PSYCHOLOGY MISCELLANY

No.45 - March 2013

Kevin Brewer

ISSN: 1754-2200

Orsett Psychological Services
PO Box 179
Grays
Essex
RM16 3EW
UK

orsettpsychologicalservices@phonecoop.coop

This document is produced under two principles:

1. All work is sourced to the original authors. Most of the images are available in the public domain (mainly from http://commons.wikimedia.org/wiki/Main_Page). You are free to use this document, but, please, quote the source (Kevin Brewer 2013) and do not claim it as you own work.

This work is licensed under the Creative Commons Attribution (by) 3.0 License. To view a copy of this license, visit http://creativecommons.org/licenses/by-nc-nd/3.0/ or send a letter to Creative Commons, 171 2nd Street, Suite 300, San Francisco, California, 94105, USA.

2. Details of the author are included so that the level of expertise of the writer can be assessed. This compares to documents which are not named and it is not possible to tell if the writer has any knowledge about their subject.

Kevin Brewer BSocSc, MSc

An independent academic psychologist, based in England, who has written extensively on different areas of psychology with an emphasis on the critical stance towards traditional ideas.

A complete listing of his writings at http://kmbpsychology.jottit.com.

CONTENTS

1. PSYCHOLOGICAL PROCESSES AND SURVIVAL IN AN EMERGENCY

1.1. DISASTER SURVIVAL

In a disaster situation, there are many factors that influence survival, varying from engineering (eg: safety features of a plane) to chance (eg: where the individual was sitting in the plane), but human psychological factors are of interest [1]. Despite the possibility of escape from an accident, for example, some victims "freeze" (behavioural inactivity - eg: remaining in seat as plane engulfed in flames) or show "irrational" behaviour such that they do not survive. "Over the years, witnesses to a variety of disasters have testified to seeing victims die who could have escaped had they responded appropriately to the emergency" (Leach 2004) [2].

Leach (2004) explored "freezing" using witness statements from official inquiry reports of maritime (eg: Piper Alpha oil platform explosion, off Scotland, in 1988) and aircraft disasters (eg: runway engine fire at Manchester Airport, UK, in 1995), and interviews with nineteen survivors. Three groups of behaviour/individuals could be distinguished:

i) Calm and reasonable behaviour including planning escape (approximately 10-15% of people).

ii) Bewilderment including impaired reasoning, and reflexive/automatic behaviour (approximately 75%).

iii) Counter-productive behaviour (eg: "freezing", screaming, uncontrollable weeping) (approximately 10-15%).

[1] These include the will-to-live, which has been studied more generally in relation to illness and old age (appendix 1A).
[2] The responses can be disorganised, inappropriate, slow or a combination of these (Leach and Ansell 2008).

1.2. COGNITIVE PROCESSES

Porter and Leach (2010) observed: "Intuitively, a threatening situation would place a high information load on the cognitive system. To enhance survival this information must be processed, interpreted and responded to in a timely and appropriate manner. Yet various official investigations clearly indicate impairment in cognitive functioning under threat..." (p41) [3]. The maladaptive behaviour may be due to impairment in executive function which involves attention, planning, and execution of actions and thoughts [4]. Porter and Leach (2010) investigated the components of this process with Royal Air Force (RAF) air crew on survival courses in the north of England.

Different tests were given to the participants during a simulation of an "aircraft down" survival incident.

a) Dual task test - This involves two tasks at the same time, and it measures the allocation of attentional resources. The tasks were to remember a number of digits, while crossing out eighty drawings of boxes in a particular order for two minutes.

b) Stroop task - Participants say aloud the colour of the ink of 25 coloured words (eg: "RED" written in red ink (congruent) or "RED" written in blue ink (incongruent)). The speed and number of errors were measured. The incongruent condition measures the ability to inhibit automatic responses.

c) Verbal fluency - Individuals have one minute to generate as many examples of a category (eg: names of countries). This tests the ability to access information from long-term memory.

d) Random letter generation task - This task involves saying aloud alphabet letters in a random order for one minute. This also measures the ability to suppress automatic responses.

e) The Tower of London test - The task is to more five pegs from one board to another board to match a pattern in the least number of moves. This measured planning ability.

---

[3] Having less physical resources (scarcity) also leads to poor decision-making. Scarcity "engages the mind, and that this engagement causes neglect along other dimensions, leading to sub-standard outcomes" (Zwane 2012) (ie: "scarcity changes how people allocate attention"; Shah et al 2012) (appendix 1B).

[4] Shalev (2000) talked of "cognitive disarray". Cognitive impairment when an individual perceives psychological or physical harm.

Compared to the control group, the participants in the experimental condition (the survival simulation) performed significantly worse on the Stroop task, the random letter generation task, and the Tower of London test, but there was no difference for the dual-task and verbal fluency tests. These findings showed that individuals in survival situations have impairments in some executive processes. The ability to inhibit automatic responses is reduced (as shown by the Stroop and the random letter generation tasks), and to plan is impaired. In the Tower of London test participants in the experimental condition took longer to plan and execute their moves. These impairments are linked to the left dorsolateral prefrontal cortex (DLPFC).

Leach and Ansell (2008) found impairments in selective and sustained attention but not attentional switching in the experimental work with RAF aircrews. A victim has the goal to survive, so survival can be viewed as a goal-directed behaviour which requires the control of actions. A failure here leads to automatic responses rather than goal-directed (voluntary) ones. For example, when an aircraft crashes into water, an automatic response is to inflate the lifejacket immediately inside the aircraft, which traps the individual, whereas a goal-directed behaviour would be to wait until outside the fuselage. One hundred and twenty-three passengers died in the Ethiopian Airways Flight 961 that crashed into the Indian Ocean in 1996 because of this automatic response (Leach and Ansell 2008).

Leach and Ansell (2008) measured the components of attention with the Test of Everyday Attention (TEA) (Robertson et al 1994) including:

- Map search (tests selective attention - ie: ability to focus) - finding eighty symbols on a map in two minutes (eg: "knife and fork" = place to eat).

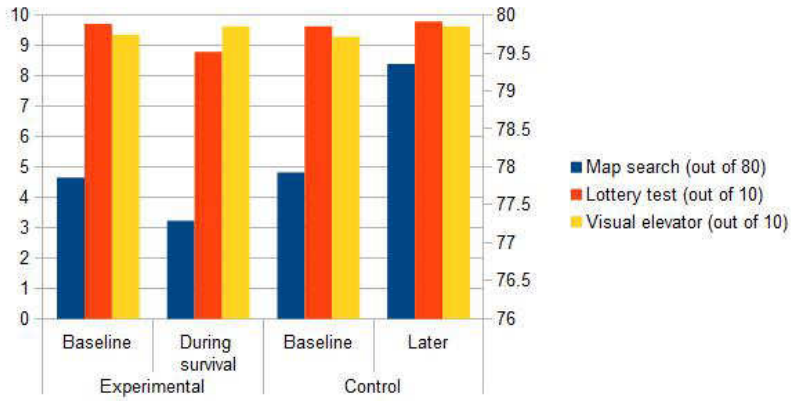
- Visual elevator (tests attentional switching) - count the number of floors in pictures of a lift moving up and down a building. Sometimes the floors upwards are counted, then the task switches to counting the floors downwards, and so on. Accuracy is the correct number of floors counted.

- Lottery test (tests sustained attention - ie: long-term concentration) - combinations of numbers and letters (eg: TU361) are presented via a ten-minute audiotape, and the participant must listen for ten targets (eg: ending in double digits like 77) and write them down.

The participants were tested before the two-week survival course (baseline), during (12-24 hours in), and after. There was a control group who did not undergo the

survival course.

The number of symbols found in the map search task declined during the survival course compared to the baseline as did the scores on the lottery test, but not the visual elevator accuracy for the participants, while the control group showed a steady improvement each time they did the tasks (figure 1.1).



(Data from Leach and Ansell 2008 table 1 p647)

Figure 1.1 - Mean scores on TEA at baseline and during a survival course.

Leach and Ansell (2008) concluded that the cognitive impairments in attention found made "flexible interaction with the survival environment difficult and the victim's behaviour becomes dominated by environmental cues at the expense of wilful, goal-directed survival behaviour. The often witnessed result is of a victim who is cognitively unable to aid his own survival" (p651).

1.3. RESILIENCE

After a traumatic event there is a lot of concern about the psychological effects including the development of post-traumatic stress disorder (PTSD), but the majority of survivors recover and get on with their lives. They show a natural resilience (Stix 2011).

However, there are individual differences in resilience, and the causes of the differences are of interest to researchers. For example, differences in the biological reaction to stress (eg: higher blood levels of neuropeptide Y and resilience) (Stix 2011).

Bonanno (2009), who has studied different groups of survivors from sudden bereavement to victims of sexual abuse, talked of "coping ugly". These are unexpected coping strategies that the individual uses, including a

self-enhancing bias bordering on narcissism (inflated perception of self).

1.4. APPENDIX 1A - WILL-TO-LIVE GENERALLY

The will-to-live (WTL) is defined as "a psychological expression of the striving for life, including both rational and instinctual underpinnings" (Karppinen et al 2012 p790). It includes an evaluation of own health and estimation of life expectancy, and the motivation to live based on current quality of life. Its loss is distinct from depression, despair, grief or sadness (Karppinen et al 2012).

Karppinen et al (2012) asked a random sample of 283 home-dwelling 75-90 year-olds in Helsinki, Finland, how many years they would still wish to live. The question was asked in 1998-2000, and the researchers subsequently collected details of the age of death of the respondents who were not still living.

The respondents were divided into three groups - wish to live less than five years more (26.1% of respondents), between 5-10 years more (55.8%), and longer than ten years more (18.0%). By the 10-year follow-up, half of the sample had died, but the rates varied significantly between the groups. The most had died from the shortest wish to live more group (68.9% of less than five years more), followed by 45.6% of middle group, and 33.3% of longest wish to live group. "Those who wanted to live longer also survived longer" (Karppinen et al 2012 p792).

1.5. APPENDIX 1B - SCARCITY AND DECISION-MAKING

Shah et al (2012) focused upon how scarcity of resources leads to inappropriate decision-making rather than personality- or environment-based explanations of this behaviour by the poor. Thus "when money is scarce, expenses are not easily met. Instead of appearing mundane, they feel urgent. The very lack of available resources makes each expense more insistent and more pressing. A trip to the grocery store looms larger, and this month's rent constantly seizes our attention. Because these problems feel bigger and capture our attention, we engage more deeply in solving them. This is our theory's core mechanism: Having less elicits greater focus" (Shah et al 2012 p682). Then "attentional neglect" means that other problems are ignored.

Shah et al (2012) designed five experiments around games where participants had certain "budgets", and loans were available at differing rates of interest.

Experiment 1

In a game to guess the letters in a word puzzle, participants were allocated a small ("poor") or large ("rich") number of guesses in each round. Afterwards, they performed a task to measure attention. The accuracy on this task was lower for the "poor" participants who had put more concentration into the previous game. This showed that concentration in the game lowered the ability to attend later.

Experiment 2

Participants played a video game where they gained points for hitting targets. Scarcity was varied by the amount of shots given to the players, though extra shots could be "borrowed" at a cost. "Poor" participants spent more time taking aim and gained more points per shot than the "rich" participants when borrowing was not available. When borrowing was available, "poor" participants borrowed more, but their performance worsened.

Experiment 3

This experiment focused on scarcity of time in answering multiple-choice questions for points. "Poor" participants had a budget of fifteen seconds per round and "rich" participants fifty seconds. Seconds could be "borrowed" at a cost of points gained in some rounds. The "poor" participants performed better (ie: correct answers) when borrowing was not available, but worst when borrowing was allowed.

Experiment 4

This experiment was the same as the previous one but the players carried the debt from borrowing seconds into subsequent rounds. The "poor" participants did not reduce their borrowing as the debt accumulated despite performance dropping as they borrowed.

Experiment 5

This experiment used the dame game, but added the option of a preview of the next question at the bottom of the screen as the individual answered the current one. "Poor" participants were too focused on the current question, so did not benefit from the preview, whereas "rich" participants did.

Altogether these experiments show that scarcity (in time or money) leads to greater focus on the current task and a neglect of others (and the future).

1.6. REFERENCES

Bonanno, G.A (2009) The Other Side of Sadness: What the New Science of Bereavement Tells Us about Life After Loss New York: Basic Books

Karppinen, H et al (2012) Will-to-live and survival in a 10-year follow-up among older people Age and Ageing 41, 789-794

Leach, J (2004) Why people "freeze" in an emergency: Temporal and cognitive constraints on survival responses Aviation, Space and Environmental Medicine 75, 539-542

Leach, J & Ansell, L (2008) Impairment in attentional processing in a field survival environment Applied Cognitive Psychology 22, 643-652

Porter, H & Leach, J (2010) Executive dysfunction in a survival environment Applied Cognitive Psychology 24, 41-66

Robertson, I.H et al (1994) The Test of Everyday Attention Bury St Edmunds: Thames Valley Test Corporation

Shah, A.K et al (2012) Some consequences of having too little Science 338, 682-685

Shalev, A.Y (2000) Biological responses to disasters Psychiatric Quarterly 17, 277-288

Stix, G (2011) The neuroscience of true grit Scientific American March, 21-25

Zwane, A.P (2012) Implications of scarcity Science 338, 617-618

2. PSYCHOLOGY AND GLOBAL CLIMATE CHANGE

2.1. PSYCHOLOGY AND CLIMATE CHANGE

Swim et al (2011b) observed: "We are facing rapid changes in the global climate, and these changes are attributable to human behaviour. Humans produce this global impact through our use of natural resources, multiplied by the vast increase in population seen in the past 50 to 100 years" (p251). Doherty and Clayton (2011) felt that climate change was "as much a psychological and social phenomenon as a matter of biodiversity and geophysics and poses threats to psychological health and well-being on multiple, simultaneous levels".

In 2009, the American Psychological Association Task Force on the Interface Between Psychology and Global Climate Change issued a report on how psychology can contribute to a world facing climate change [5].

Swim et al (2011a) outlined four aspects of the relationship between psychology and global climate change (GCC):

i) Human contributions to GCC - eg: motivation and attitudes towards consumption that produces climate-changing emissions, as well as population growth. For example, "Gender roles that define women's status by the number of children they have, limit women's access to alternative roles, give others control over women's decisions to have children, and devalue female children (creating greater demand for more children in order to ensure having male children) have been implicated as causes of population growth in India..." (Swim et al 2011b).

ii) The psychological consequences of GCC - "Heat, extreme weather events, and increased competition for scarce environmental resources, compounded by pre-existing inequalities and disproportionate impacts among groups and nations, affect interpersonal and intergroup

[5] "Climate change is sometimes equated with global warming, but it involves much more than temperature change. The human activities that cause temperature change set in motion a series of associated phenomena: sea level rise, loss of polar sea ice, melting of continental glaciers, changes in precipitation patterns, progressive shifting in the habitats of species and the boundaries of ecosystems, acidification of the oceans, and more..." (Swim et al 2011a p241).

behaviour and can result in increasing stress and anxiety. Even in the absence of direct impacts, anticipation and concern about the threat of climate change may erode quality of life and threaten mental health" (Swim et al 2011a).

iii) Psychological processes in response to GCC - "Some relevant psychological processes include sense-making; causal and responsibility attributions for adverse climate change impacts; appraisals of impacts, resources, and possible coping responses; affective responses; and motivational processes related to needs for security, stability, coherence, and control" (Swim et al 2011a). The effectiveness of persuasion in changing behaviour is one relevant research area of psychology.

iv) Cognitive, affective and motivational responses to GCC - How people think and feel about GCC and adapting to it. For example, engaging in one type of environmentally-friendly behaviour can lead to other such behaviours, reduce other such behaviours, or lead to move environmentally-harmful behaviours (Swim et al 2011b). For example, an individual buys a more fuel-efficient new car and this leads to more driving than with their old fuel-inefficient car [6].

Perceived efficacy is important in changing behaviour, both response efficacy (perceived effectiveness of the behaviour in reducing emissions) and self-efficacy (an individual's perception of their ability to change behaviour) (Swim et al 2011b).

Studies have found that performing environmentally-responsible behaviours correlates with (Swim et al 2011b):

- Positive attitudes towards preserving nature.
- "Self-transcendent universal values" (eg: preference for uniting with nature as opposed to the acquisition of material objects).
- Beliefs about the vulnerability of nature.

2.2. IMPACT OF CLIMATE CHANGE

Doherty and Clayton (2011) distinguished three types of psychological impact of GCC:

a) Direct - eg: traumatic effects ("mental health

[6] This has been called the "Jevons paradox" or the Khazzoom-Brookes postulate" (Gifford 2011).

injuries") of experiencing extreme weather events.

Changes to an individual's environment ("place") and even forced migration will have an effect through loss of "place attachment". Albrecht et al (2007) referred to "solastalgia" as "the sense of distress people experience when valued natural environments are negatively transformed" (Doherty and Clayton 2011) [7], from studying the inhabitants of open pit coal-mining areas of Upper Hunter River Valley, Australia.

b) Indirect - eg: anxiety about the future from witnessing extreme weather events.

At the extreme, "environmental anxiety" (Rabinowitz and Poljak 2003) is an obsessive behaviour, that can be disabling, worrying about health risks that are less likely than common ones (eg: fear of nuclear power plant explosion vs motor vehicle accident). Maiteny et al (2002) described three responses to chronic environmental anxiety - denial and continued consumerism [8], "green consumerism" (still consuming but choosing different products), and major lifestyle change.

c) Psychosocial - eg: GCC-related conflict; displacement of whole communities.

Doherty and Clayton (2011) felt that "global climate change is likely to have significant negative effects on mental health and well-being, effects that will be felt most by vulnerable populations and those with pre-existing serious mental illness... Localised and/or immediate consequences, such as injury or stress resulting from more extreme weather events or degraded landscapes, may be perceived as direct, personal impacts of climate change... However, for many, the psychological effects of climate change are likely to be gradual, cumulative, and/or experienced only through media and

---

[7] It is "the loss of ecosystem health and corresponding sense of place, threats to personal health and wellbeing and a sense of injustice and/or powerlessness", and is a "psychoterratic illness" caused by "land sickness" ("the people of concern are still 'at home', but experience a 'homesickness' similar to that caused by nostalgia. What these people lack is solace or comfort derived from their present relationship to 'home', and so, a new form of psychoterratic illness needs to be defined. The word 'solace' relates to both psychological and physical contexts" (Albrecht et al 2007 quoted in MacSuibhne 2009).

Higginbotham et al (2007) developed an 81-item questionnaire called the Environmental Distress Scale (EDS), of which one sub-scale covered solastalgia.

MacSuibhne (2009) was cautious about calling solastalgia a new mental illness, partly because it is unclear what "dysfunction" underlies it as a "disease". "The rhetoric of mental illness, which of course is related to the rhetoric of illness and disease overall, is a powerful tool to raise awareness and to agitate for change. However we should be cautious of identifying new mental illnesses based purelyon the laudable motivations of those who expound them" (MacSuibhne 2009 p223).

[8] With denial of GCC and its effects goes "environmental generational amnesia" (Kahn 1999), where individuals refuse or fail to accept their individual/generational contribution to the degradation of the environment.

social communication..." (p265).

"Disasters" have been traditionally viewed as natural (with a clear series of stages of warning, impact, and recovery), and human-caused/technological (with a less clear-cut pattern and greater uncertainty). In the latter case, there is often a post-event inquiry on how to stop it happening again. "The complex causes and unfolding impacts associated with global climate change blur the distinctions between natural and technological disasters and prompt individual and community responses associated with both of these types of events... The story of climate change also acts as an overarching narrative... that connects and frames disparate global events, influencing judgments regarding risk, responsibility, and efficacy and expectations for the future, which in turn have implications for adaptation and mitigation" (Doherty and Clayton 2011 p268).

GCC evokes strong emotions (but in different ways). For example, Maibach et al (2009) found that those in the USA who were "alarmed" about the reality and danger of GCC (18% of respondents) reported sadness, disgust, anger, or fear, while the "dismissive" (7% of respondents) reported disgust and anger. Other individuals inbetween the extremes were cautious (19%), concerned (33%), disengaged (12%) or doubtful (11% of respondents), and had less emotional response to the topic [9].

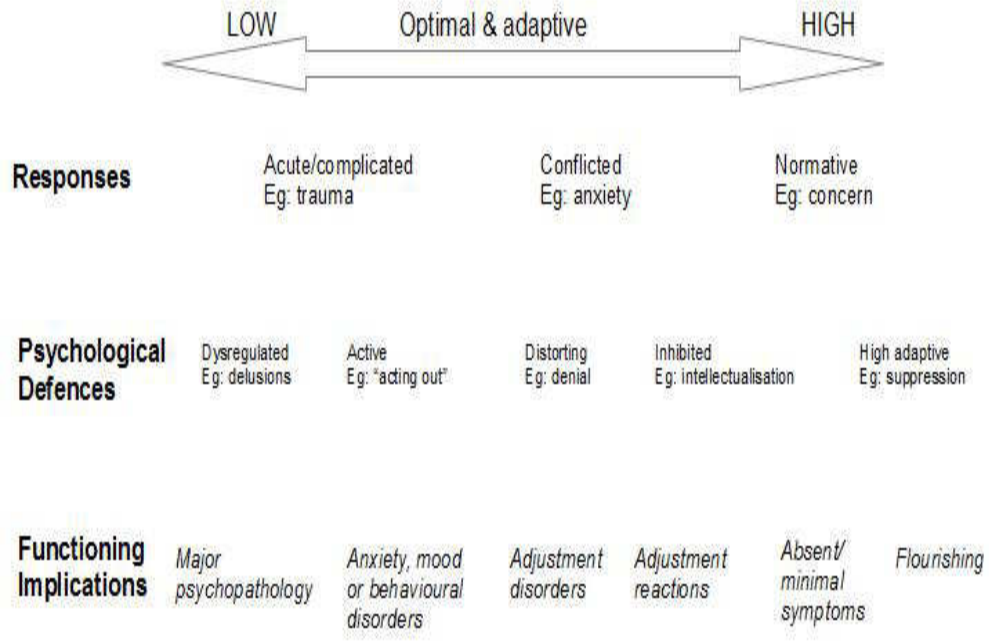
Doherty and Clayton (2011) presented a framework of responses to GCC and the ability to adapt, varying from positive to pathological (figure 2.1).

Psychological adaptation to GCC is both anticipated and reactive. Anticipated responses include threat appraisal (and planning), while reactive responses include coping strategies.

The threat appraisal of GCC for most individuals is based on social representations of the process (except for communities in Alaska, for example, who are dealing with the direct consequences currently). In other words, how the media presents the issues will influence risk perception. How individuals attribute the cause and responsibility for it is also important.

Coping strategies relate to the ability to deal with stressors. These include the dimensions of resilience (eg: inner strength to deal with situational demands) and vulnerability (eg: unable to cope) (Reser and Swim 2011).

[9] "Most people react either weakly or with emotions that do not lead to individual changes in behaviour. This reaction might stem from the way people perceive individual risk related to climate change and the fact that most experiences of climate change are indirect" (Klockner et al 2012 p15).



(Based on Doherty and Clayton 2011 figure 2 p273)

Figure 2.1 - A psychological framework for responses to GCC.

2.3. BARRIERS TO CHANGE

Gifford (2011) outlined 29 reasons summarised in seven categories of psychological barriers to responding to GCC (which he called "dragons of inaction"):

1. Limited cognition [10] - Limited knowledge about GCC or "environmental numbness" (to the information); problems with understanding uncertainty including undervaluing future risks ("judgmental discounting") and optimism bias, and perceived lack of control.

2. Ideologies/worldviews - "One significant predictor of disbelief in global warming is belief in free-enterprise capitalism... Capitalism clearly has produced an affluent lifestyle for millions of people, but some aspects of it, such as a belief in the freedom of the commons... have led to the devastation of fisheries, forests, and landscapes around the world. Having an important stake in some organizations is not compatible with adopting mitigating behaviours..."

[10] "The world's climate is so complex that it challenges the human mind. An uncountable number of variables influence each other. The causes and effects are often separated both geographically and temporally... As people cannot fully understand the climate system, communication about the changing climate should much more actively provide clear analogies or metaphors..." (Klockner et al 2012 p14).

(Gifford 2011 p293) ("system justification"). On the other hand, individuals may believe that a supernatural force will save them or science will ("technosalvation").

3. Comparisons with others - Social comparison can encourage change (as everybody else is doing it) or discourage it ("why should I change if they're not").

4. Sunk costs - eg: financial investment in environmentally-harmful activities.

5. Discredance - "When individuals hold the views of others in a negative light, they are unlikely to take direction from those others. These negative views can take various forms ranging from a general lack of trust in the other, to believing that what the other offers is inadequate, to outright denial of the veracity of the other's beliefs, to reactance against following the other's advice" (Gifford 2011).

For example, Gifford (2011) reported a content analysis of 100 responses on a website to a news story about seven environmental presentations at the American Psychological Association's conference in 2008. Individuals who denied that GCC was a problem fell into two types - GCC is an invention of scientists, or scientists are overestimating the consequences and ignoring other evidence.

6. Perceived risks - Any attempt to change faces different risks. These can be seen in assessing whether to buy a plug-in electric car in order to reduce carbon emissions (Gifford 2011):

- Will it work? (functional risk).
- Dangers of using it (physical risk).
- Cost of buying and using (financial risk).
- How others will respond when I drive it (social risk).
- Consequences of negative response (eg: low self-esteem) (psychological risk).
- Does not achieve goal and reduce emissions (temporal risk).

7. Limited behaviour - Some individuals are willing to change to some extent and choose the easier behaviours ("tokenism"), and this can lead to an increase in

negative behaviour ("rebound effect") [11] [12].

Klockner et al (2012) suggested that the combination of five factors influenced the underestimating of risk from GCC:

i) Optimism bias ("downsizing personal risks compared to risks for others").

ii) GCC involves events (eg: heavy rain) that individuals are familiar with (as opposed to greater fear of unfamiliar risks).

iii) Uncertainty about who will suffer, when and where.

iv) GCC as a natural event is perceived as less threatening than "unnatural" (technological) risks.

v) "The scale of climate change is so much beyond the ordinary risks humans usually deal with that people do not have the emotional or cognitive capacities to make an adequate risk evaluation" (Klockner et al 2012 p16).

But the level of perception of risk goes with self-efficacy (ie: perceived ability to combat the risk). For example, high risk perception and low self-efficacy leads to fatalism, denial, or wishful thinking (Klockner et al 2012).

Lewandowsky et al (2012) surveyed over 1000 visitors to "climate blogs" (eight pro-science/five sceptical) to identify the patterns of acceptance and rejection of GCC science. Rejection correlated with support for unregulated free market economics. Rejection of GCC also went with rejection of other scientifically-accepted facts (eg: HIV causes AIDS; smoking causes lung cancer), and the endorsement of conspiracy theories (eg: NASA faked the moon landing). "Acceptance of science, by contrast, was strongly associated with the perception of a consensus among scientists" (Lewandowsky et al 2012).

---

[11] Persuasion and social influence techniques can be used to change behaviour to become more environmentally-friendly. For example, the "foot-in-the-door" technique proposed that a small request that is accepted followed by a larger request will be more successful than asking the large request immediately. Katzev and Johnson (1983) wanted 66 participants to commit to reducing their energy use at home by 10% over the following three months (large request). Participants who were asked to complete a questionnaire about energy saving (small request), and did so, were more likely to agree to the large request than the control group just asked to save energy.

[12] Six principles together seem to be most effective in reducing household carbon emissions. These are prioritising high-impact actions, providing financial incentives for the behaviour, advertising the new behaviour, providing credible information, keeping the new behaviours simple, and providing feedback about the success of the new behaviour (Stern 2011).

McMichael (2012) used historical evidence from past global warmings to predict the consequences of GCC today. For example, the "Little Ice Age" in 17th century Europe (an average temperature fall of 0.2 °C) saw harvest declines, rising food prices, increased famine, and armed conflicts.

McMichael (2012) noted three sets of health risks:

- Direct impacts from extreme weather events.
- Risks from changes in ecological systems (eg: changing food yields; climate-sensitive infectious diseases).
- Impacts from social and economic changes (eg: tension over resources; mental health problems).

Climate change has consequences for humans on different time scales from the immediate weather events to the influence on biological evolution (over thousands of years) (table 2.1) (McMichael 2012).

McMichael (2012) observed that "modern societies, although larger, better resourced, and more interconnected than past societies, are less flexible, more infrastructure-dependent, densely populated, and hence are vulnerable" (p4730).

TIME PERIOD	HISTORICAL EXAMPLE
Millennia	Biological evolution - 2.7 - 2 million years ago: evolution of aspects of jaw in response to changing diet. Culture - 80 000 years ago: climate change in Africa caused Homo sapiens to move north-easterly.
Multi-century	Decline of Maya civilisation in 9th century (8-10th century: Mesoamerica drying).
Multi-decade	Early 17th century China (cold/drought) - Ming Dynasty collapse.
Multi-year	"Great famine" in early 14th century northern Europe (1315-1322 floods over seven-year period).
Short term	Yellow fever in Philadelphia - summer 1793 unusually hot.

Table 2.1 - Different time periods and historical examples of climate change.

2.4. REFERENCES

Albrecht, G et al (2007) Solastalgia: The distress caused by environmental change Australasian Psychiatry 15, S95-S98

American Psychological Association Task Force on the Interface Between Psychology and Global Climate Change (2009) Psychology and Global Climate Change: Addressing a Multi-Faceted Phenomenon and Set of Challenges Washington DC: APA

Doherty, T.J & Clayton, S (2011) The psychological impacts of global climate change American Psychologist 66, 4, 265-276

Gifford, R (2011) "The dragons of inaction": Psychological barriers that limit climate change mitigation and adaptation American Psychologist 66, 4, 290-302

Higginbotham, N et al (2007) Validation of an Environmental Distress Scale EcoHealth 3, 245-254

Kahn, P.H (1992) The Human Relationship with Nature Cambridge, MA: MIT Press

Katzev, R.D & Johnson, T.R (1983) A social-psychological analysis of residential electrical consumption: The impact of minimal justification techniques Journal of Economic Psychology 3, 267-284

Klockner, C.A et al (2012) Psychology and climate change. In Filho, W.L & Manolas, E (eds) English Through Climate Change Department of Forestry and Management of the Environment and Natural Resources, Democritus University of Thrace, Orestiada, Greece

Lewandowsky, S et al (2012) NASA faked the moon landing - Therefore (climate) science is a hoax: An anatomy of motivated rejection of science Psychological Science (in press) (Available at http://www.cogsciwa.com)

MacSuibhne, S.P (2009) What makes "a new mental illness"? The cases of solastalgia and hubris syndrome Cosmos and History: The Journal of Natural and Social Philosophy 5, 2, 210-225

Maibach, E et al (2009) Global Warning's Six Americas 2009: An Audience Segmentation Analysis New Haven CT: Yale Project on Climate Change

Maiteny, P.T et al (2002) Mind in the gap: Summary of research exploring "inner" influences on pro-sustainability learning and behaviour Environmental Education Research 8, 299-306

McMichael. A.J (2012) Insights from past millenia into climate impacts on human health and survival Proceedings of the National Academy of Sciences, USA 109, 13, 4730-4737

Rabinowitz, P.M & Poljak, A (2003) Host-environment medicine: A primary care model for the age of genomics Journal of General Internal Medicine 18, 222-227

Reser, J.P & Swim, J.K (2011) Adapting to and coping with the threat and impacts of climate change American Psychologist 66, 4, 277-289

Stern, P.C (2011) Contributions of psychology to limiting climate change American Psychologist 66, 4, 303-314

Swim, J.K et al (2011a) Psychology's contribution to understanding and addressing global climate change American Psychologist 66, 4, 241-250

Swim, J.K et al (2011b) Human behavioural contributions to climate change: Psychological and contextual drivers American Psychologist 66, 4, 251-264

3. FIFTEEN SNIPPETS AND HEADLINES ABOUT OBESITY, AND HEALTH

1. "Toddlers too obese for child car seats, says study" ("The Guardian" 4th April 2006)

Trifiletti, L.B et al (2006) Tipping the scales: Obese children and child safety seats Pediatrics 117, 4, 1197-1202

Childhood obesity is defined as ≥95th percentile of age- and gender-specific BMI on the 2000 Centers for Disease Control and Prevention BMI charts [13]. This produces figures of around 10% of 2-5 year-olds in the USA (Trifiletti et al 2006).

Child safety seats are designed with maximum weights of children in mind. Rear-facing seats (for 0-1 year-olds) are designed for up to 20 lb (9 kg), and forward-facing (for 1-4 year-olds) up to 40 lb (18 kg). "Booster seats" for heavier or older children can accommodate up to 100 lb (45 kg).

Trifiletti et al analysed the safety data on 92 child safety seats available in the USA, and found that, for example, only four expensive brands could accommodate 3 year-olds weighing more than 41 lb (18.5 kg). The researchers calculated that just over 1% of 0-6 year-olds (over 280 000 children) would be difficult to accommodate in safety seats. The appropriate safety seats reduce the risk of fatal injury in motor vehicle crashes by half to three-quarters (Trifiletti et al 2006).

2. "Fighting death with taxes" ("New Scientist" 19th August 2006)

Moodie, R et al (2006) Childhood obesity - a sign of commercial success, but a market failure International Journal of Pediatric Obesity 1, 3, 133-138

Moodie et al (2006) proposed government intervention to change the "obesogenic" (obesity-inducing) environment. Weight is increased through physical inactivity (less exercise; car use) and consumption of energy-dense foods and high-sugar beverages. Weight can be reduced by increased physical activity and better diets.

Government intervention could include controls on advertising obesogenic foods to children, subsides for healthy foods and "activity" products (eg: exercise equipment), tax on unhealthy foods and "inactivity" products (eg: petrol; car park spaces).

Moodie et al (2006) concluded: "The laissez-faire

[13] http://www.cdc.gov/growthcharts/html_charts/bmiagerev.htm.

approach of leaving solutions for obesity solely to individuals within an unfettered marketplace, is patently failing. While the public will make some sacrifices they are clearly failing to achieve their own long-term objectives. They succumb to the influence of a powerful marketing industry. In the face of such an assault on population wellbeing we conclude that the market does not, in Bator's words, 'sustain desirable activities or stop undesirable activities'. Therefore, we conclude that 'market failure' should warrant government intervention. We believe that unless the power of the commercial drivers of obesity is well understood and modified through government interventions then we will fail in promoting and protecting the health of the public in general and children in particular" (p137).

3. "Obesity is an increasing risk in childbirth, report warns" ("The Guardian" 4th December 2007)

Lewis, G (ed) (2007) Confidential Enquiry into Maternal and Child Health (CEMACH). Saving Mothers' Lives: Reviewing Maternal Deaths to Make Motherhood Safer - 2003-2005. The Seventh Report of Confidential Enquiries into Maternal Deaths in the United Kingdom London: CEMACH

In the three-year period, 2003-2005, 295 women died from causes associated with childbirth in the UK, of which 132 cases were classed as "directly" [14] and 163 as "indirectly" [15]. This figure has slowly increased since 1985-1987 (223 deaths) [16]. Over half of the women who died were overweight or obese, and about 15% of all women who died had a BMI of 35 or more ("morbidly obese").

4. "Overweight who diet risk dying earlier, says study" ("The Guardian" 27th June 2005)

Sorensen, T.I.A et al (2005) Intention to lose weight, weight changes, and 18-year mortality in overweight individuals without co-morbidities PLoS Medicine 2, 6, e171 (Freely available at http://www.plosmedicine.org/article/info%3Adoi%2F10.1371%2Fjournal.pmed.0020171)

Based on a cohort from 1975, Sorensen et al (2005) found that "deliberate weight loss in overweight individuals without known co-morbidities may be hazardous in the long term".

Just under 3000 individuals with a BMI ≥25 in 1975

[14] Causes related to the pregnancy and delivery (eg: haemorrhage).
[15] Causes not related to pregnancy and delivery (eg: psychiatric; other illnesses).
[16] The report proposed a number of reasons for this rise, including an increase in obese mothers, women with lifestyles that risk poor health (eg: drug misuse), medically complex pregnancies, women born outside the UK who may have underlying poor health, and vulnerable or socially excluded women (who are less likely to use antenatal services).

were followed through to 1999. The participants were part of the Finnish Twin Cohort of all same-sex twin pairs born in Finland before 1958. Of the 2957 participants in this study, 1058 reported an intention to lose weight in 1975 and 1899 did not. By 1999 268 of them had died.

Six groups were distinguished - the intention to lose weight or not; actually gained, lost or maintained weight. Compared to the group not intending to lose weight who had a stable weight, more deaths occurred in the intention to lose weight/lost weight group (hazard ratio: 1.86), followed by no intention/gained weight group (1.57), and no intention/lost weight group (1.17). The other two groups had hazard ratios of less than one, which meant the number of deaths were less than the comparison group (figure 3.1). The findings supported both health risks of weight gain and loss.

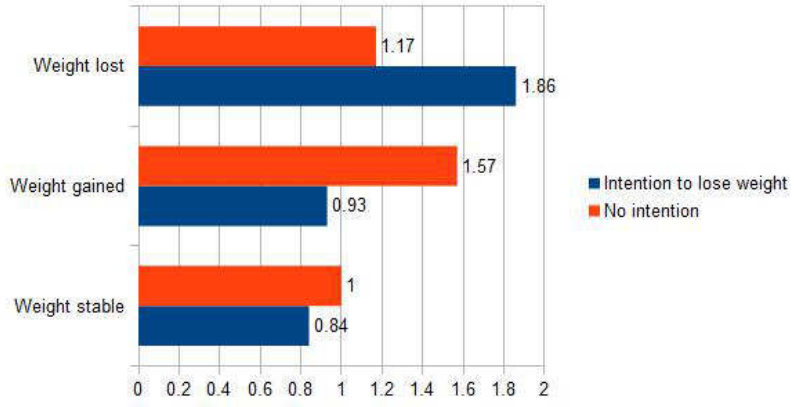


Figure 3.1 - Hazard ratios for death.

The generally held view is that weight gain increases health risks and weight loss is beneficial. Sorensen et al (2005) was not the first study to find an "apparent paradox", and these researchers suggested a number of reasons for it:

a) The weight-loss individuals had undiagnosed or unrecognised illnesses that led to death.

b) They had high-risk lifestyles or unhealthy behaviour.

c) Weight loss did not eliminate the health risk from previously being overweight (called "confounding by indication"; Sorensen et al 2005).

d) Weight loss has detrimental effects (though both the intention to lose weight and not groups did not show the same rates of mortality in the Sorensen et al 2005

study).

e) The intention to lose weight produces weight fluctuations which are a health risk.

Sorensen et al (2005) felt that weight loss has complex effects, but that their findings should not be taken as contradicting the benefits of weight loss for obese individuals.

5. "Obesity epidemic 'bigger threat than terrorism'" ("The Guardian" 3rd March 2006)

Richard Carmona (US Surgeon General) has stated in a number of lectures that the obesity epidemic is a greater risk to the US than the threat from terrorism.

DEBATE ABOUT OBESITY EPIDEMIC

Arguments Against

Mundy (2002) talked of "Obesity Inc" (industries and media) which presented "Obesity" (with capital "O") as an epidemic. Flegal (2006), however, felt that "epidemic" was an appropriate word to use in the USA because the increase in weight is larger than expected, and the prevalence of obesity is high. "Although it is difficult to say exactly what the 'normal' level of obesity is, it is clear that a surprising and unexpected increase in obesity occurred in the US in the 1980s and that the increases are continuing" (Flegal 2006 p73).

Campos et al (2006) argued that "the available scientific data neither support alarmist claims about obesity nor justify diverting scarce resources away from far more pressing public health issues" (p55). The authors challenged the claims about the epidemic of obesity in four ways [17].

i) An obesity epidemic around the world - For example, in the USA, there has been a weight gain of 3-5 kg in the last generation, but this average is the equivalent of ten extra calories per day [18]. "While there has been significant weight gain among the heaviest individuals the vast majority of people in the 'overweight' and 'obese' categories are now at weight

[17] Lobstein (2006) criticised the simplistic debate that needs to go beyond the '"There's a problem - No there isn't' argument".

[18] However, Blair and LaMonte (2006) felt that "even this small positive caloric balance results in a sizeable amount of fat accretion, and thus increases in average body mass and BMI at the population level" (p69).

levels that are only slightly higher than those they or their predecessors were maintaining a generation ago. In other words we are seeing subtle shifts, rather than an alarming epidemic" (Campos et al 2006 p55) [19].

Much of the "epidemic" is due to tens of millions of people whose body mass index (BMI) was 23-25 moving to over 25, and individuals in the high 20s gaining a BMI of over 30 (table 3.1). Campos et al (2006) asked "whether these developments represent some sort of genuine health crisis. This is true only if crossing the threshold of BMI 25 or 30 is analogous to contracting a life-threatening disease".

<15	very severely underweight
15 - 15.9	severely underweight
16 - 18.49	underweight
18.5 - 24.9	normal weight
25 - 29.9	overweight
30 - 34.9	moderately obese
35 - 39.9	severely obese
>40	very severely obese

Table 3.1 - Categories of BMI [20].

ii) Higher BMI leads to higher mortality rates - A greater risk of mortality exists for BMIs in high 30s and above, not for overweight (BMI 25-30) and mildly obese (BMI 30-35) [21]. The relationship between mortality and BMI is U-shaped. "Rarely do the risks of thinness get any media attention" (Campos et al 2006).

Many studies that find a link between mortality and BMI do not control for factors like fitness and exercise, diet quality, economic status, or family history (Campos et al 2006).

iii) The link between overweight and obesity and poor future health - Exercise is a more important factor in future health outcomes, while some body fat deposits (eg: on hips and thighs) "may actually provide significant health benefits" (for "metabolically normal" obese individuals) (Campos et al 2006).

Key for Blair and LaMonte (2006) is physical activity and cardiorespiratory fitness, which is associated with less disease (and death) at all body

[19] A small shift in all individual's weight is still important as "a large number of people at a small risk may give rise to more cases of disease than the small number of people at a high risk" (Rose 1985 quoted in Stevens et al 2006).

[20] World Health Organisation.

[21] Animal experiments show that lifelong lean rats, for example, live longer than lifelong obese ones (Stevens et al 2006).

weights compared to inactive individuals.

iv) Long-term significant weight loss is the ideal for overweight and obese individuals - Campos et al (2006) found this assertion "almost completely unsupported by the epidemiological literature" and "an untested hypothesis".

Campos et al (2006) were clear about the growing concern over obesity: "many of the leading obesity researchers who have created the official standards for what constitutes 'overweight' and 'obese' have also received sizable funding from the pharmaceutical and weight-loss industries. These obesity researchers also manage weight loss clinics and have an economic interest in defining unhealthy weight as broadly as possible, by overstating the hazards of obesity, and thus providing justifications for regulatory approvals, as well as for government and insurance industry subsidisation of their products" (p58).

Campos et al (2006) were critical of self-aggrandisement by public bodies involved. Lobstein (2006) defended one such organisation in the USA, the Centres for Disease Control and Prevention (CDC) asking for more government funding: "The implication is that the CDC's concerns to contain the rise in obesity levels are motivated by self-promotion among the CDC's senior staff working in the relevant sections. Yet what is the CDC's job, if it perceives a health hazard on the horizon, if not to seek the resources and policy-setting authority needed to ensure they can properly avert a worsening of the situation?" (p74).

In a review of over 200 US press articles about obesity, over half used terms like "time bomb", and nearly two-thirds blamed the problem on individual choice (especially poor food choices among Blacks and Latinos) (Campos et al 2006). "Such findings lend support to the theory that talk of an 'obesity epidemic' is serving to reinforce moral boundaries against minorities and the poor. Public opinion studies also show that negative attitudes towards the obese are highly correlated with negative attitudes towards minorities and the poor, such as the belief that all these groups are lazy and lack self-control and will power. This suggests that anxieties about racial integration and immigration may be an underlying cause of some of the concern over obesity" (Campos et al 2006 p58). Thus the "obesity epidemic" is a "moral panic" for Campos et al (2006) [22].

[22] "Moral panics are typical during times of rapid social change and involve an exaggeration or fabrication of risks, the use of disaster analogies, and the projection of social anxieties onto a stigmatised group" (Campos et al 2006 p58).

Orbach (2006) challenged the "obesity epidemic" from a different standpoint: "Behind the so-called obesity crisis is a serious public health emergency. Eating today is a real problem for many because it is inflected with guilt, confusion, regret, and worry. Addressing such concerns should be what drives the public health agenda so that those industries, which operate as a negative force on girls' and women's and increasingly boys' and men's self experience, are regulated out of existence" (p68).

Orbach (2006) stated "style industries" (fashion and cosmetics), in particular, along with "their handmaidens in the media", had produced "the kind of blanket of insecurity that has come to infect our relationship to our body, to our eating, and to our appetites".

These industries "love to represent themselves as simply a bit of fun that people can take or leave. This is disingenuous. The money these industries spend on positioning their wares as essential routes to achieve desirability and glamour demonstrates their wish to captivate ever-bigger audiences for their 'must have' products. We now know unequivocally that the result of their promotion of thin is having serious psychological and physical impacts on girls and women" (Orbach 2006 p67). This has led to "fatness in the mind" as individuals diet and limit their food intake and/or binge when they fail to control their appetite.

Arguments For

Kim and Popkin (2006) took an opposing stance to Campos et al (2006): "To state that the obesity increase is an illusion and that increased weight and adiposity does not contribute to poor health and functioning is really to misuse the vast literature that shows the large increases in weight and BMI dynamics globally and also the important effects of these changes on global disease profiles" (p65).

Kim and Popkin (2006) argued that "rapidly changing diets and reduced physical activity levels" have led to a clear increase in "diet-related chronic diseases" all around the world. Though the relationship between weight and health is complex, overweight and obesity is central. Kim and Popkin (2006) said: "our position is clear that increase in obesity and its health consequences are real".

Kim and Popkin (2006) criticised Campos et al (2006) for using cross-sectional data (which compares generations at one point in time, for example) on weight and BMI rather than longitudinal studies (which follow individuals over time).

For example, a longitudinal study of Chinese adults (20-45 years old) begun in 1989 found that 73% had gained

weight by the year 2000 (with an average of 7 kg for men and 6 kg for women) (Kim and Popkin 2006).

Data from National Health and Nutrition Examination Surveys (NHANES) in the USA, which used nationally representative samples, showed little change in BMI between the first survey in 1960-62 and the second in 1976-80, but a large average increase by the third survey in 1988-94. The average increase in weight was 1 kg between the first and second surveys, but an increase of 7 kg by the third survey (Flegal 2006).

In the USA (and other developed countries), the shift in weight distribution of the population has been an increase in BMIs greater than 35 and 40 (Kim and Popkin 2006). These points challenge Campos et al's (2006) first argument.

Kim and Popkin (2006) provided evidence to show links between obesity and future health (Campos et al's arguments 2 and 3). For example, overweight individuals have more health problems of all types, retire earlier, go to nursing homes at a younger age, and are more likely to be physically disabled than normal weight individuals (Kim and Popkin 2006).

Finally, Kim and Popkin (2006) argued that weight loss does reduce weight-related disorders in obese individuals (like hypertension and type 2 diabetes) (which counters Campos et al's fourth argument). However, Kim and Popkin accept that there are risks related to "more aggressive methods of weight loss".

In relation to vested interests behind an "obesity epidemic", Kim and Popkin (2006) suggested that not all parties are bad - for example, "the drug industry has played a major role in funding several major international groups that attempt to promote programmes and knowledge related to obesity prevention and treatment".

Stevens et al (2006) concluded: "Campos et al accuse the obesity research community of conjuring up a problem in order to attract dollars in the supposed face of evidence that obesity is not really a threat to public health. This is not a matter of pot calling the kettle black; it is a matter of the leopard calling the zebra spotted. It is our opinion that for decades obesity was not given adequate attention by the scientific community. It is a complex problem not easily prevented or treated by our current medical systems. It will probably require a new paradigm that integrates medical and public health services" (p78).

References

Blair, S.N & LaMonte, M.J (2006) Commentary: Current perspectives on

obesity and health: Black and white, or shades of grey? International Journal of Epidemiology 35, 69-72

Campos, P et al (2006) The epidemiology of overweight and obesity: Public health crisis or moral panic? International Journal of Epidemiology 35, 55-60

Flegal, K (2006) Commentary: The epidemic of obesity - what's in a name? International Journal of Epidemiology 35, 72-74

Kim, S & Popkin, B.M (2006) Commentary: Understanding the epidemiology of overweight and obesity - a real global public health concern International Journal of Epidemiology 35, 60-67

Lobstein, T (2006) Commentary: Obesity - public health crisis, moral panic or a human rights issue? International Journal of Epidemiology 35, 74-76

Mundy, A (2002) Diagnosing with the Truth: The Victims, the Drug Companies, and the Dramatic Story Behind the Battle Over Fen-Phen New York: St Martin's Press

Orbach, S (2006) Commentary: There is a public health crisis - its not fat on the body but fat in the mind and the fat of profits International Journal of Epidemiology 35, 67-69

Rose, G (1985) Sick individuals and sick populations International Journal of Epidemiology 14, 32-38

Stevens, J et al (2006) Commentary: Obesity claims and controversies International Journal of Epidemiology 35, 77-78

6. "Overeating by obese people is like drug addiction, brain research finds" ("The Guardian" 3rd November 2006)

Wang. G.J et al (2006) Gastric stimulation in obese subjects activates the hippocampus and other regions involved in brain reward circuitry Proceedings of the National Academy of Sciences, USA 103, 42, 15641-15645

The vagus nerve is key to communicating satiety (fullness) and this triggers other physiological processes that stop eating (eg: release of brain gut peptides). Disruption of this mechanism could lead to overeating and obesity.

Wang et al (2006) studied seven obese individuals (BMI >35) who had the Transcend Implantable Gastric Stimulator (IGS) system fitted. This sends electrical signals to mimic those of satiety. In PET scans, the right hippocampus was most sensitive to the signals of the IGS. Also it was found that the "brain regions activated by gastric stimulation overlap with those reported during craving responses in addicted subjects, supporting the commonalities in the neurocircuitry that underlie compulsive food intake and compulsive drug intake" (Wang et al 2006 p15644).

7. "The benefits of fish and linseed oils as elixir of life are another health myth" ("The Times" 24th March 2006)

Hooper, L et al (2006) Risks and benefits of omega 3 fats for mortality, cardiovascular disease, and cancer: Systematic review British Medical Journal 332, 7544, 752-760

It is generally felt that omega 3 fatty acids as found in fatty fish and fish oils can protect against certain health risks like cardiovascular disease. On the other hand, fatty fish may contain toxic compounds that have built up over the animal's life, and increase the risk of cancer. So there may be short-term benefits, but long-term risks from eating fatty fish.

Hooper et al's (2006) systematic review found neither a reduction nor an increase in mortality from eating omega 3 fatty acids. The researchers searched medical databases for articles up to February 2002 using relevant keywords, and initially found 15 159 titles. This was reduced to 48 randomised controlled trials (with 36 913 participants) and 41 cohort studies (with 563 218 participants) after applying exclusion criteria (eg: study longer than six months; randomised allocation of participants).

The methodological quality of each study was rated using certain criteria (eg: blinding; drop-out). Pooling of all the data was focused on the effects of the dose of omega 3.

The studies mostly used dietary supplements (eg: omega 3 in capsules) compared to placebos, but four studies just had advice on diet and food supplements.

Overall, it was found that there was no clear relationship between eating omega 3 fats and mortality, inconsistent evidence for reducing cardiovascular disease, and no evidence of increased cancer.

One problem for the researchers was that there was "substantial variations" between studies in findings and methodological quality.

Previous systematic reviews (eg: Bucher et al 2002 [23]) had found a beneficial effect on heart disease of long chain omega 3 fats. Hooper et al (2006) included studies of shorter chain omega 3 fats (found in some plant oils). A key difference between the Hooper et al analysis and previous ones was the former's inclusion of a study by Burr et al (2003) [24]. This study did not find any cardiac benefits to eating omega 3 fats. It differed to other studies in three ways (Hooper et al 2006):

- A long follow-up (during which the negative consequences of eating fatty fish could appear).

[23] Bucher, H.C et al (2002) N-3 polyunsaturated fatty acids in coronary heart disease: A meta-analysis of randomised controlled trials American Journal of Medicine 112, 4, 298-304.

[24] Burr, M.L et al (2003) Lack of benefit of dietary advice to men with angina: Results of a controlled trial European Journal of Clinical Nutrition 57, 2, 193-200.

- The participants were all men treated for angina.

- It concentrated on the effect of eating oily fish, which may be different to fish oil supplements.

Hooper et al (2006) observed: "It may be that the effect of omega 3 fats on cardiovascular disease is smaller than previously thought, or that its beneficial effect is limited to a specific group (such as patients after myocardial infarction or with heart failure) not represented in the study by Burr et al".

8. "Nice idea, but where's the proof?" ("The Times" 24th March 2006)

VITAMIN SUPPLEMENTS

If vitamin D deficiency is associated with cancer, and other diseases like cardiovascular ones, then supplementing vitamin D should be beneficial. This is the logic behind the use of such supplements [25].

Autier and Gandini (2007) found support for this assertion in their meta-analysis. They included eighteen independent randomised controlled trials (RCTs) in their analysis [26]. The outcome measure used was death. Most of the studies recruited older adults (over 50 years old) (many of them frail elderly), and the length of follow-up was an average of about five years. The relative risk of death during the study period was 0.93 for the individuals taking vitamin D supplements compared to the control [27]. When there is a relative risk of 1.0 both groups are equal, so lower than one means less risk for the intervention group.

Because the mean effect was quite small, the researchers concluded that vitamin D supplements "seems to be associated with decreases in total mortality rates" (Autier and Gandini 2007 p1735).

These findings are quite specific to the samples of the studies, but extrapolations are made that all vitamin supplements are beneficial for all individuals. But it is not as straightforward as this. For example, Atkins

---

[25] Regulatory authorities as in the USA (eg: Food and Drug Administration) are attempting to crack down on health claims of supplements and "functional foods" (food that is claimed to improve health). In response to such action, food producers "complain that having to prove claims about the health benefits of food would cost too much and take too long. [This is]... a lame argument" (Editors 2010).

[26] There was heterogeneity in the studies included in the meta-analysis - eg: 12 studies had a placebo in the control group. In the studies without a placebo the participants knew that they were not receiving supplements, which introduces the risk of expectation effects.

[27] However, two studies reported relative risks of greater than one - ie: vitamin D supplement-takers had a higher mortality than the control group.

(2007) noted the use of vitamin supplements as "pseudo-medicines" (to cure and protect against illness), the use of supplements to mask poor diet (as supplements are not a substitute for vitamins in food), and "mega-dosing" (taking more than the daily recommended dosage).

Physical exercise is beneficial to health, including increasing insulin sensitivity, but daily ingestion of antioxidant supplements (vitamin C and E) negated the benefits. The supplements blocked the beneficial effects of exercise on the metabolism (Ristow et al 2009). Forty healthy German men followed a physical training programme for four weeks, while half received daily doses of vitamin C and E supplements and half placebo pills.

References

Atkins, L (2007) Go easy on the vitamins Guardian 22/5, II 16-17

Autier, P & Gandini, S (2007) Vitamin D supplementation and total mortality: A meta-analysis of randomised controlled trials Archives of Internal Medicine 167, 16, 1730-1737

Editor (2010) Snake oil in the supermarket Scientific American September, p16

Ristow, M et al (2009) Antioxidants prevent health-promoting effects of physical exercise in humans Proceedings of the National Academy of Sciences, USA 106, 21, 8665-8670

9. "Watching your weight is easier if others are watching too" ("The Daily Telegraph" 2nd June 2006)

Truby, H et al (2006) Randomised controlled trials of four commercial weight loss programmes in the UK: Initial findings from the BBC "diet trials" British Medical Journal 332, 1309-1311

Truby et al (2006) compared four commercial weight loss diets in the UK over six months. The four diets were "Slim-Fast" (a meal replacement approach), "Weight Watchers pure points programme" (an energy controlled diet and weekly group support meetings), "Dr Atkins' new diet revolution" (a low carbohydrate diet), and "Rosemary Conley's eat yourself slim diet and fitness plan" (a low fat diet and weekly group exercise class).

Participants were recruited via an advertising campaign on the BBC. They had a self-reported BMI of 27-40, no major illness, and lived within thirty miles of one of the five test centres. Measurements were taken at baseline, 2 and 6 months later, and a follow-up after twelve months. In total, 294 participants were involved in five groups (4 diet programmes and a control group who followed their usual diet and exercise patterns).

All four diets led to significant loss of fat and weight over six months compared to the control group, but there was no difference between the programmes. The

average weight loss was 5.9 kg. At 12 months, there had been an average weight loss of around 10% on all four programmes (figure 3.2). However, drop-out by 12 months was higher in the Atkins and Slim-Fast groups [28].

The researchers concluded: "These results provide information on the 'best effect' that the most highly motivated subjects may hope to achieve over one year".

Note that the study was unblinded (ie: both participants and researchers knew who was in which group), and the participants were aware that they could be included in the BBC reality television show, "BBC Diet Trials". The cost of the programmes also varied greatly - Atkins (£3 for book), Rosemary Conley (24 weeks exercise classes - £140), Weight Watchers (24 weeks membership - £170), and Slim-Fast (twice daily for 24 weeks - £240) [29].

Later research emphasised the importance of group support and "successful slimmers" as "group leaders" to maintain the diet programme [30].

(Data from Truby et al 2006 tables 2 and 5)

Figure 3.2 - Weight loss (percentage of baseline body weight) on each diet.

10. "Greedy guts?" ("The Economist" 6th January 2007)

Backhed, F et al (2007) Mechanisms underlying the resistance to diet-induced obesity in germ-free mice Proceedings of the National Academy of Sciences, USA 104, 3, 979-984

Backhed et al's (2007) work with mice found that animals without certain bacteria in their gut did not

[28] Arterburn, D (2006) The BBC diet trials British Medical Journal 332, 1284-1285.
[29] Ibid.
[30] Truby, H & Bonham, M (2011) What makes a weight loss programme successful? British Medical Journal 343, d6629.

become obese on a "Western-style diet" (high in fat and sugar). Such genetically engineered (transgenic) mice gained significantly less weight in eight weeks on a diet where 41% of the calories were in the form of fat, 41% as readily digested carbohydrates (including sugars), and 18% as protein, compared to controls.

The gut of mammals is inhabited by trillions of bacteria that help in accessing nutrients from food, and they can play a role in fat storage (eg: suppressing fasting-induced adipose factor; Fiaf).

Mice with no bacteria and low levels of Fiaf gained weight similar to controls.

The findings suggested that the gut bacteria influence "both sides of the energy balance equation" (ie: gaining and losing fat/weight), and are involved in multiple processes of energy regulation in the body.

11. "Obesity's helper in triggering diabetes" ("New Scientist" 14th April 2007)

Lee, D-H et al (2007) Association between serum concentrations of persistent organic pollutants and insulin resistance among non-diabetic adults Diabetes Care 30, 622-628

Lee et al (2007) reported a correlation between concentrations of persistent organic pollutants (POPs) (eg: organochlorine pesticides) in the blood and diabetes in the USA [31]. For example, individuals with the highest level of POPs (top 25%) were up to nine times more likely to have diabetes (depending on the specific POP) than those with non-detectable levels of POPs (after adjusting for factors like age, sex, poverty, and BMI).

The dataset used was the 1999-2002 National Health and Nutrition Examination Survey (NHANES), and 749 non-diabetic adults were sampled. Based on blood samples, participants were divided into groups for serum concentrations of POPs. Insulin resistance (which is a sign of type 2 diabetes) was also established from the blood.

The researchers proposed that POPs in adipose (fat) tissue interacts with obesity to increase the risk of diabetes.

12. An example of obesity declining

Centers for Disease Control and Prevention (2011) Obesity in K-8 students - New York City, 2006-07 to 2010-11 school years Morbidity and Mortality Weekly Report 60, 49, 1673-1678

[31] Because the relationship is a correlation, it is possible that relationship can go in either direction (Pearson, A, 2007, Obesity's helper in triggering diabetes New Scientist 14/4, p16).

Data collected by the New York City Department of Health and Mental Hygiene for kindergarten to 8th grade children (4-12 years old) showed a significant fall in the prevalence of obesity from 21.9% of the children in 2006-07 to 20.7% in 2010-11. This decline may be due to the multiple interventions to reduce childhood obesity introduced by the New York City schools, including improved nutrition of school meals, increased physical activity time, and training for school nurses.

13. Environmental harshness and high-calorie foods

Laran and Salerno (2013) [32] argued that "people may choose to consume high-calorie food items as a consequence of exposure to cue indicating that the current environment is harsh" (p167). From an evolutionary point of view (or life-history theory), individuals will consume high-calorie food when the environment appears harsh in order to survive any subsequent food shortages or competition for scarce resources (ie: food that will keep them fed for a long period of time).

Laran and Salerno (2013) showed this behaviour in three experiments with 121 passersby on the University of Miami campus in the USA. The participants were offered sweets to eat that were presented as containing a new high-calorie or low-calorie ingredient. This was done in the presence of posters containing words associated with environmental harshness (eg: "survival", "struggle") or neutral ones. There were, thus, four conditions based on two independent variables. When allowed to eat as many sweets as wanted, it was predicted that participants would have more "high-calorie" sweets in the environmental harshness condition.

The findings of the first experiment supported this prediction. Participants ate significantly more sweets of "high-calorie" in the "harsh environment" condition (mean = 18.90 g) than "low-calorie" (mean = 10.56 g), and than the neutral conditions (mean = 13.68 g "high-calorie) and 14.71 g "low-calorie").

In the second experiment, the provision of "resources" was found to reduce the effect of environment harshness. Two hundred and thirty-eight students on a marketing course were offered the choice of a cup cake (high-calorie food) or a salad (low-calorie food) after seeing words about environment harshness, pleasure, or neutral ones. Half of them were given $1 ("resources") before their choice of food and half no money. In the

[32] Laran, J & Salarno, A (2013) Life-history strategy, food choice, and calorie consumption Psychological Science 24, 2, 167-173.

environment-harsh condition, 72.5% of participants not receiving the money chose the cup cake compared to 45.2% when resources provided. This was a significant difference. There was no difference in food choice based on resources or not in the neutral or pleasure words conditions.

The third experiment also manipulated the concept of duration by asking 144 students on a marketing course to rate how long or short certain events were (eg: a green traffic light). It was predicted that participants thinking about a long duration and environment harshness will choose healthy (low-calorie) food as individuals consider the best use of resources in the long-term (which is the consumption of healthy food).

In the environment-harsh conditions, 61.1% of participants thinking about long duration chose the low-calorie food compared to 33.3% of participants thinking about short duration (table 3.2).

	HIGH-CALORIE FOOD	LOW-CALORIE FOOD
Experiment 2		
Environment-harsh words:		
Resources provided	45.2 (a)	54.8 (a)
No resources	72.5 (b)	27.5 (b)
Pleasure words:		
Resources provided	74.4	25.6
No resources	70.7	29.3
Neutral words:		
Resources provided	52.6	47.3
No resources	50.0	50.0
Experiment 3		
Environment-harsh words:		
Short duration	66.7 (c)	33.3 (c)
Long duration	38.9 (d)	61.1 (d)
Neutral words:		
Short duration	47.2	52.8
Long duration	52.8	47.2

(a vs b - p = 0.012; c vs d - p = 0.018; X^2 test)

Table 3.2 - Percentage of participants choosing high- and low-calorie food in Experiments 2 and 3.

14. Income inequality and obesity

Levels of obesity are lower in countries where there is less income inequality. Put another way, there are more obese individuals (BMI >30) as a proportion of the population in countries with high income equality (based on "income gap" - how much richer the richest 20% than

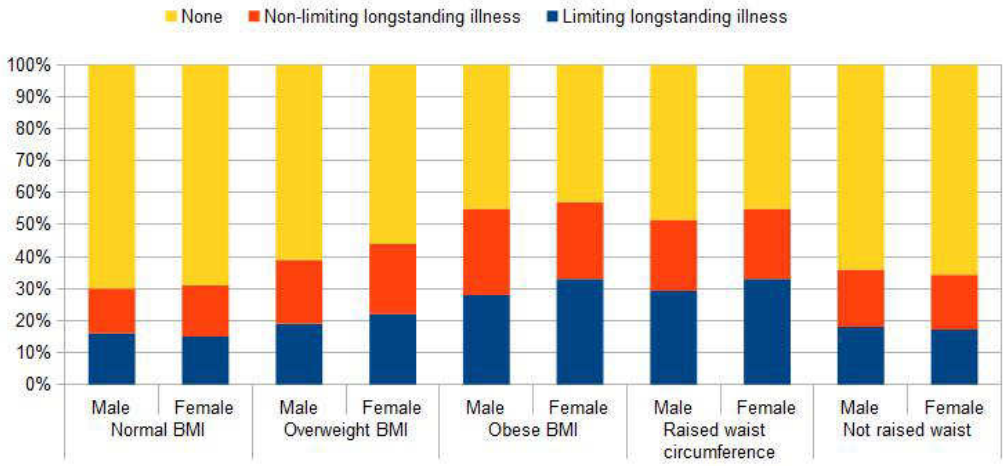
the poorest 20% of the population) (Wilkinson and Pickett 2010) [33].

Wilkinson and Pickett (2010) offered possible explanations for this relationship [34] including:

i) Comfort eating - Stressed individuals are more likely to eat high-calorie food as a comfort or way of coping, and unequal societies may be more stressful than equal-income ones.

ii) Food for status - Eating and of certain foods can be a sign of status, and in unequal societies indicating status is more important than in income-equal societies.

15. Health Survey for England 2009



(BMI - normal = 18.5 - 24.9; overweight = 25 - 29.9; obese = ≥30; Raised waist circumference = >102 cm (men) and >88 cm (women))

Figure 3.3 - Longstanding illness by BMI and waist circumference, adults 16 years and above, England 2009.

[33] Wilkinson, R & Pickett, K (2010) The Spirit Level: Why Equality is Better for Everyone (revised edition) London: Penguin.

[34] Worldwide r = 0.57 ($p<0.01$) (Wilkinson and Pickett 2010).