centre Program

Early Life

Pregnancy
Birth
Infancy
Neurodevelopment

Health Behaviours & Determinants

Diet
Stress
Physical Activity
Sleep

Mental & Brain Health

Depression
Anxiety
Psychosis
Eating disorders
PTSD
Cognition
Neurobiology

Physical Health

Gut health
Cardio health
Metabolic health
Vascular health

Healthy Ageing

Cognitive decline
Neurodegeneration

Population health | Novel interventions | Mechanisms | Implementation science | Education and training

Mechanistic pathways

INFLAMMATION AND OXIDATIVE STRESS
BDNF AND BRAIN PLASTICITY
GUT MICROBIOTA

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Diet Quality and Brain Plasticity

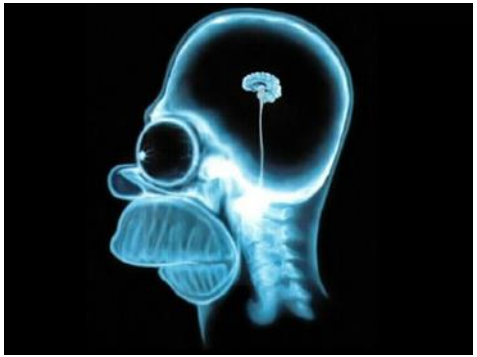
Jacka et al. BMC Medicine (2015) 13:215
DOI 10.1186/s12916-015-0461-x

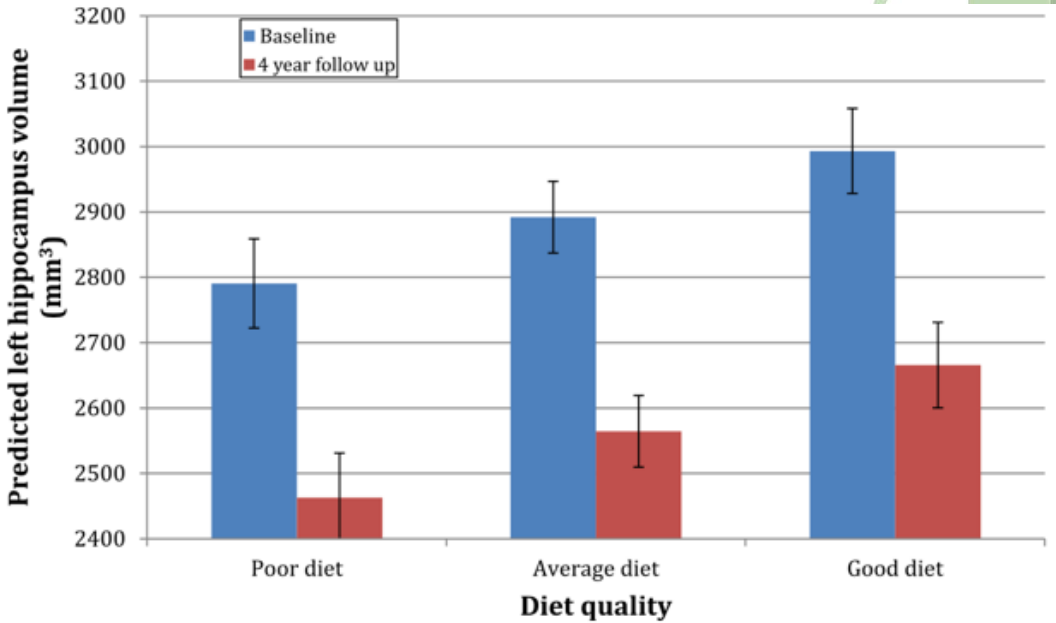
BMC Medicine

RESEARCH ARTICLE Open Access

Western diet is associated with a smaller hippocampus: a longitudinal investigation

Felice N. Jacka[1,2,3,4*], Nicolas Cherbuin[5], Kaarin J. Anstey[5], Perminder Sachdev[6] and Peter Butterworth[5]





Personality and Total Health Through Life study: n = 255; aged 60 – 64 years; 4 years follow-up

Jacka et al. 2015 *BMJ Medi*

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Diet Quality and Brain Plasticity

ARTICLE

Better diet quality relates to larger brain tissue volumes

The Rotterdam Study

Pauline H. Croll, MSc, Trudy Voortman, PhD, M. Arfan Ikram, MD, PhD, Oscar H. Franco, MD, PhD, Josje D. Schoufour, PhD, Daniel Bos, MD, PhD, and Meike W. Vernooij, MD, PhD

Correspondence
Dr. Vernooij
m.vernooij@erasmusmc.nl

Neurology® 2018;0:e1-e8. doi:10.1212/WNL.0000000000005691

n = 4,213
Aged 46 – 98 years
10 years follow-up
Results: "…better overall diet quality is related to larger total brain volume, gray matter, white matter, and hippocampal volume."

Adherence to dietary guidelines for specific food groups and brain volume

	Total brain volume
Vegetables	3.35 (0.31 to 6.39)[a]
Fruit	4.17 (1.10 to 7.24)[a]
Whole grains	3.45 (0.32 to 6.58)[a]
Legumes	0.08 (−3.13 to 3.29)
Nuts	5.91 (2.26 to 9.55)[a]
Dairy	2.45 (−0.59 to 5.49)
Fish	2.44 (−0.47 to 5.35)
Tea	−0.20 (−5.43 to 5.02)
Grains	5.39 (1.84 to 8.94)[a]
Fats	2.10 (−0.97 to 5.16)
Red meat	2.29 (−1.25 to 5.83)
Sugar-containing beverages	−1.57 (−5.25 to 2.12)
Alcohol	2.43 (−0.57 to 5.43)
Salt	0.69 (−3.15 to 4.54)

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Croll et al. 2018 *Neurology*.

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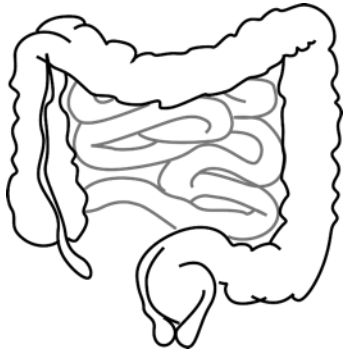
The Microbiota-Gut-Brain Axis



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- 100 trillion microorganisms
- 99.5% of our genetic material
- 23,000 human genes vs

4.4 million microbial genes

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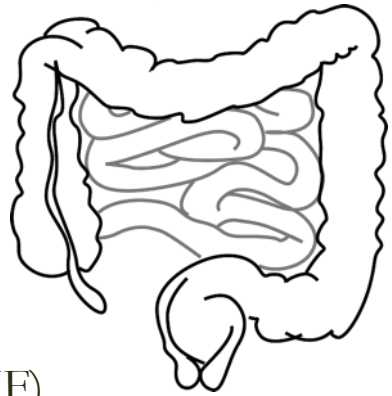
Biological Dysregulation in Depression



- Inflammatory and oxidative stress (cytokines, CRP, ROS)
- Metabolic (insulin resistance, metabolic syndrome)
- HPA axis (cortisol)
- Neurotransmitter/neuropeptide (dopamine, serotonin, GABA, BDNF)

Each modified by gut microbiota

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Maes et al. *Prog Neuropsychopharmacol Biol Psychiatry*. 2011; Lopresti & Drummond. *Prog Neuropsychopharmacol Biol Psychiatry*. 2013

A DEAKIN IDEA

‘GERM FREE MICE’

Altered stress response

Altered brain plasticity

Altered BBB

Altered levels of neurotransmitters

Altered immune system

Altered behaviours

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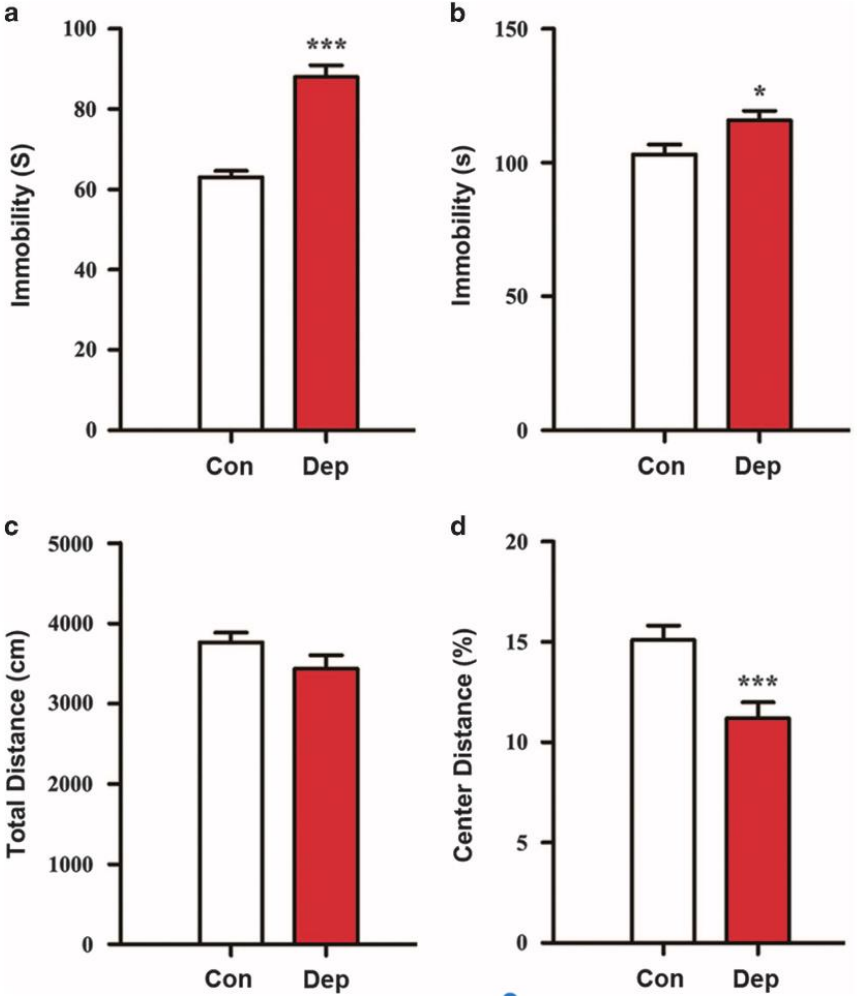

Molecular Psychiatry (2016), 1–11

www.nature.com/mp

ORIGINAL ARTICLE

Gut microbiome remodeling induces depressive-like behaviors through a pathway mediated by the host's metabolism

P Zheng[1,2,3,8], B Zeng[4,8], C Zhou[1,2,3,8], M Liu[1,2,3], Z Fang[1,2,3], X Xu[1,2,3], L Zeng[1,2,3], J Chen[1,2,3], S Fan[1,2,3], X Du[1,2,3], X Zhang[1,2,3], D Yang[5], Y Yang[1,2,3], H Meng[6], W Li[4], ND Melgiri[1,2,3], J Licinio[7,9], H Wei[4,9] and P Xie[1,2,3,9]

FMT from patients with MDD induced depressive-like behaviours in contrast to FMT from patients without MDD

SCIENCE ADVANCES | RESEARCH ARTICLE

NEUROSCIENCE

The gut microbiome from patients with schizophrenia modulates the glutamate-glutamine-GABA cycle and schizophrenia-relevant behaviors in mice

Peng Zheng[1,2,3]*, Benhua Zeng[4]*, Meiling Liu[5], Jianjun Chen[6], Junxi Pan[2,3,7], Yu Han[1,2,3], Yiyun Liu[1,2,3], Ke Cheng[1,2,3], Chanjuan Zhou[2,3], Haiyang Wang[1,2,3], Xinyu Zhou[1,2,3], Siwen Gui[1,2,3], Seth W. Perry[8], Ma-Li Wong[8], Julio Licinio[8†‡], Hong Wei[9†‡], Peng Xie[1,2,3†‡]

Zheng *et al.*, *Sci. Adv.* 2019

- Observed profound gut microbiota alterations in patients with SCZ relative to HC subjects (incl lower alpha-diversity)
- Identified unique bacterial taxa that were strongly associated with SCZ severity
- GF mice colonization with human SCZ microbiota resulted in SCZ-relevant behavioral changes similar to those observed in glutamatergic mouse models of SCZ
- Mice receiving gut microbiome transfers from patients with SCZ displayed disturbances of microbial genes and host metabolites involved in amino acid and lipid metabolism, including glutamate, which has been strongly implicated in SCZ pathology

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A DEAKIN IDEA

Main factors influencing microbiota

- Age
- Geography
- Stress
- Infection
- Medication use
- Diet

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The Healthy Parents, Healthy Kids Study

Samantha Dawson[1,2], Jeff Craig[1,2], Gerard Clarke[3], Mimi Tang[4,5], Felice Jacka[1,2]

1. Deakin University
2. Murdoch Childrens Research Institute
3. University College Cork, Ireland
4. Melbourne University
5. Royal Children's Hospital

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MOVING MOODS

Human microbial transfer as an adjunctive treatment for MDD

Primary outcome measure	**Aim**	**Target population**
Feasibility	n = 60	adults with moderate to severe MDD

Primary objective

Investigate the feasibility of FMT as an adjunctive treatment for depression in adults

Secondary objectives

Establish whether FMT changes biological parameters in depressed adults, including the faecal microbiome, Hypothalamic Pituitary Axis activity, Neurogenesis, inflammation, cardiovascular and metabolic risk factors, cognition, Quality of life, gastrointestinal symptoms and tolerability. Depression symptoms (MADRS) will also be assessed.

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Dr Jessica Green

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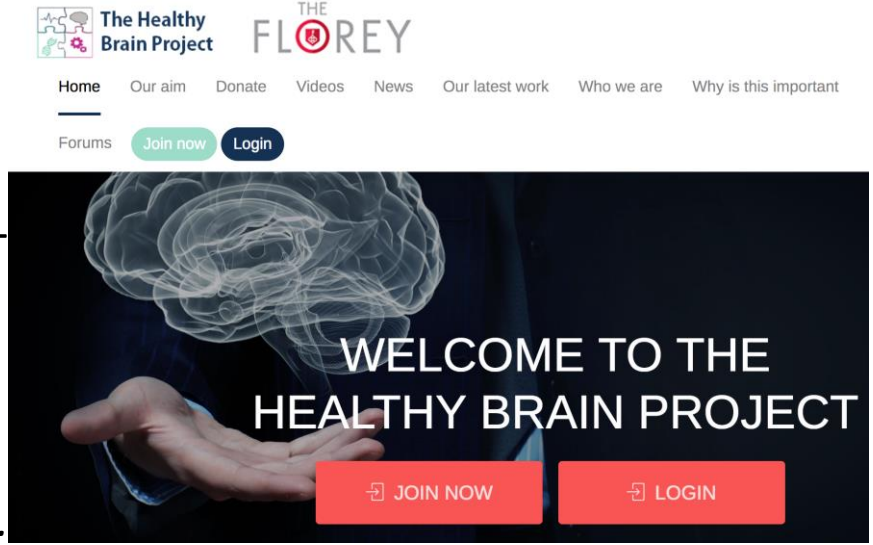
Healthy Brain Project - Microbiome

How does the gut microbiome relate to Alzheimer's disease pathophysiology?

- Healthy Brain Project – Florey Institute (lead by Drs Rachel Buckley & Yen Ying Lim)
- PI: Dr Amy Loughman, RA: Madi West
- Ultimate aim: predict relative risk of Alzheimer's disease in healthy middle-aged adults on the basis of genetic, microbiome & behavioural data.



Funded by: Jack Brockhoff Foundation.

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Exploring the association between dietary polyphenols and brain health

- Epidemiological studies
  - UKBiobank (N=~500,000), general population
  - Ausimmune case-control study (N=600), first dx of multiple sclerosis and healthy controls
  - Outcomes: incidence of mental illness, cognitive performance, fatigue, **metabolomic** and **microbiome-related** pathways

Meg Hockey

THE MOO'D STUDY

DOUBLE BLINDED 16-WEEK RCT

n= 160
≥18 y
≥ 250ml milk/day
Low mood

Randomised

Control
Conventional milk (≥250ml/day),cheese

No other dairy

Intervention
A2 milk (≥250ml/day), cheese

Fortnightly

Fortnightly

Primary outcome

Psychological distress (DASS-21 total)

Secondary outcomes

Sub scores of depression, anxiety and stress (DASS-21)

Severity of depressive symptoms (PHQ-8)

Cognitive function (Cogstate)

RECRUITMENT + DATA COLLECTION
2018-2020

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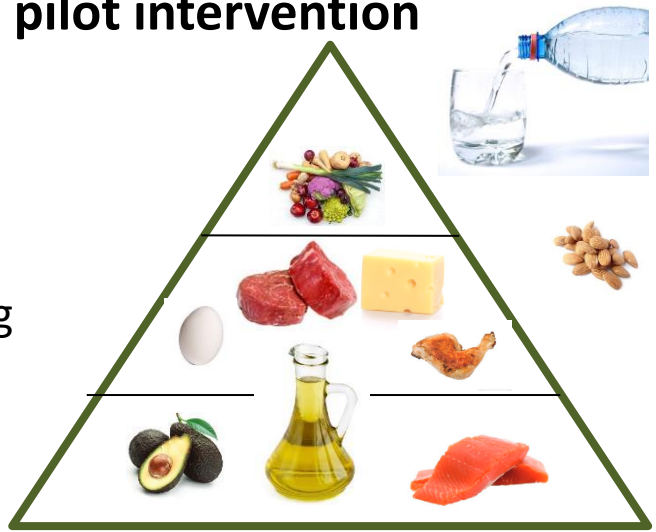
Ketogenic Diet for psychotic symptoms – PsyDiet study

KETOGENIC DIET

- Glucose is restricted → production of ketone bodies
- Used to manage epilepsy in children since the 1920s
- Only few case and animal studies in psychotic disorders/ schizophrenia
- Neuroprotective effects (adenosine and glutamate metabolism, AMPA receptor)?

A 6-week randomized, controlled ketogenic diet pilot intervention study in psychotic inpatients (n=40)

- Carbohydrates limited to max 20 grams/day
- Ketone-body levels, blood glucose levels
- Primary outcome: psychotic symptoms
- Secondary outcomes: depression, anxiety, functioning



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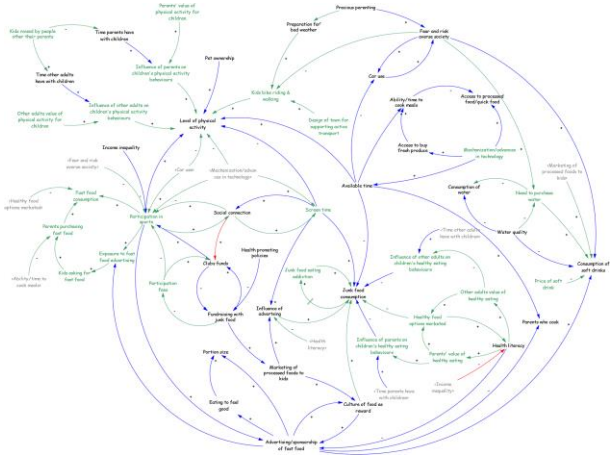
Dr Anu Ruusunen

Global Obesity Collaboration

Dr Erin Hoare

- Based in Centre for Population Health Research
- Community-based systems trial WHO STOPS (n>5000 children, 10 communities)
- Primary outcome of interest = childhood (6-12 years) obesity
  - FAMC (Dr Erin Hoare) will assess the mental and emotional health outcomes of nutritional and physical activity intervention
  - Opportunities to build mental health-related strategies into step-wedge design



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GLOBE GLOBAL OBESITY CENTRE

WHO Collaborating Centre for Obesity Prevention

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- Medicare item numbers for Dietitians and Exercise Physiologists
- Large-scale pragmatic trials
- New models of clinical treatment (e.g. shared appointments)
- Global Burden of Disease Study

Joint WFSBP & ASLM International Taskforce

- *Clinical Therapeutic Guidelines for Lifestyle Medicine in Mental Health Treatment*

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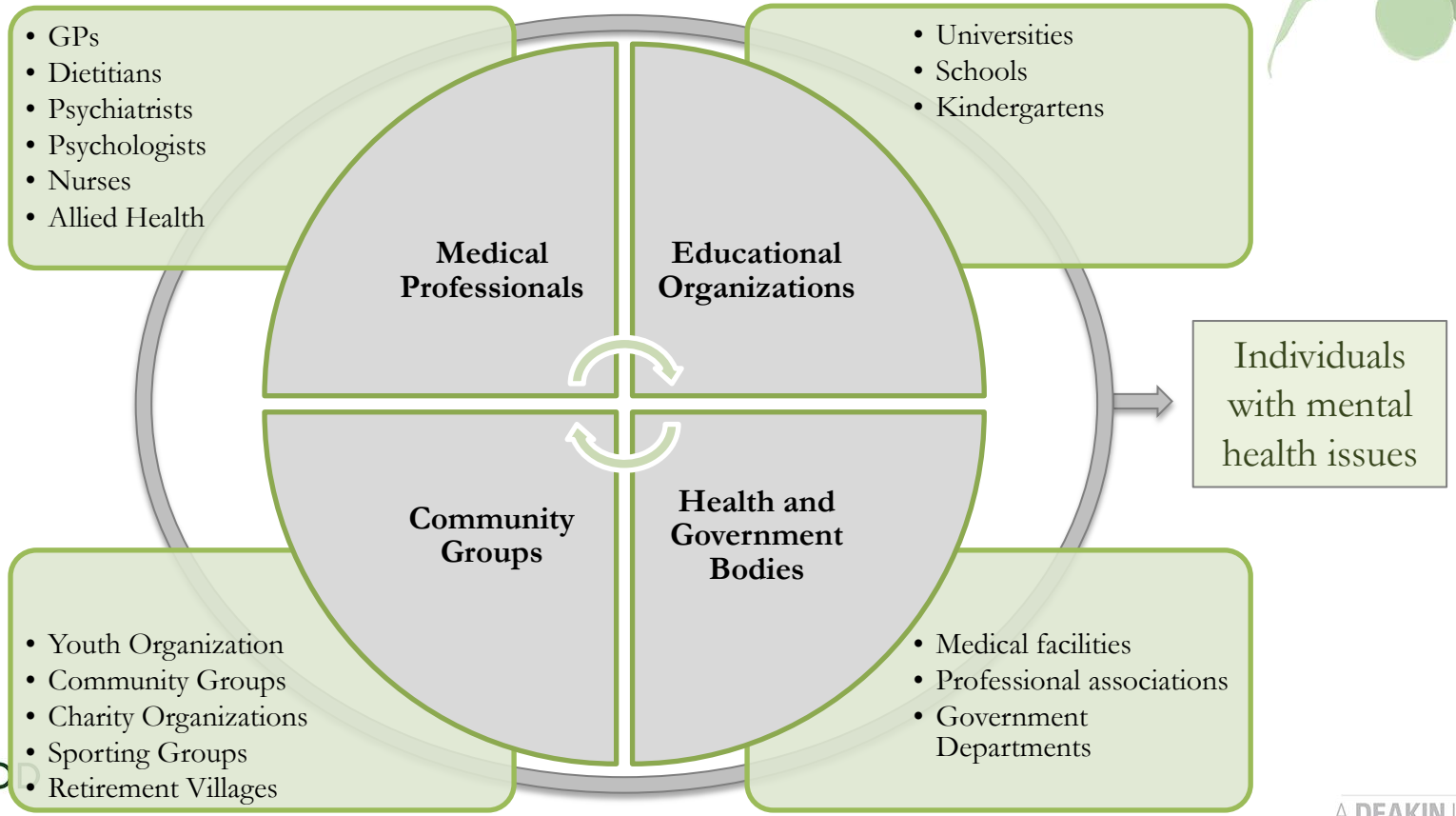
Knowledge Translation Recipients



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INTERNATIONAL SOCIETY FOR NUTRITIONAL PSYCHIATRY RESEARCH 2019

London, UK **20-22ND OCTOBER 2019**

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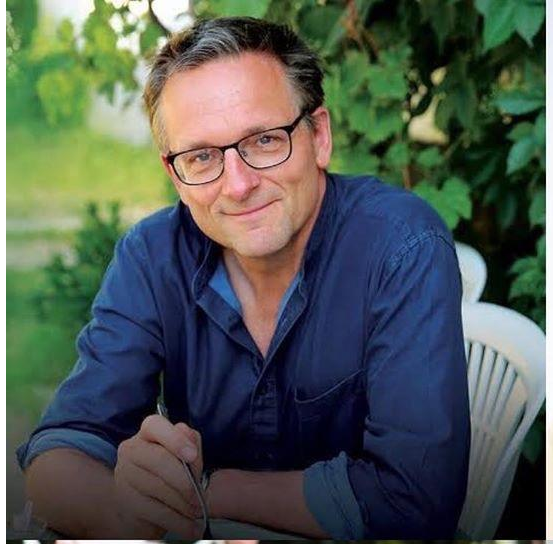

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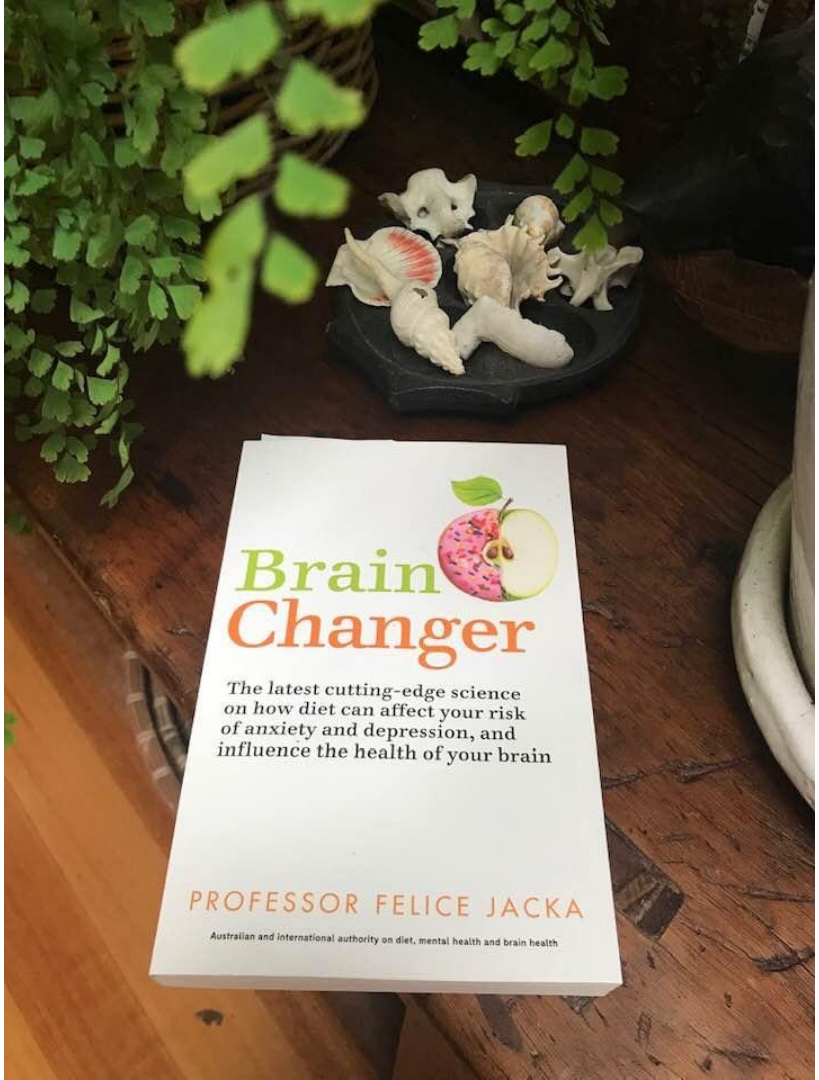

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Samantha Dawson

Claire Young

Amelia McGuinness

Hajara Aslam

Sara Campolonghi

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Jessica Davis

Jessica Green

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