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Mainly Health Shorts

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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://psychologywritings.synthasite.com/. See also material at https://archive.org/details/orsett-psych.

CONTENTS

1. THREE DATA SOURCES

1.1. LONGITUDINAL STUDIES

The "Millennium Cohort Study" (MCS) began in 2000-2002 with 19 000 newborns in the UK, and 9675 of them were surveyed at age 23 years (Villadsen and Fitzsimons 2026).

Substance use was one area of questioning, and the findings were compared to responses at age seventeen years on the MCS, and to the "Next Steps" (NS) cohort (a cohort in England surveyed in 2015-2016 at age 25).

Just under one-third of the MCS reported binge drinking at least monthly at age 23 compared to 10% at age 17, (and 25% in the NS cohort), while daily vaping was up from 3% to 19% at the same ages in the MCS. Daily smoking in the MCS was 9% compared to 20% in the NS cohort, but ever tried cannabis was similar in both groups at just under half of respondents. Ever tried harder drugs was 32% at age 23 in the MCS, 10% at age 17, and 27% in the NS cohort.

The key message was the reduction in tobacco smoking among adults in their 20s born in the 21st century compared to earlier cohorts (Villadsen and Fitzsimons 2026).

Reference

Villadsen, A & Fitzsimons, E (2026) Substance Use and Addictive Behaviours: Initial Findings from the Millennium Cohort Study at Age 23 London: UCL Centre for Longitudinal Studies

1.2. WEARABLES

Wearable fitness watches, rings, and bracelets often include a measure of heart rate variability (HRV), such that this has become a very popular metric. The heart rate fluctuates during the day depending on the physical activity being performed, but HRV measures the time between beats. A high HRV is taken as a positive sign that the body adapts to stressors, while a low HRV has negative connotations (Denworth 2025).

But HRV ranges from 20 to 70 milliseconds normally, and there is little agreement about what is a "good" or "bad" figure. Relative change over time in HRV is probably more important. "Wearables", whose accuracy here is unclear, can produce a focus on potentially negative metrics that is not necessary (Denworth 2025).

Wearable sweat sensors, which measure volume and sodium concentration in sweat, say, can be useful not only to endurance athletes. Sweat includes many biomarkers (as well as drugs taken, and environmental pollutants), and it presents an opportunity as a "diagnostic biofluid" (along with blood and urine, for example) (Lawton 2024) [1].

Well-established examples of sweat analysis include the chloride concentration in cystic fibrosis, screening for banned substances, and monitoring water and electrolyte loss in athletes (Yang et al 2023). Sweat analysis originated in the 1940s and 1950s (Childs et al 2024).

In 2016 the first of the "modern" wearable sweat sensors was tested, which was able to monitor metabolites and electrolytes, and used wireless data communications. Cloud-based non-invasive diabetes management came along also (Childs et al 2024).

Childs et al (2024) commented on the challenges of wearable sensor development. They explained that "the necessity for close skin contact imposes stringent requirements on the materials used in fabrication, especially nanomaterials, with a focus on minimising toxicity and preventing interference with analytes. Substrate materials and biorecognition layers must be biocompatible, and the materials in direct contact with skin should also be non-reactive. Additionally, the chemical methods used for electrode modification and fabrication must be rigorously tested to prevent the leakage of potentially toxic substances" (Childs et al 2024 p24607). Developments in nanotechnology and nanomaterials hold promise for further improvements in the sensors.

Sensors require a continuous flow of sweat for dynamic monitoring, and this is a problem in everyday life. One solution is medications which stimulate sweating (with their attendant issues) (Childs et al 2024).

"The main advantage of widespread adoption of sweat

[1] Individual differences in sweating range on the continuum from hyperhidrosis (excessive) to hypohidrosis (very little) and anhidrosis (none) (Lawton 2024).

sensors by all stakeholders is the ability to perform continuous monitoring of analytes. However, reliable outputs from wearable sweat sensors depend on the stability performance of the biosensor. A stable reading ensures the absence of artifacts in the signal related to movement or chemical interference that might lead to misleading concentrations" (Childs et al 2024 p24611).

References

Childs, A et al (2024) Diving into sweat: Advances, challenges, and future directions in wearable sweat sensing ACS Nano 18, 24605-24616

Denworth, L (2025) A little heartbeat irregularity can be good Scientific American December, 82, 85

Lawton, G (2024) Dripping with promise New Scientist 7th December, 30-33

Yang, D.S et al (2023) Sweat as a diagnostic biofluid Science 379, 760-761

1.3. AI DATA

Marinoni et al (2026) estimated that the land surface temperature increased by 2 °C on average around AI data centres, and the researchers called this the "data heat island effect". This term was a variation on the "urban heat island" effect, where urban areas are warmer than the surrounding countryside.

NASA satellite surface temperature data were analysed for the period 2004 to 2024. A curve was created which showed the temperature compared to distance from data centre. By 10 km away, there was no increase in temperature, but at the location of the data centre, the increase was nearly 10 °C.

Reference

Marinoni, A et al (2026) The data heat island effect: Quantifying the impact of AI data centres in a warming world arXiv (https://arxiv.org/abs/2603.20897v2)

2. TWO ISSUES WITH CONSUMER GENETICS

2.1. PATERNITY

Fathers may not be biologically related to their legal children because of adoption or stepfamilies, but also because the biological mother had a child (secretly) with another man. Some legal fathers are aware that they are not biological fathers, while others are not. These latter cases have been called "paternal discrepancy", "false paternity", and "extra-pair paternity" (EPP) (Curry 2025).

The figure of 10% of babies being the product of EPP emerged in the 1990s, though there was no solid data to support or disprove it (Curry 2025). More recently, Maarten Larmuseau (eg: Larmuseau et al 2019) has used genealogical records and DNA data to place the figure at around 1% in Europe in the last 500 years (Curry 2025).

The popularity of direct-to-consumer DNA tests has opened the possibility of individuals discovering that their biological father was not who they thought. Famously, Werner van Beethoven living in Belgium discovered in 2023 that he was not biologically related to the composer Ludwig van Beethoven despite having a historical family tree of thirteen generations showing a relationship (Curry 2025).

Wilson (2024) commented on consumer tests as provided by companies like "23andMe": "But while some people have undoubtedly learned useful health information from genetic testing, any population-wide benefits always seem to be just around the corner, held back by our limited understanding of the human genome" (p14).

"23andMe" has faced financial problems (eg: a loss of share value in 2021) (Wilson 2024). "Regardless of whether one company can make genetic testing profitable, it may be premature to write off the entire field. But those eager for the new age of personalised medicine may have to wait a little longer, as ever, it is 'just around the corner'" (Wilson 2024 p14).

References

Curry, A (2025) Paternity detective Science 387, 1030-1034

Larmuseau, M et al (2019) A historical-genetic reconstruction of human extra-pair paternity Current Biology 29, 23, 4102-4107.e7

Wilson, C (2024) Does 23andMe's decline show genetic-based medicine has been overhyped? New Scientist 9th March, p14

2.2. ENHANCEMENT

A start-up company called "Bootstrap Bio" is hoping in the future to be able to offer parents the chance to genetically enhance their children (Le Page 2026). The appearance of such companies opens the question of should children be enhanced?

Currently, there is limited knowledge about genes to benefit children, but what knowledge there is suggests polygenic causes of many traits and behaviours. Le Page (2026) added that "it may turn out that some of the gene variants don't have the effects we think. Or they could have the desired effect only in conjunction with certain other genetic variants. What's more, there are often trade-offs?" (p20).

One argument in favour of enhancement is fairness. Le Page (2026) gave this little time: "As for the idea that companies selling genetic enhancements will make the world fairer, pull the other one. A fifth of children born today end up shorter than they should be and with impaired cognitive abilities because they don;t get fed properly. Anyone concerned about taking the lottery out of infant's chances might want to focus on ensuring these children can reach their existing genetic potential, rather than trying to boost the genes of a few" (p20).

Similarly, the "Nucleus Embryo" service from "Nucleus Genomics" (announced in June 2025) offers an optimisation of traits in an embryo during IVF. A set of fertilised embryos is created by IVF, and analysis of the DNA already shows genetic diseases like Huntington's, and which embryo is implanted in the womb is chosen by the parents. Services like "Nucleus Embryo" would go one step further and alter more DNA in the chosen embryo (called "genetic optimisation") (Caplan and Tabery 2025).

Caplan and Tabery (2025) criticised "Nucleus Genomics" as offering an illusion of control over traits that are polygenic, and that science has no accurate information about: It is "what happens when you Silicon Valley-ify diagnostic genetics. Scientific reliability is swapped out in exchange for braggadocio about disrupting a medical status quo that may not even need it. Peer-reviewed research is less important than a punchy

promotional video" (p70).

References

Caplan, A & Tabery, J (2025) The myth of the designer baby Scientific American December, 69-70

Le Page, M (2026) Rolling the genetic dice New Scientist 14th February, p20

3. POTASSIUM-ENRICHED SALT

High dietary salt consumption (eg: 8.7 grams per day in the average Western diet) is a problem, particularly as the consequence of high blood pressure (above 130/80 millimetres of mercury; mmHg) is a health risk. Reducing salt consumption (to 2 grams of sodium or 5 grams of regular table salt per day, for example) is a simple answer, but easier said than done. Potassium-enriched salt is an alternative being considered (as potassium reduces blood pressure). Higher potassium levels help the kidneys to excrete excess sodium in urine (Lawton 2024).

Huang et al (2026) reported a modelling study that estimated the health benefits for adults of replacing regular salt with potassium-enriched salt globally. It was calculated that around three million deaths per year would be prevented (table 3.1), and over ten million new cases of disease. The replacement of "discretionary salt" (ie: added at the table or in the kitchen) would have a greater impact on reducing deaths than the replacement of "non-discretionary salt" (eg: added in processed foods).

- Replacing all salt with potassium-enriched salt - 2.96 m
- Replacing discretionary salt only - 1.85 m
- Replacing non-discretionary salt only - 1.56 m
- Replacing discretionary salt for adults with diagnosed hypertension only - 0.59 m
- Replacing discretionary salt for people with treated hypertension - 0.48 m
- Replacing all salt for adults with chronic kidney disease - 0.75 m (cardiovascular deaths)

Table 3.1 - Estimates of cardiovascular disease and chronic kidney disease deaths prevented per year globally.

The "Salt Substitute and Stroke Study" (SSaSS) involved over 20 000 adults in rural China, and involved sodium reduction and potassium supplementation. Significant reductions in the risk of stroke, major cardiovascular events, and premature death were found over five years with potassium-enriched salt compared to regular salt (Neal et al 2021).

In terms of blood pressure reduction, Huang et al (2024) were interested in untangling the contribution of salt reduction and potassium increase here. Data from the SSaSS were combined in a modelling study with those from a literature review of randomised controlled trials of sodium reduction, potassium supplementation, and salt substitution. It was calculated that the majority of the reduction in blood pressure ("three-quarters or more"; p304) in the SSaSS was attributable to the increase in dietary potassium rather than the reduction in dietary sodium.

REFERENCES

Huang, L et al (2024) The contribution of sodium reduction and potassium increase to the blood pressure lowering observed in the Salt Substitute and Stroke Study Journal of Human Hypertension 38, 298-306

Huang, L et al (2026) The effects of global health outcomes of switching from regular salt to potassium-enriched salt: A modelling study medRxiv (https://www.medrxiv.org/content/10.64898/2026.04.06.26350270v1)

Lawton, G (2024) The salt fix New Scientist 8th June, 32-35

Neal, B et al (2021) Effect of salt substitution on cardiovascular events and death New England Journal of Medicine 385, 1067-1077

4. NON-MEDICAL DIRECTED BLOOD DONATION

Blood donation by volunteers is the main way that general blood supplies are collected for transfusions. "Directed donation — where blood is collected from a specific donor for a designated recipient — is infrequent but serves important medical purposes in select circumstances, such as patients with rare blood types lacking compatible community donors" (Jacobs et al 2026 p2).

Non-medically indicated direct donation, however, emerged particularly at the appearance of HIV/AIDS, and the desire for known donors increased. This "fear-driven directed donation" (Jacobs et al 2026) reappeared with the covid-19 pandemic. "Requests for blood from 'unvaccinated' donors have emerged as a recurring challenge for transfusion services and clinicians, prompted primarily by misinformation about blood safety from vaccinated donors" (Jacobs et al 2026 p2).

Jacobs et al (2026) reported a two-year study (2024-2025) at the Vanderbilt University Medical Centre (VUMC) blood bank in the USA on directed donation and "unvaccinated blood". In total, there were nearly 150 000 blood donations during the study period, of which 0.3% were directed donations (eg: parent donating for their child).

Directed donations for "unvaccinated blood" were associated with care delays, and health problems for recipients. Part of the problem was that directed donation requests were problematic for the institution's standard procedures.

Jacobs et al (2026) commented on the risks specific to directed donation: "Despite being framed as 'safer', directed donations may paradoxically increase risk. Directed units, particularly from family members, have been associated with higher infectious disease marker positivity than volunteer donations. First-time parental donors exhibit infectious disease marker positivity rates of 6–7%, substantially higher than community donors" (p6). There are also health issues related to immunity.

Note that the directed donations were non-medical. The researchers recommended: "Educational materials should explicitly address the false perception that directed donation is safer than standard inventory, emphasising that covid-19 vaccination status is not a medically relevant blood safety attribute and that directed donations based on such characteristics lack scientific support but carry unnecessary risk" (Jacobs et

al 2026 p7).

REFERENCE

Jacobs, J.W et al (2026) Directed donations for unvaccinated blood: A departure from evidence-based medicine associated with clinical harm, resource waste, and oversight gaps in a two-year single-centre series Transfusion (https://onlinelibrary.wiley.com/doi/10.1111/trf.70195)

5. GENE EDITING: BRIEF REFLECTIONS

A single gene rarely has much effect on the development of a trait, rather it is a combination of different genes (polygenic). Gene editing and screening has initially focused on single genes, but with the growth of knowledge polygenic scores for a trait are becoming common. "Polygenic genome editing in human embryos and germ cells is predicted to become feasible in the next three decades" (Visscher et al 2025 p637) [2]. The term used are "embryo screening using polygenic scores" (ESPS) and "heritable polygenic editing" (HPE) (Visscher et al 2025).

Visscher et al (2025) statistically modelled that forty edits at once could reduce the risk of heart disease to less than 0.2%, for example (Le Page 2025) (appendix 5A.

This view has been criticised on a number of fronts including (Le Page 2025):

i) A limited knowledge of the effects of gene editing to predict future outcome.

ii) The statistical models of the benefits of the editing.

iii) Rare variants of genes may increase the risk of one condition, but protect against another condition.

iv) "It's going to be taken up by people who are pushing a eugenics agenda in an unsophisticated way" (Kevin Mitchell of Trinity College Dublin in Le Page 2025).

Visscher et al (2025) admitted that HPE could renew interest in eugenics, so "it is crucial to emphasise respect for individual liberty and societal values, such as diversity, equality and non-discrimination. A state should neither impose its vision of a good life on individuals nor use coercive measures to encourage the use of HPE. Similarly, the practice of reducing the incidence of a disease should not be equated with the

[2] The polygenic risk score (PRS) measures the impact of many individual variations in the genome (ie: single nucleotide polymorphisms; SNPs). Nikitin and Gursoy (2026) showed that it was possible to work backwards from the PRS to identify SNPs, and even the individual person. They calculated that 27 SNPs were enough to identify an individual in a sample of half a million people (Swain 2026). Individuals with uncommon SNPs would be easier to identify. "We should consider this when designing research studies, especially... involving vulnerable populations" (Gamze Gursoy in Swain 2026).

notion that having a disease affects an individual's inherent moral worth" (p641).

A related issue is the use of HPE to alter non-disease traits (ie: the use for purposes other than treating diseases). This is sometimes called "human enhancement". For example, "using HPE to make individuals 'better than well' [Elliott 2010] can be seen as unfair in a world where many people do not have access to adequate healthcare" (Visscher et al 2025 p642). Inequalities could be increased between those born after HPE and those born without it.

Table 5.1 summarises the main ethical arguments around HPE.

FOR	AGAINST
1. Reducing disease is a goal of medicine. HPE use to end a disease could be seen as environmental measures (eg: clean water and cholera). 2. Future generations have a right to good health (which a ban on HPE now would remove). 3. Reducing certain diseases through HPE frees up medical resources for other diseases. 4. All of humanity can benefit from improvements in health (including enhancement).	1. Deepening of inequalities, especially if already-disadvantaged individuals do not have access to HPE. 2. The potential and unforeseen dangers of HPE. 3. The removal of diversity (including of disabilities). 4. The ability to reduce a disease using HPE could remove the motivation for healthy behaviours.

(After Visscher et al 2025 table 1 p642)

Table 5.1 - Main ethical arguments for and against HPE.

APPENDIX 5A - CLONING CLONES

Evidence is emerging that clones are not identical copies of the original, but they have extra mutations, and cloning clones could lead to fatal levels of these mutations (Le Page 2026).

Wakayama et al (1998) first cloned a mouse in 1997, and then continued producing clones from each clone. By 2013 25 successive generations had been repeatedly cloned, but by the 58th generation none of the clones survived (Le Page 2026).

Genetic sequencing of the clones (Wakayama et al 2026) showed that, on average, more than seventy

mutations per clone generation appeared (while controls - ie: naturally reproduced mice - had around one-third as many mutations per generation) (Le Page 2026).

But Shoukhrat Mitalipov of Oregon Health and Science University suggested: "Any observed increase in mutation rates in clones is more likely to reflect the genomic state of the donor cells, rather than a uniform effect of the nuclear transfer process itself" (quoted in Le Page 2026).

REFERENCES

Elliott, C (2010) Better Than Well: American Medicine Meets the American Dream New York: W.W.Norton

Le Page, M (2025) Will genome editing transform our children's health? New Scientist 18th January, p13

Le Page, M (2026) Cloning has an unexpected problem New Scientist 4th April, p11

Nikitin, K & Gursoy, G (2026) Private information leakage from polygenic risk scores bioRxiv (https://www.biorxiv.org/content/10.64898/2026.02.16.706191v1)

Swain, F (2026) Sharing genetic risk scores could carry hidden dangers New Scientist 21st March, p12

Visscher, P.M et al (2025) Heritable polygenic editing: The next frontier in genomic medicine? Nature 637, 637-645

Wakayama, T et al (1998) Full-term development of mice from enucleated oocytes injected with cumulus cell nuclei Nature 394, 369-374

Wakayama, T et al (2026) Limits of serial cloning of mammals Nature Communications 17, article 2495

6. INCREASING MYOPIA

Myopia (near-sightedness) occurs in around one-third of children and adolescents today compared to one-quarter in 1990 (Lawton 2024).

The main type of myopia is axial, where the axis of the eyeball grows too long (ie: the distance between the cornea at the front of the eye and the retina at the back increases such that light entering the eye is not focused on the retina) [3]. The less common type of myopia is refractive, where the cornea or lens is abnormally curved (Lawton 2024).

High myopia is associated with risk of detached retina, myopic macular degeneration, glaucoma, and severe cataracts (Lawton 2024).

Why is myopia increasing, and starting earlier? One explanation is more and better testing today, while another is a genetic component (eg: two myopic parents increases the risk fivefold compared to no myopic parents). But these explanations cannot account for all the increase in cases (Lawton 2024).

Environmental-based explanations include "near work" (ie: activities involving close focus), and staying indoors. "Staying indoors" is a problem that covers more near work, differences in light intensity, and the spectrum of light (Lawton 2024). Overall, a more varied "visual diet" outdoors. For example, outdoors there is a "range of near and far objects, requiring the eye to focus on different points, the light-dark contrast and the level of fine detail the eye needs to resolve" (Lawton 2024 p42).

Mutti et al (2002) found that children with myopia were more likely to have parents with myopia, and to spend more time reading and studying, and less time playing sport outdoors. Data came from the Orinda Longitudinal Study of Myopia in the USA (n = 366 12-14 year-olds). In terms of specific data, 6.3% of children with no parental myopia had myopia themselves compared to 32.9% of children with two myopic parents, while myopic children spent an average of 11.2 hours per week studying compared to 9.4 hours for the sample as a whole. In summary, myopia was associated with hereditary, and with near work.

[3] In a longitudinal study of 187 US children aged 5-13 years over thirty months, Weise et al (2024) found that younger children with higher myopia had greater axial elongation during the study period than older children with lower myopia.

REFERENCES

Lawton, G (2024) The myopia epidemic New Scientist 16th November, 40-43

Mutti, D.O et al (2002) Parental myopia, near work, school achievement, and children's refractive error Investigative Ophthalmology and Visual Science 43, 12, 3633-3640

Weise, K.R et al (2024) Baseline factors associated with myopia progression and axial elongation over 30 months in children 5 to 12 years of age Optometry and Vision Science 101, 10, 619-626

7. HEART RATE VARIABILITY AND MENTAL DISORDERS

Many wearable health trackers record heart rate variability (HRV), and there is growing interest in its link with mental health. "HRV is a measure of the tiny variations in time between each heartbeat. It may sound counter-intuitive, but more variation is a good thing" (Thomson 2026 p20). Put another way, a high HRV suggests an ability to adapt to stress quicker, or, as Van Assche and Schiweck (2026) put it, "higher HRV is thought to reflect greater autonomic flexibility and adaptive capacity, indicating a healthy nervous system response to environmental demands" (p3).

In terms of research, associations have been found between lower HRV and higher depression, for example (Thomson 2026). Van Assche and Schiweck (2026) reviewed the cross-sectional and longitudinal evidence on HRV as a "predictive biomarker" for major depressive disorder. Cross-sectional research compares the resting-state HRV of a group of individuals diagnosed with depression and a group of healthy controls at one point of time, while longitudinal research measures HRV at baseline and follows individuals over time to see who develops depression. The evidence from cross-sectional studies was stronger.

But the measurement of HRV varies between studies (eg: interbeat interval; standard deviation of all normal-to-normal intervals; SDNN) (Van Assche and Schiweck 2026). These researchers also noted: "For studies in participants with depression, it is mandatory to carefully collect participant characteristics known to influence HRV, and which may moderate or mediate the association with depression. These include age, sex, BMI, anti-depressant medication intake (at least current medication and dosage, and whether polypharmacy is present), as well as any medication influencing the cardiovascular system (eg: particularly beta-blockers, and other anti-hypertensives, stimulants, benzodiazepines, anti-psychotics, and thyroid medication) and, depending on your study design, exclude or document cardiac disease" (Van Assche and Schiweck 2026 p21).

Other recommendations included standardising measurement, particularly with wearables, and controlling environmental variables, like temperature and caffeine intake, in laboratory studies (Van Assche and Schiweck 2026).

Quality of evidence was also important in an umbrella review of HRV and mental disorders generally by Wang et al (2025), who found 21 relevant systematic reviews, which included 442 studies. Good quality evidence indicated decreased HRV in individuals with dementia, post-traumatic stress disorder (PTSD), somatic disorders, and schizophrenia compared to controls. The evidence was weaker for other mental disorders. "No two diseases exhibited identical altered HRV patterns, highlighting the potential significance of overall HRV profiles in delineating distinct disorders" (Wang et al 2025 p1). Alterations in HRV were also found during treatment (eg: anti-psychotic medications), but the evidence was again weaker.

In total, only seven of 44 statistically significant meta-analyses were supported by "suggestive evidence". Key factors which influenced the quality of evidence included non-significant findings in large samples and significant results with small samples, controlling of confounders (eg: age; gender; severity of symptoms of mental disorder), HRV measurement method (eg: absolute vs normalised values), and probability level (eg: $p<0.05$ vs $p<0.001$) (Wang et al 2025).

REFERENCES

Thomson, H (2026) Listen to your heart New Scientist 9th May, p20

Van Assche, E & Schiweck, C (2026) Resting state heart rate variability in depression: An introductory narrative review of cross-sectional and longitudinal evidence Journal of Personalized Medicine 16, article 87

Wang, Z et al (2025) Heart rate variability in mental disorders: An umbrella review of meta-analyses Translational Psychiatry 15, article 104

8. TRANS HEALTH

8.1. INTRODUCTION

The health care of transgender [4] and gender diverse (TGD) populations is sub-optimal, and there is a risk of all-cause mortality up to 1.75 times greater than cisgender people, in one study in England (Jackson et al 2023) (appendix 8A).

The "World Professional Association of Transgender Health Standards of Care" (version 8) (WPATH SOC 8) (Coleman et al 2022) provides evidence and expert consensus for the health of TGD individuals. Pattar et al (2024) analysed the literature informing WPATH SOC 8 (over 1800 academic articles).

Overall, two-thirds of studies were TGD-only populations (as opposed to comparisons with cisgender samples). But White, young adults (18-29 years) were the dominant participants.

In terms of design, 45% of the studies cited were cross-sectional, and 37% longitudinal. Pattar et al (2024) argued that "longitudinal studies including a diversity of TGD individuals across life stages are required to improve the quality of evidence" (p2).

8.2. HEART

"Pronounced differences between women and men exist in the epidemiology, pathophysiology, manifestation, progression and outcomes of CVDs [cardiovascular diseases]. Consistently, there is a documented trend of lower rates of CVD in pre-menopausal women compared with men of the same age. However, following menopause, the incidence of CVD development and mortality in women is higher than that observed in men" (Franz et al 2025 p2)

[4] "Transgender women are transgender people whose experienced gender is female although their assigned sex at birth is male; and transgender men are transgender people whose experienced gender is male although their assigned sex at birth is female" (Masumori 2023 p105).

(appendix 8B).

In terms of TGD and cisgender populations, prevalence of coronary artery disease and myocardial infarction data showed the following rates: 17.8% gender non-conforming individuals, 6.6% transgender men, 8% transgender women, 9% cisgender men, and 4.8% cisgender women (Reisner et al 2016).

But what about individuals undergoing gender-affirming hormone replacement therapy (GAHT) (or cross-sex hormone treatment; CHT)?

"In general, oestrogens and androgens are administrated to transgender women and transgender men who would like to physically achieve feminisation and masculinisation, respectively, to affirm their gender. However, there are no approved drugs for CHT and no definitive protocols because of a lack of well-designed clinical trials to determine its efficacy and safety, especially with regard to long-term use, although some clinical guidelines provide hormone regimens for transgender people" (Masumori 2024 p105).

An increased risk of cardiovascular disease (CVD) events (eg: stroke; myocardial infarction) and death is a possible side-effect of CHT. In a review of the evidence, Masumori (2023) concluded that "oestrogen administration increases the risk of CVE in transgender women, but it remains inconclusive as to whether androgen administration increases the risk of CVE in transgender men" (p105). The problem is that "definite evidence" on long-term consequences, in particular, is "insufficient" (Masumori 2023).

Establishing the relationship between CHT and CVE requires the control of confounders, particularly stress and associated negative health behaviours (eg: smoking). The stress of discrimination and victimisation of TGD people can lead to CVD, including via elevated rates of smoking (Masumori 2023).

8.3. KIDNEY

Chronic kidney disease (CKD) is an area where GAHT has not been considered as a variable (Ahmed et al 2021). But the formulation and mode of administration of these hormones will impact the kidneys. "Each formulation has its own pharmacokinetic properties to consider, such as whether the exogenous sex hormone is absorbed from the gastro-intestinal tract or the skin integument, is subject to first-pass hepatic metabolism, and is characterised by steady systemic levels or by levels with

peak and trough variation, as well as the role of kidney excretion" (Ahmed et al 2021 p142).

Ahmed et al (2021) reported that they had no knowledge of published studies of CKD prevalence in the TGD population. They stated: "We and others have shown that sex hormones in the form of contraception, post-menopausal hormone therapy, and testosterone replacement therapy are implicated in the development and progression of CKD, but the effects of gender-affirming hormone therapy or gonadectomy on kidney function are unclear" (Ahmed et al 2021 p142) [5].

Collister et al (2021) performed a narrative review of the evidence on CKD. There were differences compared to cisgender people, mostly linked to GAHT. The studies in the review were mostly case reports and limited in number. "Randomised controlled trial and observational studies in nephrology do not routinely differentiate between cisgender and transgender participants" (Collister et al 2021 p1).

8.4. QUALITY OF LIFE

The "Global Pride Project" in the UK surveyed lesbian, gay, bisexual, trans, queer and questioning (LGBTQ+) adults in 2022 on well-being, mental health, and quality of life. Haffold-Letchfield et al (2026) performed a preliminary analysis on the data from 172 respondents. Key measures included depressive symptoms in the last thirty days (eg: "nervous, hopeless, restless"), general health (from "excellent" (1) to "poor" (5)), quality of life ("very poor" (1) to "very good" (5)), and discrimination (eg: "verbally insulted").

The findings highlighted differences between sexual identity groups. For example, bisexual women had the higher quality of life scores, while bisexual men had greater depressive scores. Quality of life was influenced by income, general health, and social support, overall.

Thirty-three respondents self-identified as transgender. Their mean score for quality of life was 3.6 (compared to 3.9 for the whole sample), and the mean depression score (out of 24) was 15.5 (vs 7.8).

Previous research has tended to view LGBTQ+ individuals together, though there are similarities (eg: poorer psychological well-being than cisgender

[5] This the opposite to the "trans broken arm syndrome". "The term refers to medical situations - such as having a broken arm - that are unconnected to gender identity, yet healthcare providers act on the basis there is a connection" (Davis 2024 p18).

heterosexual individuals; poorer self-rated health) (Haffold-Letchfield et al 2026).

8.5. APPENDIX 8A - STRUCTURAL STIGMA

More generally, Lattanner et al (2025) reviewed the evidence on "structural stigma" and LGBTQ+ (lesbian, gay, bisexual, trans, queer, plus others not specified) health. These author's used Hatzenbuehler and Link's (2014) definition of structural stigma as "societal-level conditions, cultural norms, and institutional policies and practices that constrain the opportunities, resources, and well-being of the stigmatised". One measure of structural stigma, for example, is the number of laws related to sexual orientation and gender identity to create an index of LGBTQ+ policy restrictions and protections (Lattanner et al 2025).

Specifically, the researchers performed a meta-analysis to quantify the association between structural stigma and poor health among LGBTQ+ individuals. Eighty-two relevant peer-reviewed studies published in English between 2006 and 2023 were included. Overall, a significant positive relationship was found (r = 0.05-0.11), and the effect size was comparable to other associations like income inequality and depression. The relationship can be summarised as greater structural stigma being associated with poorer health outcomes.

The effect size was stronger for mental health, physical health, and substance use than for sexual health/HIV/AIDS. There was some heterogeneity in the relationship for different groups (lesbian, gay etc).

The effect size of structural stigma on health was smaller than individual-level stigma and health outcomes (eg: internalised homophobia and mental health problems).

Any review or meta-analysis depends upon the studies included and these will probably vary in methodology. Differences here included in the measurement of the variables (LGBTQ+, structural stigma, health outcomes), the control of confounding variables (eg: neighbourhood deprivation; income inequality), the type of study design (eg: cross-sectional, longitudinal, quasi-experimental), and the sampling method.

8.6. APPENDIX 8B - GENDER MEDICINE AND CVD

Sex-divergent biological processes are seen in some diseases, like CVD. "In recent years, the role of gender

and sex aspects of CVD has been increasingly recognised due to differential disease development, presentation, progression, outcomes, and treatment responses between men and women. Men tend to develop CVD earlier in life and present different symptoms than women. Despite these differences, diagnostic criteria and proposed treatments are usually the same between sexes, which, together with historically male-biased clinical trial populations, might explain the higher rate of adverse drug reactions in women. Moreover, gender norms and expectations have been noted to impact how healthcare providers receive, witness, and diagnose patients, more often failing to correctly attribute women's symptoms to CVD" (Jovanovic et al 2024 p2).

Raisi-Estabragh et al (2022), for example, based on US data from over twenty million emergency department patients, reported that cardiac arrest and myocardial infarction (MI) were more common in men, while stroke and hypertension, for instance, were more common in women.

In terms of risk factors, hypertension, smoking, and diabetes were associated with higher hazard ratios for women with MI than with men (Jovanovic et al 2024). Differences in drug response have also been observed in studies, "due to differences in body composition, pharmacokinetic/pharmacodynamic (PK/PD) properties of some drugs, and fluctuations in endogenous sex hormone levels (menstrual cycle, pregnancy), or the administration of oral contraceptives (OCs) or hormone replacement therapy (HRT). These differences are rarely considered when prescribing dosages, contributing to more frequent adverse drug reactions in women" (Jovanovic et al 2024 p2).

Lifestyle can impact CVD, and "women exhibit better adherence to healthy diets compared with men, with higher intake of dietary fibre and lower energy foods. While red meat consumption has been identified as a risk factor for CVD regardless of sex, large cohort studies found certain dietary patterns, particularly the consumption of milk and dairy products, protective against CVD, obesity, and metabolic syndrome in women, but not in men. Moreover, consistent cross-national associations between gender and certain foods, such as 'masculine food habits' (red meat and alcohol) and 'feminine food habits' (fish, fruits, and vegetables), have been observed, potentially contributing to gender disparities in cardiovascular health" (Jovanovic et al 2024 p4).

Differences in physiology are also relevant to CVD (eg: female hearts "typically exhibit higher beating rates"; Jovanovic et al 2024 p5), as well as the growing

knowledge on the gut microbiome, and the interaction with sex hormones. Faecal samples from mice, for example, show "a clear difference in gut community composition" (Jovanovic et al 2024 p6). While human studies find differences in the microbiome between pre- and post-menopausal women (Jovanovic et al 2024).

The growing knowledge about "gender medicine", as Jovanovic et al (2024) called it, must not, they argued, ignore intersex and trans individuals. The rarity and the heterogeneity of intersex conditions means that "very little is known conclusively for a given patient, though a baseline expectation might be in many cases an intermediate phenotype, risk profile, and treatment response pattern between that of endosex men and women" (Jovanovic et al 2024 p13). With trans individuals, GAHT-induced changes are relevant, particularly to CVD (Jovanovic et al 2024).

Jovanovic et al (2024) highlighted a concern around the statistical analysis of gender differences: "Much of the work we have reported whether in animal models or in humans, operate through separate disaggregated statistics — for example, testing an association between a gut bacterium and a marker of cardiovascular health separately for significance in male and female subjects, achieving nominal significance in the one group but not the other, then reporting this as a sex-specific association. If the study (as frequently) is statistically underpowered in the separate male and female groups, an association may thereby be incorrectly described as sex-specific (concluding evidence of absence from the absence of evidence). On the contrary, pooled rather than disaggregated analyses can miss strong but opposed correlations in male versus female subjects as the overall signals cancel out" (p15).

8.7. REFERENCES

Ahmed, S.B et al (2021) Gender and CKD: Beyond the binary CJASN 16, 141-143

Coleman, E et al (2022) Standards of care for the health of transgender and gender diverse people, version 8 International Journal of Transgender Health 23, sup 1, s1-s259

Collister, D et al (2021) Providing care for transgender persons with kidney disease: A narrative review Canadian Journal of Kidney Health and Disease 8 (https://doi.org/10.1177/2054358120985379)

Davis, N (2024) "We don't know much": The scientists trying to close a knowledge gap in trans health The Guardian 19th March, 18-19

Franz, K et al (2025) Sex hormone-dependent host-microbiome interactions and cardiovascular risk (XCVD): Design of a longitudinal multi-omics cohort study BMJ Open 15, e087982

Haffold-Letchfield, T et al (2026) Exploring the determinants of quality of life for LGBTQ+ people: Findings from the UK participants in the Global Pride Survey Sexuality Research and Social Policy (https://link.springer.com/article/10.1007/s13178-025-01275-5)

Hatzenbuehler, M.L & Link, B.G (2014) Introduction to a special issue on structural stigma and health Social Science and Medicine 103, 1-6

Jackson, S.S et al (2023) Analysis of mortality among transgender and gender diverse adults in England JAMA Network Open 6, 1, e2253687

Jovanovic, N et al (2024) A gender perspective on diet, microbiome, and sex hormone interplay in cardiovascular disease Acta Physiologica 240, e14228

Lattanner, M.R et al (2025) State of the science of structural stigma and LGBTQ+ health: Meta-analytic evidence, research gaps, and future directions Annual Review of Public Health 46, 213-231

Masumori, N (2023) Cardiovascular risk in transgender people with gender-affirming hormone treatment Circulation Reports 5, 105-113

Pattar, B.S.B et al (2024) Characterisation of the literature informing health care of transgender and gender diverse persons: A bibliometric analysis PLoS ONE 19, 10, e0309169 (Freely available at https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0309169)

Raisi-Estabragh, Z et al (2022) Differential patterns and outcomes of 20.6 million cardiovascular emergency department encounters for men and women in the United States Journal of the American Heart Association 11, 19, e026432

Reisner, S.L et al (2016) Global health burden and needs of transgender populations: A review Lancet 388, 412-436

9. MOSQUITO-BORNE ILLNESSES

9.1. EXPANSION

Mosquito-borne illnesses are rising around the world, particularly in areas where they are less common. For example, eastern equine encephalitis in the north-east USA in 2024. Outbreaks in Massachusetts usually occur every ten to twenty years, but the latest cases are four years after the last one ended (Wade 2024).

Climate change producing warmer spring and autumn, and wetter conditions have given mosquitoes a longer active period. Between 1979 and 2022, annual mosquito days in the USA have increased by over two weeks (Wade 2024).

The geographical range of mosquito activity has also expanded (eg: in Europe), while countries where mosquito-borne illnesses are common have seen increases in cases (eg: Oropouche virus in Brazil showed an 800% increase between 2023 and 2024; Wade 2024).

9.2. ZIKA VIRUS AND UNDEMOCRATIC MOSQUITOES

Zika virus is transmitted by mosquito, in the main, and it is only a risk for pregnant women, leading to neurological impairments (eg: micro-encephaly) in the baby.

As with many pandemics, its burden is not felt evenly across society. "Mosquitoes are often presented as democratic creatures. They do not respect frontiers or boundaries, be they between countries, states, or neighbourhoods, and when they have an opportunity to do it, will bite a human they will do it, independently of the bitten person's age, sex, skin colour and and social class. The key phrase is, however, 'when they have an opportunity'. Mosquitoes have less opportunities to multiply in affluent areas, while people who live in these areas have more opportunities to protect themselves from mosquito bites. Mosquitoes may well be democratic creatures, but the distribution of pathologies they carry is decidedly not democratic" (Lowy 2020 p1).

Official figures for 2015-16 in Brazil, which are not complete, suggest that about two-thirds of pregnant

women diagnosed with Zika are non-White (Lowy 2020). While the first cases reported in a major medical journal (Trufinol 2016) of micro-encephaly from Zika in north-eastern Brazil related to low-income families (Lowy 2020).

"Part of the explanation may be purely geographic. Since the great majority (80% environs) of cases of confirmed Zika syndrome in 2015-2016 in Brazil were in the North East, and the majority of inhabitants of this region are poor and non-White, it is not surprising that the majority of the children with Zika induced impairments were born to lower class Black and Brown women. However, for many experts, this reasoning cannot fully account for the over-representation of poor women among 'Zika mothers' including in other parts of Brazil" (Lowy 2020 p2).

Treichler (1999) used the term "epidemic of signification" to describe "how AIDS linked sex, drugs, blood and death, and revealed the discrimination and stigmatisation of groups such as homosexuals, Haitians, drug users, sex workers and African migrants. The visibility of all these topics produced an emotional climate in which AIDS was not seen as one infectious disease among many others, but a pathology with a strong emotional charge" (Lowy 2020 p24).

Lowy (2020) applied this term to Zika in Brazil because "it connected mosquitoes, poverty, fertility, and harm to newborns (a fear of 'monstrous births' can be traced to antiquity), exhibited the plight of previously invisible groups such as children with neurological impairments and struggling mothers of disabled children, and produced, mainly through the use of striking photographs of affected babies, an emotionally-charged image of a Zika, quite different from the image of its close relative, dengue fever. On the other hand, Zika epidemics was also shaped by 'public secrets' – elements known to many people but seen as upsetting, and therefore seldom present in debates about this epidemics. One such public secret was stratified reproduction: the important differences between the capacity of affluent, mostly White, and poor, mostly non-White women to avoid contamination by disease-carrying mosquitoes, avoid sexually transmitted diseases, including Zika, control their fertility, avoid pregnancy-related problems, obtain a reliable diagnosis of exposure to Zika virus, get access to a good quality monitoring of fetal development, and, it is reasonable to assume, have a possibility to decide to terminate a pregnancy following an infection

with Zika virus or a diagnosis of foetal anomaly" (pp24-25).

REFERENCES

Lowy, I (2020) Zika in Brazil: Viruses, mosquitoes and stratified reproduction (KCL BIOS)
(Lowy 2024 viruses and reproductive injustice: zika in brazil; baltimore: johns hopkins university press)

Treichler, P (1999) How to have Theory in an Epidemic: Cultural Chronicles of AIDS Durham, NC: Duke University Press

Trufinol, M (2016) A new mosquito-based threat to pregnant women in Brazil Lancet Infectious Diseases 16, 2, 156-157

Wade, C (2024) Mosquito-borne illnesses are spiking around the world New Scientist 7th September, p14

10. SKIN DAMAGE AND GENERAL HEALTH

10.1. ATOPIC DERMATITIS

"Growing evidence suggests that damage to the skin can have knock-on effects for the rest of the body, driving inflammation, muscle and bone loss, and possibly even cognitive decline. The more your skin deteriorates, the more the rest of you ages prematurely" (Marshall 2024 p32).

The body's response to skin conditions involves inflammation and immune system activity which impact the rest of the body. This is the general link between skin problems and other health risks (Marshall 2024).

For example, individuals with atopic dermatitis (AD) (or eczema), where areas of skin become cracked and itchy, have an increased risk of heart attack, stroke, angina, and heart failure (Marshall 2024).

Based on a meta-analysis of fifteen studies, Yuan et al (2018) concluded that individuals with AD had a significantly increased risk of stroke, and myocardial infarction. This was especially so for males, and for individuals with severe AD.

It was not possible to establish a causal link as most of the studies were cross-sectional. There may be a common immune system mechanism, like inflammation, between AD, and stroke, say, or individuals with AD, particularly males, could have health-harming behaviours, like alcohol consumption, obesity, and smoking, which cause the stroke etc, proposed the researchers.

The studies in the meta-analysis showed heterogeneity in methodological variables, including design (eg: cross-sectional or cohort studies), sample (eg: age; recruitment), follow-up length, adjustment for confounders, and measurement of AD (eg: self-reports vs formal diagnosis). On the positive side, all the studies were rated as good methodological quality according to the "Newcastle-Ottawa Quality Assessment Scale" (Stang 2010).

Dokoshi et al (2021) outlined the background to their research: "All human epithelial surfaces use innate host defence systems to detect and appropriately respond

to environmental challenges such as physical injury and bacterial invasion. Skin and the intestine cope with their very different environments with distinct innate immune strategies to defend against unique pathogens. However, despite their differences, inflammatory disorders of these critical barrier organs are frequently observed together. For example, patients with inflammatory bowel disease (IBD) have a higher risk of inflammatory skin diseases, and patients with primary skin diseases also have a higher risk of IBD" (p1). Using mice it was shown that (deliberate) damage to the skin influenced the function of the colon (appendix 10A).

In another study with mice, Liang et al (2022) showed that premature skin ageing was linked to age-related bone loss (via cystatin-A, an epidermally derived hormone).

10.2. INFLAMMAGING

"Inflammaging" is "chronic, low-grade inflammation that occurs even in the absence of any infection or chronic conditions" (Franceschi et al 2025 p1441) as individuals age. "Inflammaging underscores the intricate interplay between ageing, metabolism and the immune system and can be described as a continuous, dynamic remodelling of the immune system, intimately tied to the concept of immunosenescence, the gradual decline in immune function that occurs with age" (Franceschi et al 2025 p1441).

It is "a consequence of each individual's lifelong exposures to inflammatory stimuli, shaped by a unique combination of genetics, lifestyle, socio-economic conditions and environmental factors such as infections and pollution" (Franceschi et al 2025 p1411). This fits with the idea of immunobiography, or "individualised inflammaging" (Franceschi et al 2025).

"The age-related decrease in physiological barrier integrity and lifelong exposure to damage entail an increase in internal 'garbage' such as endogenous, misplaced or altered molecules resulting from damaged and/or dead cells and organelles (cell debris) and loss of gut intestinal barrier integrity. This 'garbage' represents a major source of inflammatory stimuli..." (Franceschi et al 2025 p1442).

These researchers argued there will be gender differences in inflammaging due to differences in immune function: "Men exhibit higher inflammatory status and a weaker response against acute stimuli as well as a higher

production of reactive oxygen species and less-efficient antioxidant mechanisms. Women generally exhibit lower infection rates than men for various pathogens but face up to a fourfold higher risk of autoimmune diseases, especially during reproductive life" (Franceschi et al 2025 p1442).

Inflammaging is impacted by physical activity (or lack of, specifically), sleep quality (ie: poor exacerbates it), and "geroprotectors" and "senolytics" (Franceschi et al 2025). "Unlike nutraceuticals, which are dietary supplements that maintain physiological functions without necessarily affecting ageing mechanisms, geroprotectors are compounds that target the fundamental causes of ageing and ARDs [age-related diseases], their primary criterion being to extend longevity while preserving physiological function and health-related quality of life" (Franceschi et al 2025 p1447). Natural geroprotectors are vitamin D, curcumin, and polyphenols, while medications like metformin show potential (Franceschi et al 2025).

Senolytics are synthetic or natural compounds that impact cell death (eg: medications like dasatinib and navitoclax) (Franceschi et al 2025).

10.3. APPENDIX 10A - AUTOIMMUNE

"The human immune system is a double-edged sword. The same thing that neutralises foreign pathogens like bacteria and viruses can turn its antibodies, cytokines and T-cells against the body's own tissue. Broadly, this phenomenon is called autoimmunity" (Durcharme 2026 p39).

Inflammatory depression, for example, a sub-type of depression generally, has been found to have elevated levels of immune system activities (eg: circulating cytokine levels). "It is now known that cytokines — soluble immune signalling molecules that include chemokines, interferons, and interleukins — can alter information flow through the CNS and influence affective, sensorimotor, regulatory, cognitive, and perceptual domains" (Tyagi and Bartley 2026 p983).

The exact nature of "whether and how cytokines, and inflammation more broadly, contribute to psychiatric illness is a growing area of investigation" (Tyagi and Bartley 2026 p983). These researchers reviewed 36 studies on the topic with the conclusion that there was a need "for a more complete map of cytokine dynamics in humans with and without mental illness" (Tyagi and Bartley 2026 p983).

Zandi et al (2011) found N-methyl-D-aspartate (NMDAR) antibodies in the blood of four individuals in a sample of 46 adults with first episode psychosis in the UK. This was the first case of NMDAR antibodies "identified in patients with purely psychiatric disorders" (Zandi et al 2011 p686).

A specific example is autoimmune encephalitis (AE), which is "inflammation of the brain caused by an assault from the immune system" (Ducharme 2026 p39). This condition may be the basis of some psychiatric illnesses. For example, anti-NMDAR encephalitis is a type of AE where specific antibodies bind to receptors in the brain causing psychiatric symptoms like delusions and hallucinations [6].

An increasing role for autoimmunity in psychiatric conditions opens the possibility of treating mental illness with medications that target the immune system. Note that researchers are not saying that all psychiatric conditions are autoimmune-related mental illness (Ducharme 2026).

A woman with three different autoimmune conditions was treated with CAR T-cells (genetically engineered versions of T-cells) (Korte et al 2026). The conditions were haemolytic anaemia, thrombocytopenia, and antiphospholipid syndrome (Le Page 2026).

10.4. REFERENCES

Dokoshi, T et al (2021) Skin inflammation activates intestinal stromal fibroblasts and promotes colitis Journal of Clinical Investigation 131, 21, e147614

Ducharme, J (2026) The brain on fire New Scientist 18th April, 38-41

Franceschi, C et al (2025) Toward precision interventions and metrics of inflammaging Nature Aging 5, 1441-1454

He, L et al (2026) The anti-psychotic drug clozapine suppresses autoimmunity during psychosis-like behaviour in mice bioRxiv (https://www.biorxiv.org/content/10.64898/2026.03.28.714971v1)

Korte, I.K et al (2026) CD19 CAR-T therapy induces remission in refractory autoimmune haemolytic anaemia with ITP and antiphospholipid syndrome Med 7, 5, 101075

[6] In mice, He et al (2026) showed that anti-psychotic drug clozapine reduced anti-NMDAR autoantibody levels in anti-NMDAR encephalitis.

Le Page, M (2026) CAR T-cell therapy treats trio of diseases New Scientist 18th April, p12

Liang, W et al (2022) Skin chronological ageing drives age-related bone loss via secretion of cystatin-A Nature Aging 2, 10, 906-922

Marshall, M (2024) More than skin deep New Scientist 2nd March, 32-35

Stang, A (2010) Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of non-randomised studies in meta-analyses European Journal of Epidemiology 25, 603-605

Tyagi, R & Bartley, C.M (2026) Dynamic cytokine relationships across the blood-brain barrier in humans and non-human primates, implications for psychiatric illness: A systematic review Biological Psychiatry 99, 11, 983-1001

Yuan, M et al (2018) Relationship of atopic dermatitis with stroke and myocardial infarction: A meta-analysis Medicine 97, article 49 (e13512)

Zandi, M.S et al (2011) Disease-relevant autoantibodies in first episode schizophrenia Journal of Neurology 258, 686-688