PSYCHOLOGY MISCELLANY

No.217 - April 2025

Inequality and Inequity

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ISSN: 1754-2200

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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.

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1. SLEEP HEALTH

1.1. INTRODUCTION

Poor sleep health is associated with negative health consequences. Sleep duration is one of the elements of sleep health (eg: the recommended seven hours per night). Based on ethnicity, surveys in the USA find that less Black/African Americans have the recommended length of sleep compared to White, non-Hispanics (eg: 54% vs 67%; Liu et al 2016).

Whitehead (1991) defined "differences in health that are avoidable, modifiable, and inequitable in nature as disparities" (Jones et al 2020 p40).

Dubar (2022) introduced a special issue of the journal "Sleep Health" on racial-ethnic disparities in sleep, particularly in the USA. "Poor quality sleep has long been identified as a critical pathway linking lower income and lower education to increased risk for poor physical and mental health. Social factors, such as neighbourhood disadvantage, neighbourhood crime, lack of adequate access to equitable health and social services, housing inequality, and racial discrimination, have all been identified as contributing factors to the rise of sleep health disparities in the US" (Dubar 2022 p7).

Dubar (2022) outlined three key points on the topic:

i) A need to "abandon race-ethnicity as a predictor of sleep health disparities. Instead, researchers should move to advance the field by modelling the multi-faceted racialised experiencesof individuals as the true

predictors of sleep health disparities. The strong evidence for racial-ethnic group differences in sleep health warrants a deeper understanding of how individuals from under-represented groups navigate daily stressors within their everyday lives" (Dubar 2022 p8).

ii) A move from a focus on the individual as solving the sleep health disparities to the macro-level changes needed.

iii) The intersectionality of social identities (ie: the interaction of race-ethnicity, gender, social class, and other social variables) and sleep health disparities [1].

1.2. CARDIO-METABOLIC DISEASES

"Poor sleep", characterised by too little, too much, mistimed in relation to circadian rhythms, and low quality (eg: insufficient deep sleep), is a risk factor for cardio-metabolic diseases (CMDs) (eg: obesity (appendix 1A); type 2 diabetes; hypertension; cardiovascular disease) (Rae et al 2020).

Rae et al (2020) explored this relationship with data from participants of the "Modelling the Epidemiologic Transition Study" (METS). METS includes young adults of African-origin from five countries (Ghana, South Africa, Jamaica, Seychelles, and the USA) (approximately 500 volunteers aged 25-45 years from each country). A standardised questionnaire was used to collect health, and socio-demographic data. Sleep duration was self-reported.

Overall, women reported significantly longer sleep than men (mean: 8.05 vs 7.73 hours per night).

In terms of the relationship between sleep duration and CMDs, the pooled data showed a gender difference for obesity. Men had a linear relationship with more sleep association with less likelihood of obesity, while women had a U-shaped relationship (ie: low and high sleep associated with obesity).

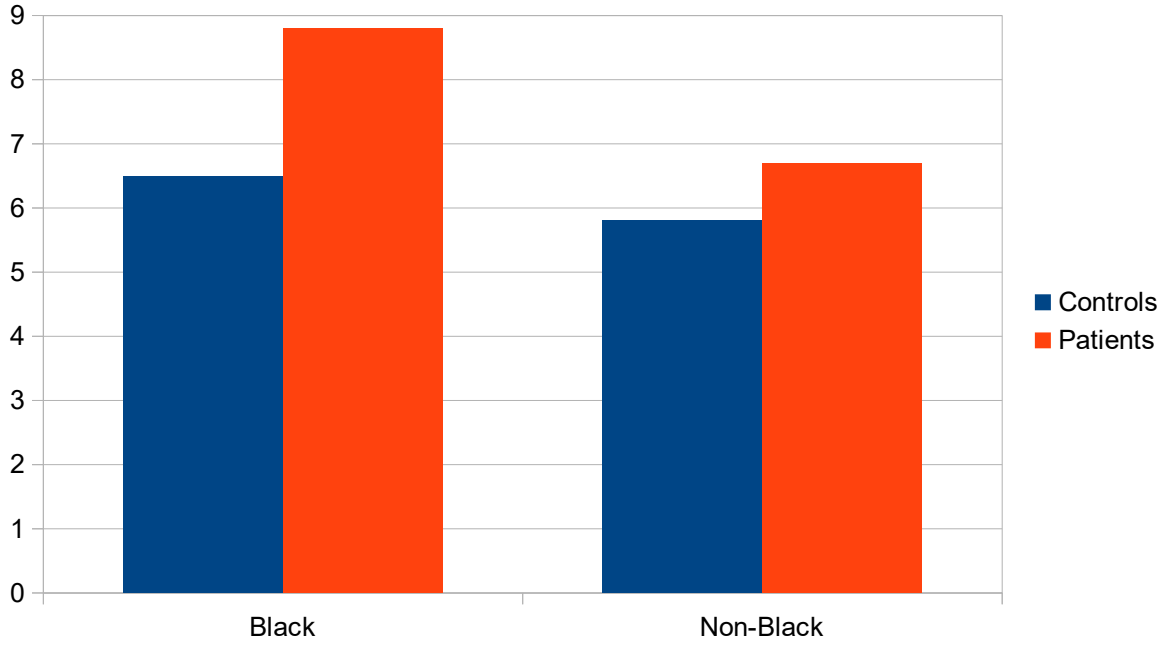
Looking at the countries separately, average sleep was shortest in the USA (less than 7 hours) and longest in South Africa (more than ten hours). Short sleep and CMDs risks were found for US participants (men and women), and Jamaican women, after controlling for variables.

[1] "Intersectionality describes a point where different positions meet or clash" (Blackman et al 2018 p327), and comes from "intersectionality theory" proposed by Crenshaw (1989).

Many details about sleep were not collected, like quality, differences between work and non-work days, and home environment (ie: where the individual sleeps).

In relation to heart disease, Moazzami et al (2020) analysed data from the "Myocardial Infarction (MI) and Mental Stress 2" study, which included patients admitted to hospitals in Atlanta, Georgia, with MI between 2011 and 2016. A control sample from the local area was used for comparison. Sleep quality was assessed using the "Pittsburgh Sleep Quality Index" (PSQI), which has nineteen items covering subjective sleep quality, duration, and disturbance. A score of five or above (out of 21) is defined as poor sleep quality. Data on other variables were also collected, including socio-economic characteristics (eg: household income), health (eg: smoking status; obesity; hypertension), and psychological factors (eg: depression). In total, data on 273 patients (190 Black) and 100 controls (44 Black) were included.

Black patients (ie: a verified MI in the previous eight months) reported significantly worse sleep quality than White patients, and all controls (figure 1.1). "This difference is driven by a combination of factors, including clinical risk factors, psychological factors as well as adverse socio-economic conditions among Black individuals with MI" (Moazzami et al 2020 p570).



(Data from table 2 p573 Moazzami et al 2020)

Figure 1.1 - Mean PSQI score.

1.3. MIDDLE-AGED SMOKERS

Focusing on a specific group, Patterson et al (2021) analysed a sub-sample of the "Temple Lung Heart Cohort Study" of over 200 45-60 year-old Black/African American cigarette smokers. "Actigraph GT3X" accelerometers were worn for fourteen consecutive days. Measures of five sets of variables were taken - socio-demographic, individual physiology (eg: body mass index; lung disease), individual behaviour (eg: diet; hazardous alcohol use), interpersonal (eg: depression; social support), and community factors (eg: food insecurity; household density).

Overall, 57% of the sample had a healthy sleep duration (defined as 6-8 hours per night), and 14% healthy sleep efficiency (ie: 85% or more of the time in bed spent sleeping). After controlling for the different variables, healthy sleep duration was associated with light physical activity, and with low immune system inflammation, while healthy sleep efficiency was associated with higher social support, and with low hazardous alcohol use.

The sample was a high risk group for poor health being smokers and attending a lung clinic. They were also generally vulnerable to unemployment and insecure employment, had low educational qualifications, and lived in poorer urban areas. But increasing light physical activity emerged as a way to improve sleep duration, and the reduction of alcohol consumption as a way to improve overall sleep efficiency. Both of which benefit health directly as well.

Analysis of the many variables was based on machine learning of the self-reported data.

1.4. NATIONAL HEALTH INTERVIEW SURVEY

Focusing on college students, Jones et al (2020) analysed data from the "National Health Interview Survey" (NHIS) for 2004 to 2017. The NHIS is a nationally representative population survey of non-institutionalised US adults, including, in the time period, over 2000 students living in a college dormitory. Measures of sleep characteristics were self-reported [2], as well as general health status.

Overall, 71% of the sample was White, 16% Black, 7% Hispanic/Latino, and 6% Asian. In total, 29% of the

[2] Self-reported sleep data tend to overestimate duration compared to objective measures of sleep (Jones et al 2020).

students reported short sleep. After adjusting for demographic variables, statistically non-significant more Black students had short sleep duration (less than seven hours per night) than White students (figure 1.2). Insomnia symptoms had low prevalence overall with no difference between the groups. Asian students were more likely to report non-restorative sleep than White students.

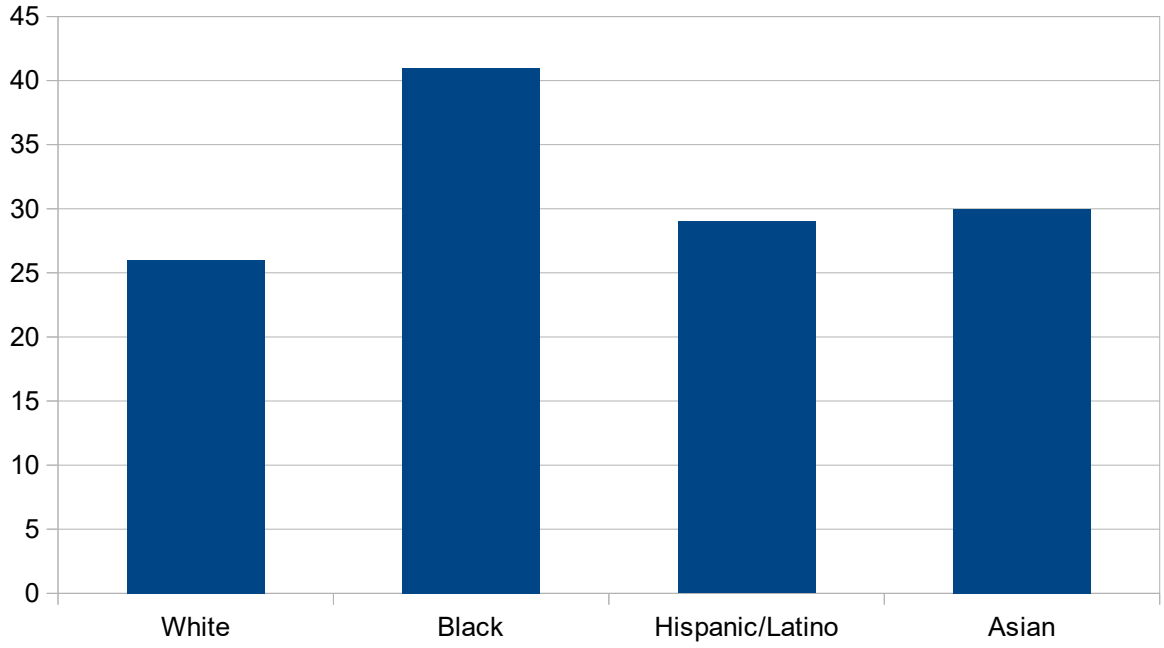


Figure 1.2 - Prevalence of short sleep (%) among students living in college dormitories based on ethnic group.

Two distinct issues that may degrade sleep health for ethnic minority students are "imposter syndrome" and "John Henryism". The former is "wherein the person consistently internalises fear related to being exposed as fraudulent or undeserving and, therefore, misattributes or discounts past achievements in the domain of interest such as work or school. This syndrome, experienced across all racial/ethnic groups, has been associated with higher levels of psychological distress among Black, Hispanic/Latino, and Asian college students studying at US institutions" (Jones et al 2020 p45).

"John Henryism" is "defined as persistent effortful coping by expending physical and mental effort without sufficient support/resources..." (Jones et al 2020 p45). This could impact sleep health.

Luo et al (2021) investigated the interaction of educational attainment and ethnicity with NHIS data (2004-2018) (a sample of over 250 000 25 to 69 year-olds). Four groups of educational attainment were distinguished in the analysis - less than high school graduation (equivalent of no educational qualifications), high school graduation, some college, and college and above.

Black adults had a higher prevalence of short sleep than White adults overall. When adding educational attainment, short sleep was most prevalent among Black adults with "some college" education, and White adults with high school graduation. Next, controlling for socio-economic, family, and health variables, it was found that greater educational attainment was associated with lower likelihood of short sleep for White adults, but the opposite for Black adults. "As a result, Black-White difference in sleep duration is most pronounced among the college educated" (Luo et al 2021 p6). This is a challenge to the general assumption that more education is associated with improved health.

Jackson et al (2013) had found a similar pattern to Luo et al (2021) for occupation - ie: "professional roles were associated with an elevated risk of short sleep duration among Black adults, whereas the opposite was observed among White adults" (Luo et al 2021 p6).

A variation of "John Henryism" is "racial battle fatigue" (eg: Smith 2014). "This concept states that Black men with higher levels of education may be more susceptible than those with lower education to experiencing mundane, extreme, environmental stress (MEES) in social institutions such as school and workplace lacking racial and gender diversity. As result, Black men are likely to require additional energy and mental effort to process and cope with the MEES, which ultimately could elicit and exacerbate stress responses at psychological (eg: apathy), physiological (eg: sleep disturbances), and emotional/behavioural (eg: overeating) levels" (Luo et al 2021 p7).

Luo et al (2021) accepted three limitations to their study:

i) The use of self-reported years of schooling as the measure of educational attainment. This does not take account of the type, context, or quality of educational experience.

ii) All measures were self-reports.

iii) Variables not measured or available - eg: sleep quality; details of neighbourhood for noise levels, say.

1.5. SOCIO-ECONOMIC STATUS

Socio-economic status (SES) is take as a measure of access to resources and relative prestige, and the impact of low SES on sleep disparities is via variables like stress (appendix 1B), poor housing and neighbourhood, and adverse health behaviours. "The association between low SES and sleep disparities may emerge early in the lifespan. Lower income families have children who report more sleep problems, and families with less educated mothers have children with less efficient sleep, particularly among Black children" (Matthews et al 2021 p436).

Matthews et al (2021) investigated this relationship with a sample of 291 men in the "Pathways to Healthy Hearts Study", which is a sub-study of the "Pittsburgh Youth Study" (PYS). Began in 1987-88, the PYS is a longitudinal study of boys from 5-6 years old. The PYS collected data during childhood and adolescence (eg: family SES at age 13 based on parental educational attainment, occupational status, gross family income, and welfare benefits/public assistance). As part of the Pathways study, actigraphy data were collected for one week, which gave sleep duration, and continuity (wake after sleep onset; WASO), and subjective sleep quality was also measured.

Overall, the men had an average of 5.8 hours of sleep per night, 66 minutes of waking during the night, and they rated sleep quality as 2.3 (out of 4). Based on ethnicity, the Black men (who were 56% of the sample) had significantly shorter sleep duration than White men (5.45 vs 6.26 hours), and more WASO (69 vs 62 minutes), but there was no difference in subjective sleep quality.

Analysing the PYS variables during adolescence, family SES was found to influence WASO, but not sleep duration and quality in adulthood. The influence was indirectly through parenting (eg: quality of relationship with son; communication; monitoring son's behaviour), and adolescent characteristics (eg: parent- and teacher-rated behaviour problems), along with adult SES. Matthews et al (2021) concluded: "Parenting and adolescent characteristics may have an indirect association with adult sleep continuity" (p436).

Note that the sample did not include other racial minorities, no women, and only urban children. The study

"did not include measures of sleep during adolescence, thus it does not show whether the measures obtained during ages 13 to 16 are related concurrently to sleep and then later to adult sleep... [Also] it does not reveal the factors associated with other sleep characteristics, eg: timing, regularity, and architecture" (Matthews et al 2021 p442).

1.6. PHYSICAL ACTIVITY

Amount of physical activity (PA) is linked to sleep duration. Generally, shorter sleep is associated with less PA, though the context of PA (eg: work- or leisure-related) is important (Tom et al 2020).

Tom et al (2020) investigated the type of PA (transportation, work and leisure) and sleep duration using data from the "Hispanic Community Health Study/Study of Latinos" (HCHS/SOL). Between 2008 and 2011 the HCHS/SOL recruited over 16 000 adults who self-identified as Hispanic/Latino living in New York, Chicago, Miami, and San Diego in the USA. Sleep duration was calculated from usual bedtimes and waking times, and categorised into three groups – short (less than seven hours), intermediate (7-9 hours), and long (more than nine hours per night).

PA was measured by the "Global Physical Activity Questionnaire" (GPAQ), which has fourteen items covering PA in a typical work – transportation (movement to and from places including walking and cycling), work (including paid work and household chores), and leisure (sport and intentional exercise) (table 1.1).

- Does your work involve vigorous-intensity activity that causes large increases in breathing or heart rate like [carrying or lifting heavy loads, digging or construction work] for at least 10 minutes continuously?

- Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?

- How much time do you spend doing vigorous-intensity sports, fitness or recreational activities on a typical day?

(Source: https://www.who.int/publications/m/item/global-physical-activity-questionnaire)

Table 1.1 – Example of items from the GPAQ.

Full data were available for 14 653 participants, of which 20% were classed as short sleepers and the same percentage as long sleepers. The mean PA overall was 40 minutes per week for transportation, 100 minutes for work, and thirty minutes leisure PA.

After adjusting for demographic variables, shorter sleep was associated with more work PA, but there was no consistent relationship for the other two types of PA. The relationship also existed for employed individuals, even controlling for occupation class, shift work frequency, and wake time. The shorter sleep group had an average of 20 minutes per day more work PA than the intermediate group. It may be that high work-related PA is linked to high work-related stressors, suggested the researchers.

The findings of this study confirmed previous research (eg: Finland; Wennman et al 2014). Other research has also found that work-related PA is not as beneficial for health as other types of PA (Tom et al 2020).

The data were self-reports of typical sleep and PA duration taken at one point in time.

1.7. COVID-19 PANDEMIC

Yip et al (2021) investigated sleep disparities during the covid-19 pandemic with a sample of 547 young Americans (18-25 years old) of different ethnic/racial groups (American Indian Alaska Natives (AIAN), Asian, Black, Latinx, and White). The sample was recruited online in April 2020.

Sleep duration was self reported, and quality was measured by the PSQI. Other variables assessed included essential worker status, and distress of being victimised because of the coronavirus (measured by the five-item "Coronavirus Victimisation Distress Scale"; Fisher and Yip 2020 quoted in Yip et al 2021; eg: "I have been teased or bullied because someone thought I was infected with the coronavirus").

Overall, Black participants reported the shortest sleep and poorest quality of the different groups. The duration appeared to be linked to being an essential worker, and the quality to distress of being victimised about coronavirus. "There were no consistent patterns for the other racial groups; however, AIAN respondents reported the second highest levels sleep duration and sleep quality. Latinx young adults reported the third highest levels of duration and the second lowest levels

of sleep quality. Asian respondents reported the second lowest levels of sleep duration (only Black respondents reported shorter duration), yet they also reported the highest levels of sleep quality. Finally, White young adults reported the longest sleep duration and the third highest levels of sleep quality" (Yip et al 2021 p465).

The data were collected early in the pandemic, entirely as online self reports.

1.8. ADOLESCENT SLEEP

The longitudinal study method allows the direction of causation of a relationship to be established. An association (or correlation) between poor sleep and poor health, say, as seen in cross-sectional ("one-shot") studies leaves the possibility of a bidirectional causation – poor sleep leads to poor health, or poor health causes poor sleep. With a longitudinal study, it is possible to establish that poor sleep happens before poor health; thus the causation.

Trude et al (2022) reported longitudinal data from the "Challenge! in Middle Schools" study, which involved 23 middle schools in urban areas of the USA between 2009 and 2013. Data were collected at baseline (Time 1; T1), six months later (T2), and eighteen months after baseline (T3). The study compared an intervention to encourage physical activity and healthy eating to no intervention among 789 adolescent girls.

The measures taken at each point included height and weight, blood pressure, and sleep variables (via 7-day accelerometer-wearing). Trude et al (2022) focused on 470 Black participants in their analysis. In this group, the overall average duration of sleep was 7.9 hours per night, WASO of 67 minutes, and sleep efficiency 88%. Shorter sleep duration and lower efficiency at T1, but not WASO, predicted risk of overweight/obesity at T1 and later. The reverse relationship was not found – ie: overweight/obesity at T1 predicting poor sleep later.

Over the eighteen months of the study, four sleep trajectories emerged:

i) "Worsened" (12.3% of sample) – Decreased sleep over time. At the extreme, sleep duration nearly halved between T1 and T3.

ii) "Irregular" (10.0%) - High variability in sleep with no consistent trend.

iii) "Improved" (6.5%) - Increased sleep duration and efficiency over time. At the best, sleep duration nearly doubled between T1 and T3. This group showed reductions in high blood pressure profiles.

iv) "Regular" (71.2%) - Stable pattern of good sleep duration and efficiency.

1.9. INFANT SLEEP

Sleep disparities have been observed in infants, with Black, Hispanic, and Asian 0-2 year-olds sleeping fewer hours than White infants (eg: Nevarez et al 2010). Powell et al (2020) looked at the impact of maternal experiences of racism upon infant sleep. They explained: "Parents who experienced racial discriminatory events tend to be less supportive and may experience depressive symptoms, which likely influences parenting behaviours. Previous work has shown that parenting behaviours, including emotional availability, arousing activities, and close contact at bedtime, influence child sleep. Thus, mothers experiencing racism might be more likely to develop parenting practices, such as over-reactivity or laxness that adversely affect their child's sleep environment" (Powell et al 2020 p464) (appendix 1C).

Data from "Project Viva" were analysed. This is a cohort of pregnant women recruited in 1999-2002 in eight urban areas of Massachusetts. Information up to two years old was available for 552 women of colour and their offspring.

Mothers reported experiences of racial discrimination at interviews in the first few weeks of the child's life (average ten weeks old), and were categorised as no, moderate, or high exposure. The sleep behaviour of the infant was reported by the mothers at six months, one year, and two years old.

Approximately one-third of women reported no racial discrimination, one-third moderate, and one-third high exposure. The no-exposure group became the comparison group for analysis, and on average their infants had 11.8 hours of sleep per day, while the figure was 11.5 hours for the high-exposure group.

Controlling for potential moderators (eg: maternal education; household income; body mass index; smoking status), maternal experience of racial discrimination was associated with shorter sleep duration of infants at six months old only (calculated as fifty minutes less sleep per day).

The study used maternal reports of infant's sleeping duration without independent verification, and the measure of racial discrimination concerned lifetime exposure, rather than during pregnancy or the life of the child specifically.

1.10. TREATMENT

Insomnia disorder is a risk for many pregnant women, and cognitive behavioural therapy (CBT) is a recommended treatment, but research shows that half of pregnant women trying CBT do not adequately improve (Kalmbach et al 2023). Are there racial/ethnic disparities here?

Kalmbach et al (2020) reported a randomised controlled trial on the efficacy of digital CBT for pregnant women with clinical insomnia recruited from six hospitals in the USA. Four-six women were assigned to CBTI (CBT for insomnia) and 45 to "sleep education" (control group). The former involved six sessions covering behavioural sleep strategies, relaxation, cognitive therapy, and sleep hygiene presented by a White male virtual therapist avatar.

Kalmbach et al (2023) analysed the data with particular reference to 24 non-Hispanic White and 15 non-Hispanic Black women in the CBTI group. The Black women were four times more likely than White participants to discontinue the CBTI (ie: not complete the six sessions).

Treatment success was measured by the "Insomnia Severity Index" (ISI) (Bastien et al 2001) (table 1.2), which measures symptom severity on a range of 0 to 28. Mean reductions in scores were over twice as large for White women compared to Black participants. Other measures of sleep quality also showed greater benefits for White than Black women for CBTI.

- "Difficulty falling asleep" – none (0) to very severe (4)
- "How noticeable to others do you think your sleep problem is in terms of impairing the quality of your life?" - not at all (0) to very much (4)
- "How worried/distressed about you about your current sleep problem?" - not at all (0) to very much

(Source: https://www.ons.org/sites/default/files/InsomniaSeverityIndex_ISI.pdf)

Table 1.2 – Example of items from ISI.

In summary: "White pregnant women had high treatment completion rates in digital CBTI and reported large reductions in insomnia symptom severity and global sleep disturbance. By comparison, Black pregnant women completed fewer sessions of digital CBTI and did not report significant treatment benefits for either insomnia symptom severity or global sleep disturbance" (Kalmbach et al 2023 p22). The differences in symptom improvement between the women was not due to number of CBTI sessions completed, which was contrary to expectations. The researchers did not have a specific explanation for the findings.

More generally, other research has highlighted the "[S]ocial and structural determinants of insomnia. Pregnancy is a stressful life event, and disproportionately so for Black Americans who report higher levels of psycho-social stress, pregnancy-related stress, and perceived racism relative to white Americans" (Kalmbach et al 2023 p23).

While digital CBTI tailored to Black women (eg: Black avatar) (Zhou et al 2022) has found greater completion of sessions and improvements in insomnia symptoms (table 1.3). Kalmbach et al (2023) admitted: "It is unclear whether the avatar's depicted race or sex may have influenced treatment engagement among Black pregnant women in our study" (p23).

- Comparison of a standard internet-delivered CBTI ("Sleep Healthy Using the Internet; SHUTi), a culturally tailored version (SHUTi-BWHS), and a sleep education control.
- The main outcome measure was ISI score at six months follow-up.
- 333 Black women in the "Black Women's Health Study" (BWHS) in the USA participated.
- ISI score (ie: insomnia severity) was significantly reduced in the two CBTI groups between baseline and follow-up compared to the control group. Symptom reduction was linked to completion of the six sessions of CBTI, and significantly more participants in the SHUTi-BWHS group completed than in the SHUTi group (78% vs 65%).
- The participants were not representative of Black women in the USA as a whole, being of higher socio-economic status, and middle-aged and older adults.

Table 1.3 – Zhou et al (2022).

1.10. APPENDIX 1A - OBESITY

Sleep problems are a risk for obesity in that poor sleep leads to greater hunger and eating generally as well as high fat and sugar foods (Holliday et al 2021). But measures of sleep are often self-reported, and those of obesity varied (eg: BMI; waist circumference) in the research, so that the results of some studies are mixed. Longitudinal data would be ideal (table 1.4) (Holliday et al 2021).

STUDY	DETAILS
Lauderdale et al (2009)	"Coronary Artery Risk Development in Young Adults" (CARDIA) study: no relationship between objectively measured sleep duration or fragmentation and BMI
Vgontzas et al (2014)	"Penn State Cohort": self-reported poor sleep at baseline was associated with greater likelihood of developing obesity 5-10 years later, but sleep duration (objectively and subjectively measured) had no relationship to development of obesity in the future
Koolhaas et al (2019)	Netherlands: middle-aged and older adults (45 years and above) measured at six years apart on average; shorter sleep duration and lower efficiency associated with BMI at follow-up. But no association for WASO and sleep latency and obesity

Table 1.4 - Three longitudinal studies of sleep and obesity.

Holliday et al (2021) analysed data from the "Pittsburgh Research on Neighbourhood Change and Health" series of studies, began in 2013 with assessments in 2016 and 2018. The sample included over 1100 low-income, predominantly Black (95% of sample), adults. Both objective (seven days of actigraphy) and subjective measures of sleep were collected, and BMI (weight (kg) divided by height squared (m^2)) was the measure of obesity.

No significant longitudinal association was found between sleep and BMI, though the average sleep duration was 5.75 hours per night when measured objectively. Holliday et al (2021) noted that the overall finding was "consistent with prior work focused on objective sleep measures. Prior studies have found a relationship between self-reported sleep and obesity over time. Although we found a significant association between sleep quality and average BMI over time (but not deviation), this effect

was attenuated after adjustment for co-variates" (p15).

This study measured a number of different aspects of sleep. The objective measures included total sleep time (average number of hours of sleep per night), sleep efficiency (ratio of time spent asleep to time spent in bed; mean 71-78%), and WASO (number of hours awake after sleep onset; mean 1.5 - 2 hours) (ie: waking in the night). The subjective scoring of sleep quality ranged from on the sca1e from 1 ("very poorly") to 5 ("very well") (mean 3.7).

1.12. APPENDIX 1B – GOAL-STRIVING STRESS

The relationship between stress and poor sleep is well established, but there are different types of stress (eg: work, financial, interpersonal relationships). One particular stressor is "goal-striving stress" (GSS), which is "due to the deficit between goal aspiration and achievement" (Cain-Shields et al 2020 p118). Parker and Kleiner (1966) were the first to highlight GSS for African Americans, particularly in relation to mental illness, while there are negative health outcomes found in other studies (Cain-Shields et al 2020).

Cain-Shields et al (2020) explored GSS using data from the "Jackson Heart Study" (began in 2000-2004) (with complete data here on 4943 African American adults aged 21 years and above). GSS was measured by the discrepancy between "where one would like to be next year" (aspiration) and "where one is now" (achievement) on a ten-point scale, and by four categories of disappointment about not reaching the goal (not at all, slightly, fairly, and very). From these responses, a GSS score (ranging from 0 to 36) was produced, where a higher score indicated greater GSS. Sleep duration was self reported.

Overall, 26% of participants were classed as high GSS (score of ≥5), 33% as moderate (score of 2-4), and 41% as low GSS. Generally, higher GSS was associated with shorter sleep duration (and lower quality, as well as other negative health outcomes). After adjustment for all variables (eg: health conditions; physical activity; obesity; smoking; depressive symptoms), there was not a significant association between GSS and sleep duration, but high GSS did increase the risk of low-quality sleep.

1.13. APPENDIX 1C – RACIAL DISCRIMINATION AND INSOMNIA

Also studying racial discrimination, but upon their

own sleep, Cheng et al (2020) surveyed over 1450 adults with insomnia in the Detroit area (of which one-quarter were a racial minority).

Insomnia symptoms were more severe in the racial minorities groups, and individuals who reported more severe symptoms also reported higher levels of racial discrimination. It was found in the analysis that "racial discrimination explained almost 60% of the differences in insomnia severity between White individuals and racial minority groups after accounting for co-variates, including socio-economic status (ie: income and education)" (Cheng et al 2020 p547).

Racial discrimination was measured by a single item, "Thinking about your race or ethnicity, how often have you felt treated badly or unfairly because of your race or ethnicity", with the response options, "never" (0) to "all the time" (4). The study was a cross-sectional design, so it was not possible to establish causation.

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2. WATER POVERTY

2.1. UK

The United Nations asserts the human right to water and sanitation. This is assumed to be fulfilled in high-income countries, but Sylvester et al (2023) argued that there is evidence from Europe and North America that this is not so for everyone.

"Water poverty" is a concept that is used, and it is defined as where the water and sewage bill exceeds 3% or 5% of a household's disposable income (Sylvester et al 2023). Applying this definition in the UK, 18-20% and 5-10% of households in 2019-20 were affected by water poverty (Sylvester et al 2023).

"Technicalisation", as in the above definition, obscures the lived experience and "hides the political processes that work to create the problem" (Sylvester et al 2023 p494).

The water industry research body (UKWIR 2020) proposed six "drivers" of water poverty - "absolute income, unit cost of water, bill and income volatility, living costs, volume of water required, and customer control and understanding" (quoted in Sylvester et al 2023). Sylvester et al (2023) criticised this work: "These factors influence the severity of water poverty but do not reveal the structures that produce it. For example, the unit cost of water is set by water companies, varying between regions, as well as between metered and non-metered households... Water billing is not only calculated based on unit cost but also on infra-structural investment, cross-subsidies and the cost of company and customer debt. The role of the customer in paying for these additional costs is not inevitable, rather it is the product of ideologically designed governance processes... Similarly, the unit cost of water is set within the framework of 'financial engineering' where it is commodified, along with household units, to secure company borrowing and shareholder profit... Therefore, politically engaged drivers of water poverty exist, and are hidden, within water sector governance processes" (pp494-495).

Sylvester et al (2023) undertook a review of scholarly and "grey" literature on water poverty in England and Wales between 1985 and 2022 (n = 354 documents). The findings were presented in time periods:

a) 1985 - 2000: In 1989 the water and sewage companies were privatised, and in preparation for this, companies recovered debts, which led to a massive increase in physical water and sewage disconnections in the second half of the 1980s and into the 1990s. "Water poverty at this time was, therefore, characterised by the state that arose from physical disconnection from water and sewage services" (Sylvester et al 2023 p497).

Prices rose by about 40% during the 1980s, and widened inequalities as well as increased debt for poorer households. Public health concerns arose with reported increases in diseases like dysentery, and the belief of their connection to water poverty. In 1999 the Labour Government made water and sewerage disconnection illegal. "This fundamentally changed the defining characteristic of water poverty in England and Wales" (Sylvester et al 2023 p499). The concept of vulnerability to water poverty was introduced.

b) 2000 - 2020: "The turn of the century marked a new manifestation of water poverty, as an issue of affordability and bad debt rather than physical disconnection" (Sylvester et al 2023 p499). The price of water continued to rise (eg: fourfold between 1987 and 2011). One survey in 2013 found that one-fifth of customers struggled with their bills (Sylvester et al 2023).

From the industry's side, bad debts were rising, and this impacted the average customer bills (eg: £11-12 in 2008 and £21 in 2020) (Sylvester et al 2023). "For customers living with water poverty, common coping behaviours were found to include: cutting back on leisure and social activities, buying only the essentials, and dipping into savings... Those with the greatest affordability issues would continually trade off essential outgoings and juggle multiple debts. The emotional responses to living in water poverty varied. Those with children, disabilities or health conditions found it particularly hard to make cutbacks, both emotionally and for health purposes" (Sylvester et al 2023 p502).

The industry views those who fall into arrears as "won't pay" and "can't pay". The former group believed to take advantage of the no-disconnection policy. However,

CR (2009) concluded: "The assumption that water debt is caused by customers knowing they cannot be disconnected is not supported by the research" (quoted in Sylvester et al 2023). Sylvester et al (2023) preferred this picture that "the most common situation appears to be that when customers cannot afford all essential outgoings they often default first on the one with less immediate consequences" (p504).

2.2. USA

Household water affordability in the USA has been impacted by two trends in recent years. First, compared to inflation, the tripling of costs for water providers due to the replacement of ageing infrastructure, increasing regulations, and reduced support from the government. "At the same time, the income gap between high-income earners and low-income earners has widened, particularly as lower wages have stagnated, leaving low-income households with less buying power now than in previous decades. The covid-19 pandemic exacerbated this trend" (Patterson et al 2023 p2).

Patterson et al (2023) analysed data from 787 water providers across all US states, and estimated that 17% of household may experience a financial burden in paying for water services (defined as costing one day's pay or approximately 5% of income), while between 5% to 26% of households experienced unaffordable water services (depending on the volume of water used, and the definition of unaffordable [3]). The calculations were based on use of 6000 gallons per month, which 83 gallons per day (average indoor per capita use in the USA) multiplied by the average household size (2.65 persons).

Rising residential drinking water bills is an issue where costs vary between different areas and States in the USA. El-Khattabi et al (2023) compared bills from 1720 water systems in four US States for consumption of 4000 gallons of drinking water per month ("modest levels of consumption") with data from between 2016 and 2019.

Municipally-owned water systems were more likely to have lower water bills than for-profit systems. El-Khattabi et al (2023) summed up the contradictory results: "Though we find that water systems with high levels of poverty tend to have higher water bills, our

[3] For example, a study in New Jersey using spending greater than 10% of disposable income on water services, and 21% of households were in this position in 2019 (Van Abs et al 2021 quoted in Patterson et al 2023).

results also suggest that local systems that serve populations with higher levels of income inequality and higher proportions of non-White population tend to have lower water bills" (p1). The findings were weak statistical relationships, and were limited by the dearth of data about the drivers of water rates at the local level (appendix 2A).

Meehan et al (2025) found that "plumbing poverty", as they called it (ie: households without piped running water), had worsened in the fifty largest US cities since 2008, "disproportionately affecting households of colour in twelve of the fifteen largest cities" (p93).

Plumbing poverty was part of what the researchers called a "reproductive squeeze", which is "systemic and compounding pressures on household social reproduction, including the collective weight of unaffordable housing, increased utility and consumer debt, stagnant wages and similar pressures that affect the ability of people to live and work" (Meehan et al 2025 p93). Social reproduction is a concept as used by the researchers to describe "life-making at at the everyday scale - such as housework, childcare, education, health care, clean water provision and so on" (Meehan et al 2025 p99). They emphasised that this was a wider use than in Marxist theory.

2.3. APPENDIX 2A – INTERNATIONAL POVERTY LINE

The international poverty line (iPL) is defined as $2.15 per day in 2017 Purchasing Power Parity (PPP) exchange rates, while previously it was $1.9 per day at 2011 PPP rates (Moatsos and Lazopoulos 2024). The current figure is based on the median value of the national poverty lines of low-income countries, and was developed by researchers at the World Bank.

But even the World Bank admitted that PPP estimates "may not reflect the expenditure patterns of the poor" (quoted in Moatsos and Lazopoulos 2024).

The iPL is a version of the absolute poverty level. This is the set amount that is needed to survive and it does not change between economies. Whereas the relative poverty level is calculated separately in each country based on the overall wealth (eg: 10% of the median income of the country). More specifically, relative poverty poverty can be defined in the tradition of Townsend (1979) as "living with resources below those commanded in

the surrounding society that it results in exclusion from ordinary living patterns, customs, and activities" (Moller et al 2024 p1).

I would add another category of "subjective poverty", which expresses how people think about their income and wealth. Simplistically, they do not feel that they have as much money as they "should" have (or compared to important others). The figure is entirely subjective and has no relationship to actual wealth in the country. For example, on the BBC "Question Time" programme in November 2019, an audience member argued that he was not rich with earnings of £80 000 per year when it was asserted that this amount was in the top 5% of income in the UK [4].

2.3.1. Crude Oil Price

"The crude oil price (COP) is one of the most vital universal macro indicators. Quoted by most news providers worldwide, 'it serves as a barometer for economic perspectives, inflation, currencies movement, and political unrest in the Middle East'. Despite superior climate goals, extensive usage of renewable energy generation sources, and growth of electric vehicles, crude oil is one of the world's prominent energy sources. It is considered one of the crucial measures of global economic trends, and its price fluctuations significantly impact the economic growth of nations" (Purohit and Panigrahi 2024 p1).

"Fluctuations in COP significantly affect the economy of oil-importing and oil-exporting nations. For example, a fall in COP affects the economic growth of the exporting countries, while a rise will cause inflation, leading to a recession in the importing countries" (Purohit and Panigrahi 2024 pp1-2).

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3. DATA JUSTICE AND INJUSTICE

3.1. INTRODUCTION

Redden (2022) observed: "We have entered an 'age of datafication' [5] as businesses and governments around the world access new kinds of information, link up their data sets, and make greater use of algorithms and artificial intelligence to gain unprecedented insights and make faster and purportedly more efficient decisions" (p18). But this is not always the case, and there are examples of problems with automated and algorithm-based systems. A "Data Harm Record" is kept by the Data Justice Lab at Cardiff University in Wales [6].

Datafication (Mayer-Schonberger and Cukier 2013), simply, is the "growing reliance on data driven technologies across social life" (Dencik and Sanchez-Monedero 2022 p2). "Data justice" is a way of "privileging social justice concerns" (Dencik and Sanchez-Monedero 2022 p2) in this situation. Dencik et al (2019) described the concept of data justice as "used to denote an analysis of data that pays particular attention to structural inequality, highlighting the unevenness of implications and experiences of data across different groups and communities in society" (p875).

Couldry (2019 quoted in Dencik and Sanchez-Monedero 2022) argued that "datafication significantly shapes what comes to count as social knowledge and the very terms upon which we come to reason about values as choice is automated and regulated by what legal scholar Karen Yeung (2017) describes as the 'hypernudge'. At the same time, our understanding of data itself is not clearly defined and so when we want to make justice claims about it, it is unclear whether this is about its distribution as a good or resource, the inferences made from it and how people come to be recognised, or the nature of how it is

[5] "The concept of datafication implies rendering into data many aspects of the world that had not been quantified before" (Masiero and Das 2019 p916).

[6] "The Data Justice Lab emerged out of a recognition for the need to advance research and practice that can take account of these concerns, building on the work of others and shifting the lens through which we understand both developments and implications of the growing digital economy. The Snowden leaks of 2013 provided a pivotal moment for exploring the significance of data-centric technologies in our everyday lives, and moved our attention towards the nature of transformations in governance and the limitations in our ability to contend with them" (Dencik et al 2019 p874). Other data justice projects include the "Detroit Digital Justice Coalition" and the "US/Canadian Environmental Data and Governance Initiative (EDGI" (Dencik et al 2019).

generated and attributed meaning" (Dencik and Sanchez-Monedero 2022 p4).

"Data ethics" is a framework that has been proposed, as seen, for example, in the "General Data Protection Regulation" (GDPR) in Europe, where individuals must give some form of consent about the information collected on them. "Data ethics foregrounds key challenges with datafication, including transparency, bias and accountability, but has also been criticised for containing such challenges within individualistic moral assessments or as procedural safeguards that do little to challenge existing power structures" (Dencik and Sanchez-Monedero 2022 p5).

Taylor (2017) proposed three central pillars to this approach - (in)visibility, (dis)engagement with technology, and anti-discrimination. The first two relate to information collected on the individual, while the latter concerns the "so-called algorithmic 'bias'... Predominantly, discrimination by algorithms is understood as the result of existing discrimination patterns present in the training data (using demographic categories such as gender, age, ethnicity, or disability), but more comprehensive engagements with this issue also considers biases introduced via assumptions in labels or biases brought about in particular contexts of use" (Dencik and Sanchez-Monedero 2022 pp6;7).

3.2. JOURNAL SPECIAL ISSUE

In May 2018 a conference on "Data Justice" was held at Cardiff University, and from it came a special issue of the journal "Information, Communication and Society" (volume 22, number 7, 2019) covering the social, political, economic and cultural issues related to the datafication of society (Dencik et al 2019). Fraser's (2010) tripartite theory of justice is important here (table 3.1).

The articles covered the following key points about data justice:

i) The social engagement with technology is situated in society - In other words, if there is discrimination in society, then it will be mirrored in technology and data.

A technological solution to data injustice is too

- What, who and how of justice.

- "For Fraser, injustice and justice are historically contingent ideas that demand consideration of not only what is unequal, but also who is unequal and how inequality is inscribed in political institutions. In her analysis..., she argues that whereas nineteenth and twentieth century problems of injustice primarily corresponded to problems of economic distribution and hence class, twenty-first century injustice involves additional problems of disrespect for social groups and political exclusion and, accordingly, culture and politics. In these 'abnormal' times, institutions, decision makers, and constituents disagree about the relative importance of maldistribution, misrecognition, and misrepresentation and the role of class, culture, and politics in the conception of a just society" (Gangadharan and Niklas 2019 p886).

- "In total, Fraser's theory illustrates that injustice is multi-faceted and lacks a singular source or solution. While it might be tempting to link the conditions of an unjust society to the proliferation of automated computer systems or growth of surveillance capitalism, Fraser's tripartite theory of justice helps to clarify that technology assists and exists alongside, as opposed to at the centre of a discriminatory and unjust society" (Gangadharan and Niklas 2019 p886).

Table 3.1 - Tripartite theory of justice (Fraser 2010).

narrow for Gangadharan and Niklas (2019), who suggested we "'see through' technology, acknowledging its connectedness to larger systems of institutionalised oppression" (p882). They call this a "decentred approach" (as opposed to a "process-oriented perspective" of a technological solution).

These researchers explored this idea in thirty interviews with representatives of civil society organisations in Europe (eg: human rights; anti-poverty; consumer rights). Seven themes emerged from the analysis:

a) Misrecognition (ie: lack of dignified treatment) and maldistribution (ie: lack of equal rights or access to services) feed into discrimination of marginalised groups, particularly Romani, migrants, poor people (particularly unhoused), and members of the lesbian, gay, bisexual, transgender and queer (LGBTQ) community.

b) "Data for equality matter" - For example, for interviewees from anti-poverty and human rights groups, "lack of data about marginalised groups means greater marginalisation" (Gangadharan and Niklas 2019 p889). One interviewee said: "[P]eople of African descents and Muslims really push for data collection because they

realise that their realities are ignored... [Data] should be part of your obligation to also promote equality and report on what you've done so this is part of the equality planning" ("SG2"; p890).

Other interviewees noted the risks of data collection for such groups, and the need for legal safeguards.

c) "Data collection marginalises the already marginalised" - eg: a city government in Poland that tried to create a database of unhoused individuals for shelter providers, but also accessible to the police.

d) "Context-ignorant systems harm life chances and decrease the dignity of the marginalised" - "Interviewees shared how database system design is flawed and neglects specific marginalised groups with dire material and emotional consequences. A clear example of this relates to national identification systems. In Sweden, for example, national ID numbers have a gender marker (ie: a numerical code related to one's gender assigned at birth). When someone changes their legal gender, the national ID number also changes. As one interviewee explained: '[P]rivate companies... government agencies... and every official... all ask for your person number... So, if you change that, then a number of problematic situations arise' (SG 9), including the inability to access prior customer records or health history" (Gangadharan and Niklas 2019 p891).

e) "Automation in the welfare state will amplify powerlessness of the marginalised" - eg: the risk of dehumanisation by automation as one interviewee described: "[A]lready... people in public employment services... behaved kind of like computers. [Y]ou either... fit into this box, or you don't. And if you don't, 'Goodbye'.... [B]ut there was hope because you're thinking, 'They're still human beings'" ("AP2"; p892).

f) "Automation spells limited choice and higher prices for the marginalised" - For example, consumer rights groups' interviewees were concerned about the misuse of data by companies, including "data-driven price differentiation" and "personalised pricing".

g) "Work on algorithmic discrimination has limited appeal" - Digital issues are "peripheral to the 'bigger' problems" of poverty and discrimination (Gangadharan and Niklas 2019 p893).

Gangadharan and Niklas (2019) concluded: "With decentring, it is possible to recognise the specific impacts of technologically mediated discrimination without claiming its totalising effects. Problems of discriminatory data mining or unfair machine learning are significant, and they do not constitute the primary means by which discrimination, unfairness, or injustice is or will be practised. Similarly, problems of data collection, open data projects, or other data-based (though not automated) initiatives are also significant, and they do not constitute the primary means by which discrimination, unfairness, or injustice is or will be practised" (p896).

ii) Data and algorithms are involved in "the production of particular kinds of meaning, reinforcing certain discursive frames over others" (Dencik et al 2019 p877).

In the USA in particular, the response to injustice generally has been the "discourses of rights, due process, and anti-discrimination" (Hoffmann 2019 p900). But looking for an easy "fix" to "biased" algorithms could result in "little more than a set of reactionary technical solutions that ultimately fail to displace the underlying logic that produce unjust hierarchies of better and worse off subjects in the first place" (Hoffmann 2019 p911).

Hoffman (2019) described three easy "fixes" - looking for the individual "bad actor" behind the "bad algorithm" to blame; "single-axis thinking": downplaying that discrimination occurs on more than one dimension ("intersectionality"), and anti-discrimination approaches that ignore that "data and algorithms do not merely shape distributive outcomes, but they are also intimately bound up in the production of particular kinds of meaning, reinforcing certain discursive frames over others" (p909).

iii) Data are integrated into systems of governance.

Park and Humphry (2019) used examples from Australia (eg: National Disability Insurance Agency's intelligent avatar interface "Nadia") to show "how the introduction of automated systems can reinforce the punitive policies of an existing service regime at the design stage and how innovative AI systems that have the potential to enhance

user participation and inclusion can be hindered at implementation so that digital benefits are left unrealised" (p934).

This is part of the "digital divide". Initially, this concept described the haves and have-nots of digital technology, but it has subsequently been widened to include "the multiple dimensions that create inequalities in the uses and benefits of technology" (Park and Humphry 2019 p934).

Masiero and Das's (2019) case study of India's Public Distribution System in the state of Karnataka (ie: food security system) which was linked to the biometric identification population database (Aadhaar), highlighted three problematic forms of data injustice - legal, design-related, and informational.

A "ration shop" worker interviewed by the researchers explained: "Users are given food [in ration shops] on the basis of the link between Aadhaar and the ration card. If the ration card has not been linked to Aadhaar, they have to go to computer centres to link it and then come back again. If a non-registered user asks me for a ration, I cannot give it even if I know them" (pp924-925). This relates to the legal issue - making access to food dependent on registration on Aadhaar.

Design-related issues are summarised by the ration shop users who said: "No matter how many times I try, the [point-of-sale] machine will not recognise me" (p925).

Masiero and Das (2019) saw the Indian government wanting to move from ration cards to cash transfers, but users appeared not aware of the implicit change built into the technological development. This is an example of the informational issue. Here, "technology is not simply 'socially' embedded, but purposefully inscribed in a political design with clear directions and consequences" (Masiero and Das 2019 p929).

iv) The role of data in resistance to governance - eg: "data witnessing", which Gray (2019) talked of in relation to the work of "Amnesty International". Their use of data in the "Decoders" project has four aspects - "(i) witnessing historical abuses with structured data from digitised documents; (ii) witnessing the destruction of villages with satellite imagery and machine learning [eg: "Decode Darfur"]; (iii) witnessing environmental injustice with company reports and photographs [eg: oil spills in Niger Delta]; and (iv) witnessing online abuse through the classification of Twitter data [eg: "Troll

Patrol”]” (Gray 2019 p971). The different sources of data allow the resistance to governance and injustice.

Data collection in the form of land surveys and mapping has a long history, including by empires, and particularly involving Indigenous territories. "Counter-mapping" (Peluso 1995) is a strategy of resistance by such groups to the "official" maps of the empires. Kidd (2019) gave this example: "The map in the stairwell of the house in the Arctic town of Spence Bay literally turned the world upside down. Rather than their usual representation as feature-less blank white spaces on the upper margins, the Inuit territories were in the centre, and their communities, waterways and important sites were named in Inuktitut. At that time in 1989, the Inuit were negotiating with the Canadian government to establish their own self-governed territory of Nunavut. ‘The power of data, including maps, graphs and visualisations', as Renzi and Langlois remind us, ‘not only resides in its capacity to produce knowledge, but also in its ability to shape perceived realities’. ‘Whoever owns, controls and has the right to access and analyse data’ holds tremendous political and ideological power. ‘Data has transformative and affective potential’ and ‘activists are drawing on data as a way to provide means for social transformation’ (2015 p202)" (pp954-955).

v) The benefits of a datafied society are not evenly distributed, and "privileged" actors often gain more.

“Community mapping” in cities with disorganised development is seen as a “pro-equity data initiative” (Heeks and Shekhar 2019 p1007). Datafication applied to residents living in slums and other informal settlements about which data have been lacking as a rule is a double-edged sword. There are “real incremental gains... But it is external actors and wealthier communities that gain more; thus, increasing relative inequality” (Heeks and Shekhar 2019 p992).

Heeks and Shekhar (2019) explained further: “The most marginalised – those without homes, those without identification, those residing on the physical margins who come in to the city to make their living – are rarely made visible by these data initiatives. Yet what also remained largely invisible was data that might truly challenge political elites or enable them to be held to account The communities that are made visible reap some benefit directly. However, they lose control of their

representation; becoming legible to others who can make use of the community's data twin for their own purposes. From this, we can see the ambivalence of legibility. Slums must be legible to government, NGOs [non-governmental organisations], development agencies etc. if they are to benefit from the resources, services, support etc. that these external organisations offer. But that same legibility exposes slum residents to any other agendas these organisations may hold. Those agendas may be orthogonal to slum interests or even counter to those interests: extractive, persecutory or predatory" (p1006).

Based on analysing community mapping projects in neglected area of 4 cities in the Global South (Nairobi (Kenya), Pune and Chennai (India) and Solo/Surakarta (Indonesia)), Heeks and Shekhar (2019) outlined four types of data justice:

a) Procedural - eg: whether community members involved in collecting data about themselves.

b) Rights-based - eg: right to be fairly represented in the data; privacy; access and ownership of data.

c) Instrumental - results of the data collection and analysis (eg: new schools, clinics).

d) Structural - whether only the powerful benefit from the data.

vi) "Environmental data justice" - "the role of data justice in relation to environmental data collection and the concept of environmental justice" (Dencik et al 2019 p879).

For example, in 2016 in the USA the "Environmental Data and Governance Initiative" (EDGI) was set up in response to the agenda of the Trump Presidency in relation to the environment - what was called "extractive logic" by Vera et al (2019). "Through grassroots archiving of data sets, monitoring federal environmental and energy agency websites, and writing rapid-response reports about how federal agencies are being undermined, EDGI mobilises EDJ [environmental data justice] to challenge the 'extractive logic' of current federal environmental policy and data infrastructures. 'Extractive logic' disconnects data from provenance, privileges the matrix of domination, and whitewashes data to generate uncertainty" (Vera et al 2019 p1012).

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4. DRUGS AND INEQUITIES

4.1. INTRODUCTION

"Variation in rates of substance use and outcomes such as overdose, infectious diseases, and justice system involvement, are notable across race and ethnic groups... While these differences are frequently described in the research literature, the likely origins and meaning of group differences are rarely discussed and sometimes interpreted deterministically when, in fact, 'race' and 'ethnicity' are inherently social constructs. Furthermore, in the United States, definitions of race and ethnic groups, which are typically based on definitions from the White House Office of Management and Budget..., vary over time in ways that impact interpretation of findings" (Compton et al 2023 p1).

4.2. GENERAL TREATMENT

Substance use disorders (SUDs) are most common for alcohol, tobacco, and cannabis, but can include prescription drugs. "SUDs are associated with a health problems of disease including increased risk of infections, non-communicable diseases, and violence which affect quality of life" (Kiburi et al 2023 p1).

Health equity in SUD treatment is "treatment that is readily available, addresses multiple needs of the individual, is offered for adequate duration and includes medication in combination with psycho-social treatments" (Kiburi et al 2023 p1). There are many factors which account for disparities in health equity, and Kiburi et al (2023) outlined them in relation to SUD treatment in Kenya:

1. Individual level factors

i) Place of residence – eg: treatment facilities only in urban areas disadvantages rural inhabitants.

ii) Race/culture/language – eg: health professionals use the national languages of Kiswahili or English, but local languages are common, and there are few formal interpreters.

iii) Occupation – eg: treatment costs money which excludes unemployed and low income workers.

iv) Gender/sex/sexual orientation – eg: stigma around females using substances means that few seek help.

v) Education – eg: less education is associated with substance use, and poorer outcomes with treatment.

vi) Socio-economic status (SES) – eg: low SES individuals have less access to treatment.

vii) Social capital – eg: SUD is associated with low social capital (eg: poor relationships and low social support), and social support is important in treatment outcomes.

viii) Attitude towards substance use as a disorder – eg: belief that SUD cannot be treated.

2. Structural factors

i) Policy framework – This is "founded on the notion that people in low and middle-income settings such as Kenya will never be able to afford evidence-based treatments, and the promotion of 'substitutes' with increasing evidence of feasibility but little or no evidence of efficacy. The result is improvisation with no research, and no goal of improving access to quality care. In Kenya this is increasingly being exemplified by laypersons in recovery running SUD treatment centres, as well as religious leaders and motivational speakers setting up programs for people with substance use disorders" (Kiburi et al 2023 p3).

ii) Health financing – eg: little investment by the government in SUD treatment.

iii) Lack of standardisation of treatment – eg: different treatment approaches used in different treatment facilities.

iv) Lack of services for special populations – eg: prisoners; homeless adults/street children; pregnant women; children and adolescents.

Involving under-served and disadvantaged groups in treatment as well as in research is one way to reduce disparities. For example, Latinx adults in the USA are under-represented in SUD treatment and research, and the reasons include stigma, family responsibilities, and concern over loss of income (Jaramillo et al 2023).

Accepting that Latinxs are "not a monolith", Jaramillo et al (2023) offered five lessons learned from a randomised controlled trial of SUD treatment for Latinx adults in the USA (Paris et al 2018):

a) Involve a cultural affirming team – eg: bilingual/bicultural Spanish-speaking research assistants (RA) contacted participants and fed back concerns of the participants to the researchers.

b) Have credible community partners – eg: clinics involved in the trial that participants trusted.

c) Researchers who understood the population of potential participants.

d) Establish trust with participants.

e) Researchers remain visible/accessible throughout the trial.

In terms of practicalities, Jaramillo et al (2023) commented: "When recruiting underserved populations - including but not limited to immigrant groups or individuals with low acculturation - it is important to consider limited literacy and potential accommodations. Taking into account this factor will increase recruitment by expanding the participation pool... We recommend preparing for lengthier visits when recruiting, as the reading of study materials might be necessary. In addition, participants with less exposure and familiarity with research procedures will benefit from guidance about the differences between the relationship with a research team, guidance as to scope of activities and assistance they can expect, and limits of confidentiality. Research

teams should also ensure adequate training on the study population, common psycho-social stressors, and limitations of their roles for RA staff" (p3).

4.3. SPECIFIC TREATMENT

It was estimated that only one-fifth of individuals in the USA with opioid use disorder (OUD) in 2021 received the appropriate medication (Tippit et al 2023). There are racial-based inequities in terms of who receives medication for OUD (MOUD), which Tippit et al (2023) showed with data from the US Military Health System (ie: active duty service members, and retirees, and family members) between 2018 and 2021.

There were 13 789 new OUD diagnoses in the study period. Overall, only 9% of patients received MOUD within one year of diagnosis. Receipt of MOUD was significantly lower for non-White patients.

The study used official medical records, which are dependent on their accuracy, and have missed cases that were not recorded therein. There was no analysis of lack of MOUD receipt, nor outcomes of the medication (Tippit et al 2023).

Chronic non-cancer pain (CNCP) is helped by opioids, but it can be challenging for individuals with a past or current history of substance use as well (and their doctors). "To assist clinicians treating CNCP, governing bodies created guidelines for prescribing opioids for chronic pain and strategies to taper patients off prescription opioids which included opioid-risk assessments; prescription drug monitoring programmes (PDMPs); and urine toxicology screening... Mass reductions in opioid prescriptions resulting from guideline-driven practices have had unintended consequences, including uncontrolled pain, decreased quality of life, and suicide" (Cooke et al 2023 p2).

Applications of such guidelines in the USA, for instance, can vary based on the race/ethnicity of the patient as Cooke et al (2023) showed in a study of eight "safety-net" primary care clinics in the San Francisco Bay Area. Safety-net clinics provide services for patients without health insurance and/or unable to pay for treatment. Interviews were undertaken with clinicians and patients in 2013-2015 and 2018-2020.

It was found that "patients and clinicians described how racism and discrimination against PWUD [people who use drugs], or those suspected of drug use, interacted

and impacted the management of CNCP, leading to frustration and anger among patients. Patients recognised the healthcare setting as one fraught with the potential for bias that could impact their pain management. Some clinicians unreflexively perpetuated racist and discriminatory stereotypes toward patients who used drugs, or were suspected to use drugs, while other clinicians reflexively questioned the ways in which medical training and clinical policies might contribute to racialised and substance use disparities in care at a structural level" (Cooke et al 2023 p3).

The experience of one patient summed up the situation: "[The doctor said to me] 'You'll be fine [and don't need pain management] because it says here that you're basically an addict', because somebody put something in the [medical] record. But they don't know me. So, I'm like, 'How dare you?' And so, I was like, 'I don't even care, bye'. I don't even care, I'm not going to let anybody talk to me that way. So, I just left and just dealt with it [the pain] and it slowly went away. I was just in the ER [emergency room] [...] But when that doctor came in, I don't know who he was, he was some old guy, he just treated me like dirt. And he didn't even know me" (p3).

While this quote from a clinician presents the attitudes of some doctors towards Black patients with CNCP and substance use: "I mean nobody will come out to you and say, 'Yeah, I sell my medicines for crack', but a lot of people, they will say, 'Well, I use crack because it makes me feel really good and so you can't deny me my opiates because I use crack'. I mean, you know, it just takes a long time to explain it to people. And then I think it's just so prevalent and out there, they don't necessarily even know that [crack is] not good for them" (p4).

Other clinicians were more reflective – eg: "I found, like we have this coefficient that was like ridiculously high for [patients with a history of substance use] and my first patient in clinic that morning was this Black gentleman with a history of substance use. And I was just like, 'Oh, like, I know that even though I'm aware of this, I still have some sub-conscious biases going on'. So, it's more just [...] asking that extra question, 'Am I feeling more reluctant to prescribe Vicodin [strong painkiller] to this patient because they're Black?' And despite my best efforts to try and not to, I know that at some unconscious level [bias] enters in, just like it enters into everyone, and [I'm] just trying to stay self-aware of that. So that's

how I try to deal with it" (p4).

In terms of the application of prescribing guidelines, there was increased opioid surveillance. For example, one clinician said: "What people [clinicians] will say is like 'the guidelines say that we should stop opioids in this case'. What they mean is like, 'I think this person is fundamentally untrustworthy and probably a drug addict, but the guidelines say that I'm right about this biomedical aspect of the situation'. So, we don't have to have a conversation about my consideration of their moral fibre because the guidelines back me up here, so we go with the guidelines" (p4).

While for patients who just wanted opioids for CNCP, one individual said: "I feel like [clinician] treat me like a drug addict. Because she gave me [naloxone], 'take this just in case you overdose'. I've been on this medicine for 5–6 years and I don't do drugs, I don't like medicine. They have to force me to take the stuff. What makes you think I'm going to overdose? Don't you give that to your dope fiend patients?" (p5).

4.4. DEATHS

Drug-related deaths show disparities based on sex/gender and race/ethnicity. Jones et al (2023) showed this with analysis of surveillance data (ie: officially collected) in the USA, from the "Treatment Episode Dataset-Admissions" (TEDS-A) data, and the "Centre for Disease Control and Prevention's Wide-Ranging Online Data for Epidemiologic Research" (CDC WONDER), covering opioids and stimulants from 1992 to 2020. TEDS-A is viewed as the official source of treatment admissions based on drug type, and CDC WONDER includes drug overdose deaths.

There was great variety in admissions and deaths when analysis was based on race/ethnicity and sex/gender. Overall, men had higher treatment admissions and overdose deaths than women for all opioid and stimulant types. Non-Hispanic Black individuals had the highest prevalence rates for treatment admissions and overdose deaths from cocaine, with men showing the largest increase in treatment in the study period. Methamphetamine deaths had also increased among American Indian/Native Alaskan individuals.

It was found that "overall percent increases in overdose deaths were far greater than the increases in treatment admissions. Worryingly, this suggests that the current treatment system may not be adequately addressing

the ongoing overdose crisis, indicating a need for greater access to treatment and other harm reduction approaches" (Jones et al 2023 p5). This was especially so for opioids, attributed to synthetic fentanyl and its analogues.

4.5. CO-MORBIDITY

Co-morbidity of substances as in alcohol use disorder (AUD) and OUD is a challenge to treatment and increases the risk of overdose death. Barker et al (2023) analysed Canadian data on concurrent AUD and OUD, and opioid agonist therapy (OAT). Official data were available on British Columbia residents (aged 12 years and above) who accessed OAT between 1996 and 2020 (n = 62 110). Disproportionately more cases were First Nations individuals (around half of the First Nations sample compared to one-third of non-First Nations individuals).

Concurrent AUD and OUD increased the risk of death compared to those with OUD without AUD. But OAT reduced the risk of mortality overall.

4.6. RISKY DRINKING

Perceived discrimination is a major stressor and can predict risky alcohol drinking (eg: drunkenness; heavy episodic ("binge") drinking). Guo et al (2023) explored this behaviour among American Indian youth with data collected under the "Substance Use among American Indian Youth Study" (2016-2020). This is an annual study of schools near American Indian reservations. The sample analysed by Guo et al (2023) involved 2516 American Indian adolescents who had ever used alcohol.

Three groups of questions were key:

i) "Alcohol involvement" – eg: frequency of drinking; amount in last 30 days. A measure of risky drinking was created based on number of times drunk, and heavy episodic drinking in last year.

ii) Perceived discrimination – eg: "How often have other kids said something bad or insulting to you because of your race/ethnicity?".

iii) Protective factors – eg: religiosity (eg: "How important is religion in your life?"); parental monitoring (eg: "My parents know where I am after

school"); enjoyment of school; cultural identity.

Overall, 40% of the sample was categorised as risky drinking. There was a positive association between risky drinking and perceived discrimination, but religiosity reduced the strength of the relationship (ie: it was a protective factor against risky drinking). Parental monitoring was negatively associated with risky drinking.

4.7. ARRESTS

Joshi et al (2023) asserted that the "War on Drugs" policies in the USA are "a hallmark of structural racism" (p1). Structural racism is defined as "the totality of ways in which societies foster racial discrimination through mutually reinforcing systems of housing, education, employment, earnings, benefits, credit, media, health care, and criminal justice. These patterns and practices in turn reinforce discriminatory beliefs, values, and distribution of resources" (Bailey et al 2017 quoted in Joshi et al 2023). The most obvious example of the War on Drugs policies is aggressive policing in Black communities, and the disproportionately higher drug-related arrests.

In some parts of the USA, laws on cannabis have changed to include decriminalisation (ie: removal of criminal penalties for small-scale possession) and/or adult-use ("recreational") legalisation (which can include a regulated legal market) [7]. But racial-based inequities still remain. "Research on the impact of cannabis laws on arrest disparities among adults suggests that cannabis laws generate meaningful cannabis arrest reductions but fail to eliminate relative disparities" (Joshi et al 2023 p2).

Joshi et al (2023) showed this with their analysis of cannabis arrest data for the cities of Washington DC and Los Angeles (table 4.1). Monthly arrest rates for 2010-19 for Black and White adults (21 years and above) were calculated, and for pre-decriminalisation and post-decriminalisation. Note that race/ethnicity was based on law enforcement officers' observations.

In Washington DC, the average monthly overall cannabis arrest rate was 84.4 per 100 000 people for Black adults pre-decriminalisation compared to 4.6 for

[7] Decriminalisation is a reduction of penalties as first in Massachusetts in 2009 where possession of a small amount of marijuana was treated akin to a traffic violation in terms of penalties. Legalisation allows for legal sale, but, even in this situation, the law can be broken by underage use, for example (Grucza and Plunk 2022).

Whites, and 19.2 and 1.6 respectively post-decriminalisation. In Los Angeles, the figures were 56.1 for Blacks and 7.4 for Whites pre-decriminalisation, and 19.8 and 2.9 per 100 000 people respectively post-decriminalisation.

CITY	KEY DETAIL
Washington DC	It is legal for adults 21 years or older to possess two ounces or less of marijuana (2015 "Legalisation of Possession of Minimal Amounts of Marijuana for Personal Use Initiative")
Los Angeles	Elimination of criminal consequences for personal possession by persons 21 years or older of 28.5 g or less of marijuana (2016 "The Adult Use Marijuana Act")

(Source: Table 1 Joshi et al 2023)

Table 4.1 – Decriminalisation of personal cannabis use by adults.

4.8. GOOD SAMARITAN LAWS

Medical help-seeking by bystanders during an overdose event can be delayed through fear of negative law enforcement consequences, and this has led most US states to enact "Good Samaritan Laws" (GSLs). "GSLs are state laws that provide limited legal protections for certain low-level criminal offences for individuals who call 911 or otherwise seek assistance and, in most states, for the person experiencing the overdose" (Pamplin et al 2023 p2).

McClellan et al (2018), for example, calculated a 15% lower incidence of opioid overdose deaths in states with GSLs compared to without. But the effectiveness of GSLs depends on knowledge about them, and the exact nature of the legal protection (eg: from arrest vs from charges). However, "GSLs are unlikely to influence people who do not trust that law enforcement will abide by the law" (Pamplin et al 2023 p2).

Pamplin et al (2023) investigated racial/ethnic differences in relation to GSLs in New York City. One hundred and twenty-eight people who use illicit opioids were surveyed. Overall, 90% of Black respondents and 78% of Whites indicated that they would call for an ambulance as a bystander of an overdose.

Reasons for not calling included, most commonly, fear of being arrested for a drug-related offence for

White respondents, while Black respondents reported fear of the consequences for the overdoser.

There was not evidence of racial/ethnic differences in willingness to seek help, but there were "marked differences" in knowledge about GSLs. Pamplin et al (2023) explained: "Almost two thirds of the Black people in our sample had never heard of the GSL, compared to less than half of the white participants. Though Black and white participants scored equally low on what protections are provided by the GSL, Black people on average were more likely to inaccurately believe they were protected if they have an open warrant or were in violation of probation or parole" (pp5,7). This latter misunderstanding reinforced mistrust of police as arrest could follow help-seeking not from calling an ambulance, but for the violation of parole conditions by being in the vicinity of drug-taking, for example.

4.9. CONCLUSION

Keyes and Mauro (2024) began their overview of the topic thus: "Racial disparities in health outcomes arise due to historical legacies and current practices of assigning value and wielding power differently based on race, ethnicity, and country origin. The impact of pronounced and pervasive racism can be traced throughout history, to today, in the way drugs are distributed and controlled, used, and the ways in which people who use drugs are penalized and shut out of evidence-based care. Shining a light on these issues is critical for advancing a health equity" (p1).

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5. EVOLUTIONARY ECOLOGY APPROACH TO INEQUALITY

5.1. OVERVIEW

Smith et al (2023) provided an overview of an evolutionary ecology perspective [8] on inequality. They defined inequality as "those differences that are imposed on individuals (or classes of individuals) by structural features of a social system. Thus, inequality as used here focuses on that sub-set of phenotypic variation shaped by social structures — reinforced within or across generations — that privileges some individuals over others" (Smith et al 2023 pp1-2).

Inequality in wealth is key. Wealth is defined, by Smith et al (2023), as "attributes or possessions that contribute to well-being or fitness. Forms of wealth can be material (resources, such as food or territory), relational (social networks) or embodied (knowledge, skill)" (p2).

Mattison et al (2023) asserted: "Evolutionary anthropologists understand the drive to accumulate material wealth as one that is coupled ultimately to increasing reproductive success" (p1).

Smith et al (2023) outlined four key questions:

[8] Also classed as an evolutionary social science approach.

i) What factors shape differences in inequality within and between species?

Evolutionary ecology focuses on drivers of behaviour like "resource density, predictability, and patchiness or clumping that facilitate control by a sub-set of individuals within a society" (Smith et al 2023 p2).

Other factors include how individuals respond to subordination in a group hierarchy (eg: the cost of migration to another group), the means of wealth inheritance, and hierarchy (Smith et al 2023).

ii) How does inequality in human societies compare to other mammals?

Smith et al (2023) admitted: "We are well aware of the difficulties and potential pitfalls in comparing human and non-human behaviour, particularly when it concerns complex patterns of behaviour such as property/territory inheritance and systems of domination and subordination. Nevertheless, there is much to be gained from careful and nuanced sharing of concepts between evolutionary biology and social sciences" (p3).

Common drivers of inequality across mammals include resource control, and kin and non-kin coalitions (appendix 5A), while institutionalisation of inequality is different in humans, argued Smith et al (2023): "Institutionalised inequality is qualitatively different, involving codified differences in power and wealth that are ascribed to individuals via inheritance (eg: hereditary slavery, aristocracy) or some other institutional procedure (eg: priesthood)" (p3) (appendix 5B).

iii) Why has institutionalised inequality spread in "recent" human history?

"Be that as it may, the archaeological record indicates that institutionalised inequality, as measured typically by grave goods, as well as by variations in residential size and other architectural signatures, is rare until Holocene times (beginning roughly 11 millennia ago) although some contest this, and periodic episodes of inequality that came and went in the more distant past may prove to have been more common than currently documented. But it is only in the past few millennia that non-egalitarian and even markedly stratified systems have

replaced nearly all such societies. The near absence of institutionalised differences in wealth and power for most of the history of our species raises the question of what changed" (Smith et al 2023 p4).

The development and spread of agriculture is one answer. "The asymmetries in bargaining power that arise from controlling highly productive resources (especially arable land) in turn fuel economic specialisation and exchange, further cementing institutionalised inequality" (Smith et al 2023 p4).

iv) What are the biological consequences of inequality?

The impact includes upon health and mortality, nutrition or food intake, and reproductive success. In many mammals, dominant individuals (ie: higher in the social hierarchy) benefit in these areas.

Smith et al (2023) countered the criticism that the evolutionary ecology approach "'naturalises' phenomena such as inequality, hierarchy and gender roles — and in so doing makes them seem inevitable, thus reinforcing the oppressive status quo— or otherwise conceals socially constructed aspects of inequalities" (p5). In particular, these authors responded that inequalities are not fixed in stone or genetically determined like characteristics such as eye colour. But these researchers rejected the view of inequalities in human societies as entirely socially constructed as "something being 'socially constructed' does not entail that there is no role for ecological or evolutionary factors" (Smith et al 2023 p5).

5.2. CAUSES OF INEQUALITY

Carlisle and Maloney (2023) considered three broad categories of forces that shape differences in income, wealth, and well-being:

i) Skills and productivity – In economics, wage levels will be set based on supply and demand for particular skills. So, low-supplied skills in high demand will receive a higher wage.

"Central to this framework, of course, is the assumption that workers can leave a job whenever they are underpaid relative to their productivity. More generally,

this framework depends on labour having substantial bargaining power. There is considerable empirical evidence that wages do not track productivity automatically, and that the relationship between pay and productivity depends on the policies and institutions that shape bargaining in the market" (Carlisle and Maloney 2023 p3).

ii) Policy and redistribution – This includes policies related to labour and wages as well as government taxation and redistribution of wealth. But wealthy elites who can disproportionately influence political decisions may prefer to keep their resources. As Schattschneider (1960) noted, "The flaw in pluralist heaven is that the heavenly chorus sings with a strong upper-class accent" (quoted in Carlisle and Maloney 2023).

iii) Intergenerational transmission - "When there are strong intergenerational ties in status, advantages may accumulate over time, widening inequality on many dimensions. Bequests, and the social practices that govern inheritance, provide an obvious intergenerational influence on wealth inequality" (Carlisle and Maloney 2023 p3).

5.3. GENDER INEQUALITY

Sexual selection theory predicts that men and women have different reproductive strategies. Males seek to have as many offspring as possible, whereas females have a limited number of offspring, but support them to develop. "This results in a number of hypothesised differences between women's and men's general behaviours, where women, on average, are anticipated to focus on securing resources that support relatively few children, whereas men are anticipated to be motivated more by the acquisition of reproductive partners" (Mattison et al 2023 pp2-3).

For example, in polygynous horticultural societies, men are incentivised to acquire wealth (eg: cattle), which can be used to pay the bride price for many wives (and consequently more offspring). Mattison et al 2023 explained: "By contrast, in resource-moderate environments we can expect the rates of reproductive returns to wealth for women and men to be relatively similar... If so, the scope for gender inequality in wealth may also be relatively limited" (p3).

The culture system can exaggerate or inhibit such inequalities (eg: male- or female-based inheritance; monogamy or polygamy). "To summarise, the resources that generate the highest potential for wealth inequality are also commonly those that create the greatest potential for divergence between men and women. Where resources are less easily monopolised and less productive, divergence between genders in terms of reproductive agendas and the resources that support those should be minimal; gendered inequality is most likely in socio-ecological systems that allow some men to achieve very high reproductive success at the expense of other men" (Mattison et al 2023 pp3-4).

5.4. ECONOMICS AND BIOLOGY

The concept of hierarchy in biology is seen in groups of animals where there is a dominant individual(s) and subordinate(s). The dominant individual usually has access to mates, and can control the opportunities for subordinates to mate. Co-operative breeding is an example of this situation. It is "where one or more individuals help to raise offspring that are not their own" (Bowles and Hammerstein 2023 p2).

Such helping behaviour by kin makes more sense than by non-kin. A "pay-to-stay" explanation (eg: Kokko et al 2002) suggests that the subordinate gains from being in the group, but must "pay" for this privilege by helping raise the dominant animal's offspring.

Combining biological and economic models, the dominant individual "may be in a role comparable to that of an employer who 'hires' or 'fires' its helpers by granting or denying them access to resources. The helper's 'wage' takes the form of direct and/or indirect (kin-related) fitness gains (superior to the helper's fitness as an isolate) that are at least partly under the dominant's control. Quite like the owner of a firm whose income typically exceeds that of their employee, the dominant animal may produce more offspring than the subordinate, and of course more so if there are multiple helpers" (Bowles and Hammerstein 2023 p2).

An example in the bird kingdom is the purple martin (Bowles and Hammerstein 2023). There are two distinct "classes" of male based on visual appearance – mature and immature. A mature male (dominant) establishes a territory and attracts a female. Then another female may be attracted to the territory, but also comes an immature male (subordinate). The territory owner ("employer"), who

has offspring from both females, cannot provision the offspring by himself, so he needs the help of the immature male ("employee"). The immature males has mated with the second female (his "wages"), and so is motivated to provision all offspring as it is not possible to distinguish paternity. The subordinate male's work is also an example of pay-to-stay.

5.5. THE EMERGENCE OF INEQUALITY IN HUMAN SOCIETIES

Dow and Reed (2023) began: "There is broad agreement that 15 000 years before the present (BP), almost all humans lived in small mobile foraging bands. By 5000 BP, the first states had arisen in Mesopotamia and Egypt. The intervening 10 000 years saw a transition from egalitarian societies to stratification involving elite and commoner classes, where the elites controlled access to land, inherited their privileges and often enjoyed vastly better living standards than commoners" (p1).

Understanding about the early foraging humans comes from the few contemporary mobile foragers that exist today. These small groups of a few dozen people tend to show egalitarianism, and a number of reasons have been proposed for this behaviour: "(i) the production technology is simple; (ii) natural resources are available to everyone; (iii) personal asset accumulation is limited; (iv) food storage is limited; (v) technology for violence is widely accessible; (vi) teamwork can be useful for hunting; and (vii) food sharing mitigates individual risks associated with bad luck or injuries" (Dow and Reed 2023 p1) (appendix 5C).

Mobile foragers became sedentary foragers in southwest Asia 15 - 13 000 BP. "Kelly [2013] remarks that such societies tend to exhibit 'social hierarchies and hereditary leadership, political dominance, gender inequality, and unequal access to resources', although these features are not universal" (Dow and Reed 2023 p1). Subsequently, agriculture developed around 11 600 BP. Inequality was "relatively modest" still (Dow and Reed 2023).

So what led to the development of inequality in human societies in these early days? Dow and Reed (2023) outlined three theories:

i) "Holocene [9] environment household inheritance"

[9] The Holocene is the current geological epoch (ignoring the disputed concept of the Anthropocene) beginning 11 700 BP (https://ucmp.berkeley.edu/quaternary/holocene.php#:~:text=The%20Holocene%20is%20the%20name,the%20Holocene%20has%20been%20a; accessed 23rd August 2024).

theory (HEHI) (eg: Borgerhoff Mulder et al 2009) – The emergence of "assets" that could be transmitted from parents to children (eg: a patch of land; animal herds).

Borgerhoff Mulder et al (2009) distinguished three kinds of wealth that can be passed on – embodied, material, and relational. "Embodied wealth refers to individual characteristics like body weight or grip strength, material wealth refers to physical assets like land or cattle, and relational wealth refers to social assets like the number of one's exchange partners. When parents reliably transmit such wealth to their children, random shocks to the wealth levels of households in one generation yield persistent inequality across households in subsequent generations" (Dow and Reed 2023 p2).

Borgerhoff Mulder et al (2009) also distinguished four economic systems – hunter-gatherer (mobile foragers), horticultural (simple domestication of plants and animals), agricultural (more complex domestication of plants), and pastoral (more complex domestication of animals). These four economic systems interact with the three kinds of wealth to give twelve possible combinations.

Analysing the different situations, Borgerhoff Mulder et al (2009) concluded that "(i) material wealth is especially important in agricultural and pastoral societies; (ii) material wealth is more readily inherited than embodied or relational wealth in agricultural and pastoral societies; and (iii) both agriculturalists and pastoralists have substantially greater inequality than hunter–gatherers or horticulturalists..." (Dow and Reed 2023 p2).

Subsequent authors (eg: Mattison et al 2016) have added other preconditions for the development of inequality, including climate stability (which favoured sedentary groups while climate shocks led to mobility and sharing), and the ability to defend resources (eg: larger group sizes).

Put simply, some individuals build up resources to pass to later generations, and others do not, so inequality develops over time.

ii) "Ideal free ideal despotic" theory (IFID) (eg: Kennett et al 2006) – When groups started to settle, early arrivers to a suitable site can exclude late arrivers. This assumes that there is a limited number of sites (eg: good quality soil), and so demand is greater than supply. Defence of a site and/or the creation of barriers (literal or metaphorical) to entry are important. The resource-holders (or "dominants") may

receive newcomers ("subordinates") but on their terms.

Weitzel and Codding (2022) saw this as "despotism", which can be negative and positive. "In the former case, the early occupants at a site drive away newcomers. In the latter case, the early occupants extend concessions to newcomers and allow them to stay in subordinate roles so long as they provide labour services. Subordinates may find the concessions offered by despots attractive in comparison with the alternative of moving to the next best site" (Dow and Reed 2023 p3).

iii) "Insider outsider elite commoner" theory (IOEC) (eg: Dow and Reed 2022) – Inequality develops between locations due to differences in "resources". The "successful" sites thrive (eg: increasing population density) while the "unsuccessful" ones decline (eg: leading to migration by the inhabitants).

Success can be seen as food productivity, and this influenced by climate, and technology, for instance. High productivity allows the "insiders" to benefit compared to "outsiders", and within the site, "elites" over "commoners". Those individuals that have "wealth" can share and build up their resources through kinship and/or marriage. In time, the different groups become "institutionalised" and there is structural inequality (eg: nobility; peasantry).

The fact that subordinates do not leave can be explained by Carneiro's (1970) "circumscription theory". He argued that "complex, unequal societies arise in environmentally circumscribed regions. These are areas in which there are limits to migration due to either geographical factors, eg: narrow valleys surrounded by mountains, or social factors, eg: densely populated areas with little free land close by in which to disperse" (Perret and Currie 2023 p1) (eg: ancient Egyptian state on the fertile banks of the River Nile surrounded by desert). The less the alternatives, the more inequality develops in a society (Perret and Currie 2023).

In terms of more recent human history, using archaeological evidence, Milanovic (2019) charted wealth in the early part of the common era (CE) (or AD is sometimes used): "He finds that inequality peaked in this era around 150 CE, then declined sharply through 300 CE and more gradually to 700 CE. These changes in inequality reflect in part the decentralisation of political power as the Roman Empire declined, as central elites lost some of their (often physically dispersed) assets and local

authorities gained greater resources" (Carlisle and Maloney 2023 p4).

While in the 14th and 15th centuries CE, Alfani (2021) finds lower inequality than previously, and it is attributed to the impact of the Black Death, for example. "High mortality and the existing inheritance institutions led to the sell-off of land to allow the distribution of its value across multiple heirs. This process lowered land prices and enabled more people to enter into land ownership, the primary form of wealth holding. There is also evidence of reduced income inequality specifically, based on rising wages for unskilled workers in urban areas, reflecting labour shortages due to high morbidity and mortality. After the mid-1400s, the re-consolidation of state power led to a return of rising inequality. The particular form of state activity in the era—taxation, often regressive, to support military expenditures that flowed to elites — reinforced the tendency to rising inequality" (Carlisle and Maloney 2023 p4).

5.6. ALTERNATIVE VIEWS

"Despite the global spread of intensive agriculture, many populations retained foraging or mixed subsistence strategies until well into the twentieth century. Understanding why has been a longstanding puzzle" (Medupe et al 2023 p1). One theory is the "marginal habitat hypothesis" (eg: Bigelow 1975), which proposed that foragers persisted because they lived in marginal habitats not suitable for agriculture. An alternative theory is the "oasis hypothesis of agricultural intensification" (eg: Childe 1928), which "claims that intensive agriculture developed in areas with low biodiversity and a reliable water source not reliant on local rainfall" (Medupe et al 2023 p1).

The fact that foragers persisted is important because such societies tend to be "relatively egalitarian within sexes and age groups, [while] a few hunting and gathering societies had food storage and high social stratification, the societies of the American Pacific Northwest being a well-known example" (Medupe et al 2023 p2). So, inequality may not be inevitable in human societies.

The marginal habitat hypothesis has been tested using "net primary productivity" (NPP) as the measure of habitat quality. "NPP is often used as a proxy to evaluate how suitable a habitat is for agriculture — with higher values considered more suitable. NPP is calculated

based on the amount of new plant growth annually in an area, excluding the plant's own metabolic needs. NPP is therefore a measure of the energy available to support life in a specified area per year beyond the maintenance costs of the flora" (Medupe et al 2023 p2). Porter and Marlowe (2007), for example, analysed 186 societies and found no difference in NPP between foragers and agriculturalists; thereby rejecting the marginal habitat idea. However, NPP is "a poor measure of habitat quality. It measures only non-metabolic plant production, yet the equatorial rainforests have extremely high NPP, but much of it is non-edible (leaves, woody tissues) or difficult to forage (high in the canopy). Further, many areas that had foragers or horticulturalists until recently now have intensive agriculture, demonstrating that these habitats are in fact suitable for agriculture or can be modified to be suitable for agriculture" (Medupe et al 2023 p2). Other variables may influence the type of society that develops, including biodiversity, pathogens, high levels of rainfall, and local animals that damage crops (Medupe et al 2023).

The oasis hypothesis placed the importance upon a reliable water source, and low biodiversity. Medupe et al (2023) adapted the original idea beyond a literal oasis to "a place with low to moderate rainfall, a water source not solely reliant on local rainfall (such as a river), and low to moderate biodiversity, including pathogens" (p3). These researchers tested the prediction that intensive agriculture was more likely in areas of low/moderate (vs high) rainfall, and low/moderate (vs high) biodiversity with data from the "Ethnographic atlas" (a database of around 1300 societies).

Intensive agriculture was defined as "growing crops on 'permanent fields, utilising fertilisation by compost or animal manure, crop rotation or other techniques so that fallowing is either unnecessary or is confined to relatively short periods' [Murdock 1967]..." (Medupe et al 2023 p3). Monthly mean precipitation, and biodiversity were scored, as well as NPP, and pathogens.

The relationship between rainfall and agriculture was an inverted U-shape. "Initially more rainfall is associated with greater agricultural intensity, but at some threshold the relationship between rainfall and agricultural intensity becomes negative" (Medupe et al 2023 p5). This supported Medupe et al's (2023) modified version of the oasis theory. But there was also support for the marginal habitat hypothesis as the likelihood of agriculture increased with increasing NPP (to a certain point and then declined). Pathogens (particularly tsetse

flies) and animals like elephants which could damage crops also influenced whether agriculture developed.

Overall, at the extremes (ie: very low or very high rainfall) intensive agriculture did not develop, but "generally lower rainfall and biodiversity is favourable for its emergence" (Medupe et al 2023 p1).

5.7. INHERITANCE OF WEALTH

When the ability to pass wealth to future generations becomes possible, then rules around it appear (eg: property rights).

Hooper et al (2023) explored this issue in a study of four nomadic pastoral communities in South Siberia and the ownership of camp sites. The historical territory of Tannu Uriankhai (in the present-day Republic of Tuva) has experienced Qing, Soviet, Russian, and Mongolian state control. The researchers interviewed 85 heads of household in 2013, 2015 and 2016. Inequalities between households was less related to camp ownership than livestock wealth, education, and wealth outside the pastoral economy.

Kohler et al (2023) analysed archaeological data on Pueblo societies in the present-day US Southwest for 500 BC to AD 1500. Maize growing was key to these societies. Inequality between households could be explained by "patchy resources resulting in different household opportunities, and increasing constraints on mobility are key ingredients. The latter factor encompasses two slightly different potentialities. On one hand it signals difficulty of escaping nascent systems of inequality, and on the other hand increased permanence of settlement makes transmission of superior land within particular lineages more likely" (Kohler et al 2023 p9).

5.8. PARENTAL INVESTMENT

Parental investment in their offspring can be one factor leading to inequalities among individual adults. In the case of humans, this is seen in "skills formation" and "health capital", which is "how investment during childhood influences key attributes of adults such as their lifetime earnings and health outcomes, and what stages of development should be targeted for positive intervention to have the maximum health or economic benefits to adults" (Vitikainen et al 2023 p2).

Generally, "earlier investment is more efficient", but does that include pre-natally also (Vitikainen et al 2023)?

Vitikainen et al (2023) reported data from a long running field experiment with the banded mongoose in Uganda between 2013 and 2017. A pre-natal boost was given to some pregnant females in the form of extra food, and those mothers gave birth to heavier offspring than unfed controls (Marshall et al 2021). The boosted group received normal levels of post-natal care (known as "escorting" where an adult feeds and protects the pup), while the unfed controls received extra levels of food (post-natal boost).

In terms of consequences into adulthood, pre-natal boost offspring had twice as high adult survival than post-natal offspring and controls (ie: no-pre- or post-natal boost). But the post-natal boost group had higher lifetime reproductive success (based on number of pups born) than the other groups, and the two experimental groups had higher success than the controls.

In summary, the experiment showed that "the amount of resources and care received during pre-natal and post-natal periods combine to mould the lifetime trajectories of survival, reproduction, and physiology of adults. As in humans, the level of investment at an early stage of development may influence the responsiveness of offspring to investment at later stages, leading to variation in adult life history" (Vitikainen et al 2023 p10).

5.9. EARLY LIFE EXPERIENCE

Two groups of evolutionary theories have been proposed to explain "early-life effects" (ie: early-life adversity and negative adult outcomes) (Malani et al 2023). One group can be called "Developmental Constraints" (or "silver spoon") hypotheses, which assert that "harsh conditions in early life decrease later-life phenotypic quality (and thus, evolutionary fitness), perhaps because organisms make trade-offs in harsh developmental environments that promote immediate survival but compromise long-term outcomes" (Malani et al 2023 p1).

The second group of theories, known as "Predictive Adaptive Response" hypotheses, suggest that "there is selection for organisms to use their early-life conditions to predict characteristics of their adult environment and adjust their responses to the early environment accordingly. Under this model, incorrect

'guesses' about the future lead to poor outcomes during adulthood" (Malani et al 2023 p1). Both sets of theories could be combined - "Adult outcomes can simultaneously be determined by the quality of the developmental environmental and how well organisms predict some feature of adulthood" (Malani et al 2023 p2).

Developmental Constraints hypotheses have "stronger empirical support" (p2) in humans and other long-lived mammals (Malani et al 2023).

5.10. RELATIONAL WEALTH

Material wealth and relational wealth are associated. Relational wealth as seen in networks of social relationships are "crucial axes upon which material wealth differences may rest. Social relationships provide platforms for mobilising the resources of others, with individuals being more motivated to provide material, political or informational support to those that they have social ties with (eg: friends or family). Such networks may be structured by material wealth. This means that choice in social partners may be driven by aspirations to create relationships with wealthy others to access their resources, and wealthy individuals are potentially motivated to maintain such asymmetrical relationships to maintain positive reputations, reduce social tensions, or access the resources of others. Thus, the individuals or households with the most material wealth may have the greatest relational wealth (ie: the largest networks of social relationships or most lucrative network positions) within their community" (Redhead et al 2023 p2).

Redhead et al (2023) supported their assertions with data from Pemba, an island of the Zanzibar archipelago, off the coast of Tanzania. Relational wealth was measured by food sharing, friendship, and co-working (eg: "which households commonly help you with food? For example, people who bring food (prepared or unprepared) to your house?"; "to which households do you often give food? For example, people to whom you will take food (prepared or unprepared) to their house?"; p4). Material wealth was measured by an inventory of household possessions.

Overall, wealthier households were more likely to share food with others, and to report more friendships and more co-working ties. There were gender differences, however. Redhead et al (2023) explained: "Genetic relatedness is a salient feature of womens' social networks, with women reporting friendships and co-working

relationships with closely-related individuals. Food is also shared preferentially between related households. For men, we see less emphasis on genetic relatedness. Kinship featured little in accounting for their work or friendship ties, and was replaced by reciprocity — at least for co-working ties" (p9).

5.11. MOVEMENT IN THE SOCIAL HIERARCHY

Position in the social hierarchy can be passed from parent to offspring in a process called "social inheritance". But an individual's position in the hierarchy can change through "active dynamics" or "passive dynamics". "Active dynamics refer to changes where individuals overtake others within the social gradient through status seeking behaviour. Individuals can achieve these changes on their own, or they may form coalitions with other group-mates to challenge and overtake other members of their group. By contrast, passive dynamics occur via demographic processes, such as the addition and subtraction of members from the group; for instance, when Queen Elizabeth II passed away, Charles III became King of the United Kingdom" (Strauss 2023 p2). Passive dynamics is also seen as a "queueing system".

Strauss (2023) considered such changes in spotted hyenas with thirty-year data from four wild groups in Masai Mara National Reserve, Kenya. "Spotted hyenas have convergently evolved the nepotistic hierarchical societies found in many cercopithecine primates [eg:macaques]. Nepotistic societies are characterised by female philopatry, behavioural inheritance of position in the hierarchy, and kin structured social bonds. Social inheritance of hierarchy position follows Kawamura's [eg: 1958] two rules—matrilineal cohesion, where descendants of the same female are grouped together in the hierarchy, and youngest ascendency, where younger offspring occupy higher positions than their older siblings" (Strauss 2023 p2).

Passive dynamics accounted for the majority of changes in hierarchy. Strauss (2023) stated that "in queuing systems, the tendency to rise in rank via passive dynamics dampens selection for risky status seeking behaviour, and in co-operative breeders, waiting for dominant breeders to die is a successful strategy by which subordinates ascend to become dominants" (p7).

Other studies, however, have found that active dynamics influence position over the lifetime; both up

(eg: Tibetan macaques; Sun et al 2017) and down (eg: female savannah baboons; Combes and Altman 2001).

5.12. REPRODUCTIVE SKEW

Across the animal kingdom there are differences in lifetime reproductive success (known as "reproductive skew"). This is highest in mound-building termites, for example, where the whole group supports one fertile pair. "Disparities in individual physical condition, access to resources, social status and social relationships can lead to inequality in reproduction..." (Mouginot et al 2023 p1).

In theory there is a situation of low reproductive skew: "In a strictly promiscuous mating system, where males and females mate indiscriminately, equal access to reproductive opportunities can theoretically occur. In practice, however, the distribution of paternities often deviates from an equal distribution owing to competition and conflicting interests within and between the sexes..." (Mouginot et al 2023 p2).

A number of theories have been proposed to explain male reproductive skew. The "priority-of-access model", for instance, focuses on the competitive advantage or position in the social hierarchy giving priority to certain males over others. But lower ranked males do mate, either because they circumvent the control of higher ranked males ("limited control model") or the highest ranked male permits reproduction by other males in exchange for social benefits ("concession model") (Mouginot et al 2023).

Mouginot et al (2023) considered male reproductive skew in bonobos and chimpanzees suing data from well-studied populations in Africa. "Contrary to the common portrayal of bonobos as peaceful, in both bonobos and chimpanzees, more aggressive, high-ranking males obtain more mating success than less aggressive, low-ranking males. Nonetheless, dominance status does not completely predict male reproductive success in Pan, requiring the consideration of additional mechanisms" (Mouginot et al 2023 pp2-3). These include (Mouginot et al 2023):

a) Male chimpanzees forming coalitions to defend territory in exchange for reproductive opportunities, but not among bonobos (concession model).

b) Bonobos travelling in larger groups mean fewer

opportunities for lower ranked males, whereas in chimpanzees, "the more dispersed ranging patterns of females may provide opportunities for consortships whereby a male and female travel together, away from others" (Mouginot et al 2023 p3) (limited-control model).

c) Female reproductive synchrony in bonobos is greater, which makes mate-guarding by the highest ranked male more difficult and costly (limited-control model).

d) Male sexual coercion and female choice. Compared to chimpanzees, "female bonobos commonly outrank even the highest ranking males and they do not appear to experience sexual coercion by males. Thus, female bonobos probably have a greater capacity to act on their preferences than do female chimpanzees" (Mouginot et al 2023 p4) (limited-choice model).

The data on bonobos came from four sites (including fifty paternities), and for chimpanzees seven communities (228 paternities). Reproductive skew was calculated using the "multinomial index" (M) (Ross et al 2020), which shows the distribution of paternity in a group. For example, in a group of five males, if all ten paternities belonged to one male, that is a high reproductive skew compared to two paternities each for the five males in a low reproductive skew situation.

Bonobos were found to have the higher male reproductive skew (mean M = 2.57 vs 0.9, out of 5, where a higher number is larger skew) (Mouginot et al 2023).

5.13. BIOLOGICAL CONSEQUENCES OF INEQUALITY

Durey et al (2023) outlined the situation: “From an evolutionary ecology perspective, the distribution of relational, material and embodied wealth is reflected in group health and well-being outcomes. Intergenerational transmission of wealth positively impacts on people’s fitness, evolutionary change and capacity to adapt. Those in society who are unable to access such wealth can experience a pervasive sense of risk and uncertainty that is difficult to adapt to and that damages health and well-being. Yet, social inequality has been a dominant organising principle in the hierarchical structure of human society for thousands of years and ‘manifests in unequal access to goods, information, decision making, and power’[Moreton Robinson 2000]” (p2).

This is not to say that inequality cannot and should

not be reduced. "Societies that have more equality, including the Nordic countries, apply concepts of fairness, reciprocity, trust and mutual aid to practice, where a sense of value is derived from social sources including co-operation rather than power, money and status. According to Wilkinson & Pickett [2009] 'greater equality is the material foundation on which better social relations are built'" (Durey et al 2023 p2).

Durey et al (2023) reflected on the biological consequences of inequality in Australia (ie: Aboriginal and Torres Strait Islanders vs non-Aboriginal) through the lens of oral health (ie: decayed, missing or filled teeth). "Although often considered preventable, oral disease is a global public health problem – affecting an estimated 3.5 billion people worldwide. Children living in poverty, socially marginalised and with limited access to dental care are the most affected by oral disease, including in Australia where Aboriginal children have higher rates of dental caries than non-Aboriginal children" (Durey et al 2023 p2).

Durey et al (2023) drew on three of their qualitative studies in Western Australia of oral health and young Aboriginal children (table 5.1). Together the studies suggested that "structural factors outside individual control, including access to and cost of dental services and discrimination from service providers, prevent many Aboriginal families from making optimum oral health decisions, including returning to services" (Durey et al 2023 p1).

STUDY	METHOD	KEY THEMES
Durey et al (2016)	Focus groups with Aboriginal Health Workers	Barriers to access services include cost, limited availability, & racism. Schools' dental service is important enabler.
Durey et al (2017)	Discussion groups with parents/carers	Barriers include cost of dental care, providing healthy diet for family, & negative judgments from service providers. Schools' dental service seen as important.
Durey et al (2021)	Interviews with dental professionals working with Aboriginal children	Social determinants of oral health (eg: heavy marketing of sugar products). Lack of appropriate professional training.

(Source: Durey et al 2023 table 1)

Table 5.1 – Three studies by Durey et al of oral health and Aboriginal children.

The solution for Durey et al (2023) was to focus on the structural causes of the problem rather than upon the individuals. This fitted with the idea of "studying up" (Nader 1972). "'Studying up' addresses inequality by redirecting questions to 'study the culture of power rather than the culture of powerlessness' [Nader 1972] and by calling to account powerful institutions and governing bodies for their role in undermining rather than promoting good health outcomes" (Durey et al 2023 p3).

5.14. IMMUNITY-FERTILITY AXIS

The "immunity-fertility axis" has been described as a "natural inequality" in that breeding females (compared to non-breeding ones) in a co-operative breeding situation have a weakened immune response. "Investment into reproduction may divert energy and resources away from processes, pathways and systems that increase the health and life-span of an individual, ultimately affecting an individual's fitness; this includes the immunocompetence (an individual's ability to mount an immune response to pathogenic invasion to provide strong resistance to disease and infection) of an individual" (Wallace et al 2023 p2).

However, Wallace et al (2023) provided evidence that challenged this idea. Data on two species of African mole-rats, where there is one breeding female in a colony (high reproductive skew), showed no difference in immunocompetence between the breeding female and the non-breeding females. The researchers commented: "Under conditions of extreme reproductive skew the breeders have the best of both worlds: increased reproductive investment and survival (as a result of increased immunocompetence)" (Wallace et al 2023 p7).

The data came from ten captive-bred colonies at the University of Pretoria in South Africa.

5.15. CONTINGENCY HYPOTHESIS

The "contingency hypothesis" (also called luck or chance in everyday language) asserts that "an individual's behaviour, health, social position, and fitness are strongly dependent on events and experiences that it can neither control nor predict. The outcomes of contingent events in early life are often especially important, as they can set individuals onto divergent,

self-reinforcing trajectories. Recent evolutionary theory has argued that luck in an individual's life, particularly in early life, can outweigh individual quality in determining lifetime reproductive success" (Zipple et al 2025 p81).

Animals living in social groups experience many interactions in early life that influence their later development. This can be studied experimentally using genetically identical individuals, and so any differences that appear in later life must be due to the environment. Zipple et al (2025) did this with free-living mice and the variable of resource competition. Sixteen litters were kept in semi-natural environments.

Males experience competitive feedback whereas females do not - ie: "males compete for territorial control and resource access, while females do not. Females appear unconstrained in their movement, whereas males repeatedly visit only a small subset of available space. Males also spend much less time engaged in spatio-temporal overlap with each other than do females. And territory-less males have higher mortality and attain less access to females than do territory holders" (Zipple et al 2025 p81).

The feedback from early male interactions (ie: success or failure) "pushes individuals onto divergent, self-reinforcing life trajectories, while the same process appears absent in females" (Zipple et al 2025 p81). The early divergence was seen as larger differences in later life (sometimes called the "Matthew effect"; eg: Rigney 2010).

"In populations of humans and non-human animals, the additional amplifying impacts of competition and contingency exist against the backdrop of unequal starting position and likely magnify early inequalities that result from structural or environmental adversity or advantage" (Zipple et al 2025 p84).

5.16. APPENDIX 5A - MAMMALIAN SOCIETIES

Dominance hierarchies (a marker of inequality) are "highly variable across mammals" (Smith et al 2023 p3). Smith et al (2023) plotted the steepness of dominance hierarchies (ie: the degree of inequality) for twenty-four non-domesticated mammalian species. At the shallow end (ie: low inequality) were whiptail wallabies, mountain goats, and chimpanzees, with bonobos, European badgers, and gorillas in the middle, and snub-nosed monkeys, wolves, and sable antelopes with the steepest

hierarchies.

A number of mechanisms that increase or decrease inequality in these mammalian societies can be distinguished (Smith et al 2023):

i) Maternal nutritional resources and state - Good-condition females with low stress produce healthy offspring (eg: enhanced immunity, and faster growth) who tend to be larger.

ii) Resource inheritance - eg: transfer of territories across generations in wolves, lions, hyaenas, and chimpanzees. Chimpanzees also show knowledge transfer (ie: social learning by offspring from observing parents).

iii) Intergenerational social support - eg: maternal death can impact offspring survival, particularly where offspring depend on the mother long after weaning as in coalitions. Dominant individuals tend to privilege their genetic relatives in a group.

iv) Food sharing - "the unresisted transfer of food from one food-motivated individual to another, can promote equal access to limited food resources" (Smith et al 2023 p9).

v) "Revolutionary coalitions" - Individuals lower in the hierarchy can join together to upset the "fixed social order".

vi) Conflict resolution - Forgiveness and de-escalation of conflict encourages co-operation, which, in turn, favours equality in a group.

vii) Inequity aversion - eg: brown capuchin monkeys showed an understanding of fairness in an experiment that offered one individual a high reward (most preferred food - grape) at the expense of a low reward to another individual (less preferred food - cucumber) (Brosnan and de Waal 2003). This behaviour is "most pronounced in species that co-operate, especially those who do so outside of mating or kinship, such as occurs in chimpanzees..., long-tailed macaques and corvids" (Smith et al 2023 p10).

Smith et al (2023) commented that "multiple features characterising dominance hierarchies (one measure of inequality in animals) are not evolutionary constrained,

highlighting the enormous flexibility of social systems" (p10). Factors (i) to (iii) above tend towards inequality whereas the others lead towards equality of members in a group.

5.17. APPENDIX 5B – INSTITUTIONALISATION

Human societies have rules that are enforced in different ways "from gossip, ridicule and ostracism in hunter-gatherers, through to third-party punishment by the state in liberal democracies" (Powers et al 2023 p1). The complexity of societies as they grow in population numbers and in rules lead to to the development of hierarchical structures to help in decision-making and in rule enforcement, argued Powers et al (2023). The cost of egalitarian decision-making where everybody is involved in every decision becomes too great as group size increases, and so this favours "representatives" to make the decisions, which in turn leads to "political inequality" in that representatives have power that ordinary group members do not have.

Prentiss et al (2023) used the term "persistent institutionalised social inequality" (PII), and outlined two groups of models to explain the move from egalitarianism to PII:

a) Mutualism (eg: "scalar stress"; Johnson 1982) – Growing population and increasing complexity in a society leads to the establishment of leaders (or organisers/managers). Their behaviour benefits all, but also creates wealth for themselves.

b) Coercion (or patron-client scenario) – eg: "ideal despotic model".

Prentiss et al (2023) compared the two sets of models using archaeological data from the Bridge River site in British Columbia, Canada (used by an indigenous people known as the St'at'imc or Upper Lillooet). PII emerged 1200-1300 years ago based on "wealth or prestige markers" (eg: "possessions"; bones of salmon (an indicator of amount of food)). The conclusion drawn by the researchers was that "inequality emerged under a mutualism scenario but persisted for subsequent generations under more coercive conditions" (Prentiss et al 2023 p1).

5.18. APPENDIX 5C - FORAGERS

What factors lead to foragers remaining egalitarian or material inequality developing? Wilson et al (2023) used computer modelling with five characteristics of resources (table 5.2):

FACTOR	EGALITARIANISM	INEQUALITY
Predictability	Low	High
Heterogeneity	Low	High
Abundance	High	Low/Intermediate
Economy of scale	Low	High
Monopolisability	Low	High

Table 5.2 - Factors influencing egalitarianism and inequality among foragers (Wilson et al 2023).

i) Predictability - "If resources are predictable, individuals know where and when they can be defended which may: (i) reduce mobility, enabling greater time for defence over movement (a mobility-defence trade-off) and, (ii) enable individuals to have confidence in pay-offs for investing in exclusionary and controlling behaviours" (Wilson et al 2023 p2).

ii) Heterogeneity - Highly heterogeneous environments where resources are abundant in places but scarce in others could favour inequality.

iii) Abundance - Increasing abundance above the minimum level needed for survival, but not superabundance, may promote inequality.

iv) Economy of scale - "Resources with larger economies of scale could decrease the cost of defence for each individual if defence costs are partly shared or co-ordinated. In such cases, individuals may be incentivised to co-operate for defence, presenting opportunities for leader or patron based intra-group inequality while favouring territoriality" (Wilson et al 2023 p2).

v) Monopolisability (or ability to control resources) - The ease by which resources can be monopolised depends on factors like the cost of "production", and ease of storage.

Predictability and heterogeneity of key resources were found to be most important in Wilson et al's (2023) computer modelling study.

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6. HEALTH

6.1. INTRODUCTION

"Covid made obvious what many already knew: Inequity – whether because of race, culture, skin colour, income or caste – can be lethal" (Gravitz 2022 pS2). Both infectious and non-infectious diseases "thrive on inequity", whether it is between countries and regions of the world, or between groups within countries (Gravitz 2022).

In the example of heart disease, advice to eat healthier food and undertake more physical exercise, though evidence-based, comes from studies that involved mostly White and well-off participants. Walking to improve health, say, is not advisable in poor neighbourhoods with high air pollution, or feasible in cultures where women walking in the street is frowned upon. Also diets vary between cultures, as well as food and financial insecurities (Madhusoodanan 2022).

Other disparities in relation to heart disease include access to treatment, inaccurate screening tools (appendix 6A), and the cost of medication.

Health data trends and comparisons depend on the definition used. For example, in the case of maternal mortality, the World Health Organisation (WHO) includes deaths while pregnant or within 42 days of the end of the pregnancy, while the Centers for Disease Control and Prevention (CDC) in the USA include within one year of the end of a pregnancy (McLemore and D'efilippo 2022).

6.2. LIFE EXPECTANCY

High-income countries saw "robust life expectancy gains" in the 20th century with higher living standards, and well-resourced healthcare, but this trend is "much less favourable in the 21st century, even prior to the covid-19 pandemic. Several countries experienced large,

simultaneous life expectancy declines between 2014 and 20151 and overall slowdowns in gains since 2010. Stalled reductions in cardiovascular disease mortality, along with rising drug overdose and mental and nervous system disease mortality, are key contributors to these trends. Notably, sizeable mortality inequalities across socio-economic status and geographic region exist within most of these countries and have tended to widen in recent decades" (Wilkie and Ho 2024 p1).

Wilkie and Ho (2024) analysed data on life expectancy for six Anglophone countries – Australia, Canada, the Republic of Ireland, New Zealand, the UK, and the USA – between 1990 and 2019, taken from the World Health Organisation's "Human Mortality Database".

Life expectancy at birth was highest in Australia, and lowest in the USA (an average difference of 4.75 years for men). The researchers explained the Australian advantage as due to a large immigrant population (as foreign-born individuals often have higher life expectancy than native-born ones in a country), and a "less severe smoking epidemic" than the other countries. Australia also has "lower firearm-, drug- and alcohol-related mortality. This may be related to its strong public health efforts. In 1996, Australia instituted strong gun law reforms, followed by substantial buyback programmes. In 2006, Australia implemented an innovative national network for youth mental healthcare (headspace), which may have improved mental health literacy and provided timely access to mental health services. These, in turn, may reduce suicide and drug- and alcohol-related mortality" (Wilkie and Ho 2024 pp8-9). The healthcare system generally performs well in Australia in comparison to other countries (eg: lower perinatal conditions; lower cancer mortality) (Wilkie and Ho 2024). But Australia has a high obesity rate, so there is still room for improvements.

Geographical inequalities existed in all countries, particularly with Indigenous populations. For example, life expectancy in Nunavut and Northwest Territories is 11-12 years lower than the best performing areas of Canada, while it is 5-6 years for Aboriginal and Torres Strait Islanders in Australia (Wilkie and Ho 2024).

6.3. THE GRINDING DOWN PROCESS

Sapolsky (2022) began: "Western cultures have long cherished the notion that all people are created equal. But in the real world, our lives are not balanced with

equal opportunities and resources" (p27). There is a simple relationship between wealth/income/socio-economic status (SES) and health, but this is due to more than just differences in access to healthcare, and risky health behaviours, like smoking. Sapolsky (2022) argued that key is "the stressful psycho-social consequences of low SES" (p28). One manifestation is "feeling poor" (as much as being poor), particularly in an environment of inequality. "Health is particularly corroded by your nose constantly being rubbed in what you do not have" (Sapolsky 2022 p28).

The idea of "allostatic load" (eg: Juster et al 2010) has been used to describe the challenge of disease and the body's reaction to return to a baseline state (or homoeostasis). Individuals with a low SES have a heavy allostatic load "because the body is in a constant and futile battle to return to a normal, non-stressed state" (Sapolsky 2022 p28).

The stress associated with this situation is a general wear and tear than grinds down the individual (table 6.1). Sapolsky (eg: 1982) has shown such wear and tear in studies of baboons and their position in the social hierarchy. "If you are a low-ranking baboon - a socially stressful situation - your body has unhealthy abnormalities in its secretion of glucocorticoids, which are stress hormones such as cortisol. The body also shows unhealthy changes in the gonadal, cardiovascular and immune systems" (Sapolsky 2022 p28).

- "Life in societies with wide gaps between rich and poor creates ongoing social and psychological stresses. These grind down the body in a host of unhealthy ways, affecting our brains, our immune systems and our DNA, according to a broad range of research" (Sapolsky 2022 p29).
- Brain - eg: prefrontal cortex (involved in planning and decision making) impaired by stress hormones.
- Chromosomes - telomeres (molecular caps on DNA) get shorter (leading to vulnerable chromosomes, like "a kind of premature molecular ageing"; p29).
- Chronic inflammation throughout the body.
- Circulatory system - eg: increased blood pressure.
- Metabolism - eg: impact on insulin response of cells.

Table 6.1 - The impact of stress on selective body systems.

6.4. GENDER AND MEDICINE

Generally, "drug metabolism, side effects and benefits differ significantly between the average man and woman for many widely prescribed medications, with women having a 50 to 70 percent higher chance of an adverse reaction. Body size, proportion of fat to muscle and a host of other factors, including hormonal influences, account for these differences. But physicians rarely consider these dynamics when writing prescriptions" (Stefanick 2022 p44).

This is an example of "how the healthcare system is blind to biological sex differences" (Stefanick 2022 p44). Other examples include viewing certain conditions common to both men and women as "men's diseases" or "women's diseases" (eg: heart disease viewed by many as a "man's diseases"; osteoporosis as a "woman's disease"), the use of only men in clinical trials, and not distinguishing sex differences when men and women are involved in trials. For example, Dolor et al (2013 quoted in Stefanick 2022) found that 83% of 427 journal articles on coronary artery disease treatments had no data on women or did not analyse the data based on sex.

There is also gender bias in medicine.

The impact of disease on men and women is a complicated picture as seen by the examples in table 6.2, but the key message is that "women are not men" (Stefanick 2022 p48).

- Cancer - Overall, cancer kills more men than women, but that hides patterns like that women have a higher risk of developing (the more aggressive) right-sided colon cancer. More men die from lung, colon, kidney, and liver cancer, but overall cancer risk is higher for women under 50 years than men.

- Bones - White women as twice as likely as White men to have osteoporosis (fragile bones), but the risk of death from fragile-bone fractures is greater for men. On the other hand, "gender-specific" knees in knee replacements does not improve outcome.

- Heart - Problems take different forms in women and men.

- Disease - Men are more susceptible to viral, bacterial, parasitic and fungal infections, but women have greater rates of sexually transmitted infections.

(Source: Stefanick 2022)

Table 6.1 - Disease differences between men and women.

6.5. APPENDIX 6A – SCREENING PROBLEMS

"Race-norming" is where different cut-off points are used for different groups, and so builds in discrimination to diagnosis. A prime example is cognitive functioning, where a lower level was assumed to be the norm of Black Americans compared to Whites. This has led to the call to remove race-based adjustments in diagnostic criteria (Liverpool 2021).

But there are situations where adjustments will provide greater equity. For example, screening standards for diabetes are based on studies with middle-aged White individuals. In the USA, for instance, it is recommended to test blood glucose levels of 35-70 year-olds who are overweight or obese (ie: a BMI (body mass index) ≥25 kg/m^2) (Wallis 2022).

But Aggarwal et al (2022) found that to detect diabetes equally across all race/ethnic groups, testing should include healthy weight Asian, Black and Hispanic Americans. One potential problem is that BMI does not capture differences in body fat between groups (eg: Asian Americans have more abdominal fat at lower body weights; Wallis 2022). The waist-hip ratio might be a better measure (Wallis 2022).

Screening might also need to include younger adults in non-White groups (Wallis 2022).

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7. CHILDREN

7.1. PATHWAYS TO INEQUALITY IN HEALTH

Pearce et al (2019) asserted: "Today, in the UK and across the globe, socio-economic inequalities are observed in almost all aspects of child physical and mental health, whereby children living in more socio-economically disadvantaged circumstances experience worse health than their more advantaged peers" (p998). These researchers provided an overview of "socio-economic circumstances" (SECs), social determinants of health (SDH), and child health based on four pathways:

i) Material living conditions – eg: warm safe home; nutritional foods. "Material hardship and poor housing quality have been found to mediate the association between SECs and child health, including respiratory problems in childhood" (Pearce et al 2019 p1000).

ii) Psycho-social – This includes "the feelings of inferiority, subordination or lack of control that may be produced by social inequality, in turn influencing physical and mental well-being via neuroendocrine pathways" (Pearce et al 2019 p1000), and the stressors of living in social disadvantage (eg: parents experiencing financial strain and their health and behaviour).

iii) Behavioural – Health inequalities that arise from unhealthy behaviours like smoking, high alcohol consumption, poor diet, and low physical activity. "Unhealthy behaviours tend to be more prevalent in less advantaged groups and these undoubtedly influence health. However, empirical research indicates that the behavioural pathway may be less important than others and certainly not sufficient to entirely account for the gap in health observed between the rich and poor. Furthermore, this pathway has been criticised for its simplistic focus, since health behaviours are structurally determined and heavily influenced by psycho-social and material pathways and the wider SDH"

(Pearce et al 2019 p1000).

iv) Structural SDH – eg: neighbourhood deprivation; poor access to health and child-related services.

Add to these pathways, a life course approach which sees the impact of different factors varying at different ages (eg: high risk in infancy), and the cumulative effect of disadvantages.

Diderichsen et al (2001) presented a model with five levels to explain health inequalities. The levels are social stratification ("the process by which structures in society influence SECs for children"; Pearce et al 2019 p1001), "differential exposure" (the greater burden of health risks among disadvantaged groups), "differential vulnerability" (the greater exposure to risks among disadvantaged groups), "differential consequences" (the continuing impact of childhood illness on adulthood), and further social stratification (eg: low income employment as an adult).

7.2. CHILD POVERTY TRAJECTORIES

Childhood poverty is associated with negative health outcomes in late life. "Poverty experiences can be dynamic across childhood, which poses a challenge when choosing the age to measure exposure to childhood poverty. One method to address this is to model trajectories of poverty across childhood incorporating all available information on poverty experiences throughout childhood" (Moller et al 2024 p1).

Longitudinal data is necessary here. Moller et al (2024) reported such data from Denmark covering all children born between 1980 and 2000. Childhood poverty was defined as income below 50% of the median income of the population, and was rated each year from birth to sixteen years old. The outcome variable was contact with the healthcare system. Using Nagin et al's (2018) categories, five groups were identified - low use, mainly GP [general practitioner] use, medium use, high use, and psychiatric use.

The sample was over 1.2 million individuals followed for between two to 22 years (ie: 16-37 years old at time of study). Four trajectories of childhood poverty were identified:

i) "No poverty" (87% of the sample) - No poverty experienced at any age of childhood.

ii) "Early poverty" (5%) - Experiences of poverty more so before the age of ten years, but not after that age. Most likely to be single parent households.

iii) "Late poverty" (6%) - More likely to experience poverty in older childhood and adolescence.

iv) "Persistent poverty" (2%) - Poverty throughout the sixteen years of childhood and adolescence. This group was more likely to be immigrant parents, have more children, unemployed mother, and self-employed father.

Moller et al (2024) summed up the findings: "Among both men and women, early and late childhood poverty were associated with higher odds of being in the psychiatric use group. Among women, early and late childhood poverty were also associated with higher odds of being in the high use group and the low use group. Persistent poverty was associated with higher odds of being in the low use group and lower odds of being in the high use and the psychiatric use group in both sexes" (p5).

Put simply, moving in and out of poverty during childhood seemed to lead to negative health outcomes more than "persistent poverty". This might seem contrary to logic. Previous research does support these findings (eg: Sweden), but also not (eg: USA). "These differences in findings could be a result of differences between self-reported information on health status and register-based information on healthcare use, but also differences between contexts both in terms of social security and health care provision. These factors can thus exacerbate the effects of lack of financial resources in a context with limited social security compared to Denmark with higher social security" (Moller et al 2024 p5).

Moller et al (2024) used contact with the healthcare system as officially recorded, and so missed those who did seek help. Individuals in the persistent poverty group may have had poor health, but did not seek medical treatment.

The findings "do not point to a particularly sensitive period for the exposure to childhood poverty as the results were similar in the early and late poverty groups" (Moller et al 2024 p6).

The three poverty groups varied in characteristics, and it may have been these other than financial poverty that influenced negative health (eg: single parent household and divorce/parental breakup; self-employed fathers spending more time with child).

In terms of further evaluation of the methodology, a

large sample studied over many years using official records were positives. The oldest participants were in their mid-30s, however, and it is possible that childhood poverty manifests in negative health outcomes later in life, including the age of death.

Moller et al (2024) admitted a problem with official data (eg: Danish National Patient Register"; "Income Statistics Register"): "A consequence of using register-based information is that children can only be registered with one address and parental income was only obtained for this registered address. The income of parents that the child did not share a registered address with was therefore not included, and it is not known if the children were living equally as much in these households potentially leading to misclassification of poverty exposure" (p7).

The categories of poverty is another issue. The common definition of below 50% of median income was used, but if this figure was varied, then the numbers in the four categories of poverty would change. The researchers made these observations: "Incomes that are not reported to the Danish tax authorities are thus not included, and this has been estimated to be 2.2% of the Danish gross domestic product (GDP)... Information on parents' wealth was also not included in the analyses, which could lead to misclassification of children from families living off this. Also, childhood poverty was measured by the income method instead of measures of subjective experiences of material hardship, which could influence the strength of the associations. Studies have shown overlaps between income poverty and material hardships" (Moller et al 2024 p7).

7.3. CHILDREN-IN-CARE

The number of children in state care in England rose by a quarter between 2008 and 2020 (Bennett et al 2022). "Widespread recognition of poor health and social outcomes for these children, together with concerns about the long-term financial health of local authorities entrusted with their care, have precipitated research into likely drivers of this rise. Child poverty has emerged as a key risk factor for children entering care" (Bennett et al 2022 pe496). Child poverty rates were falling in the early 21st century, but rose after the 2008 recession with this being a key cause (ie: falling household income), along with welfare benefit restrictions (Bennett et al 2022).

But there are geographical differences in children-in-care and child poverty rates around England. Bennett et al (2022) analysed data from 147 local authorities between 2014 and 2020. It was calculated that a 1% increase in child poverty was associated with an additional five children entering care per 100 000 children. This was estimated at around 10 300 extra children-in-care in the study period compared to if the child poverty rates of 2014 had remained constant.

The local areas with the largest rise in child poverty rate saw the largest increase in children entering care (ie: a "double burden"). The worst areas were in the northeast of England (Middlesborough, Hartlepool, Redcar, and Cleveland), but also parts of the northwest, the Midlands, and some coastal areas.

The data came from official sources, and were based on the local-authority level.

7.4. POVERTY AND EARLY BRAIN DEVELOPMENT

Early childhood poverty is associated with lower school achievement, and this may be explained by physical differences in the brain. Studies have shown differences in the surface area of the cerebral cortex, and electrical brain activity patterns, for example (Troller-Renfree et al 2022).

Electroencephalography (EEG) measures electrical brain activity along the dimensions of "frequency" (oscillations of activity throughout the brain - eg: lower frequency/slower oscillations, theta waves), and "power" (amount of activity measured across the scalp (band)) (Troller-Renfree et al 2022). "Childhood EEG-based brain activity demonstrates a specific developmental pattern. As children mature from the neonatal period through middle childhood, they tend to show a decrease in brain power in the low-frequency portion of the frequency spectrum, as well an increase in brain power in the mid- to high-frequency portions of the frequency spectrum" (Troller-Renfree et al 2022 p1). Individual differences in the pattern, particularly power, have been associated with differences in cognitive abilities.

Differences in the pattern also emerge quickly after birth based on family income. "Specifically, several studies with small sample sizes have suggested that within the first several years of life, children from lower-income families average more low-frequency (ie: theta) EEG band power, and less mid- to high-frequency

(ie: alpha, beta, and gamma) band power compared with children from higher-income homes" (Troller-Renfree et al 2022 p2). Note that these are general patterns and children living in poverty show great brain plasticity and individual differences. So, could poverty reduction change child's brain development?

The "Baby's First Year" study (BFY) was designed to answer this question. It randomised 1000 low-income mothers living four US urban areas to receive a cash gift per month for the child's first few years - either $333 ("high-cash gift group") or $20 ("low-cash gift group"). EEG data on 435 infants were available at one year old (Troller-Renfree et al 2022).

The key finding was that "infants in the high-cash group showed more power in high-frequency bands" (Troller-Renfree et al 2022 p1).

The BFY is a randomised controlled trial, which allows a comparison between two groups, but it does not control all potential variables during the first year of the child's life. Troller-Renfree et al (2022) stated: "On balance, though, we judge that the weight of the evidence supports the conclusion that monthly unconditional cash transfers given to the mothers in our study affected brain activity in their infants. This is notable because the patterns of neural activity we observe in the high-cash gift group have been correlated with higher language, cognitive, and social-emotional scores later in childhood and adolescence" (p5). The researchers accepted, however, that at this stage it is not known if the changes in the brain will lead to later educational benefits. The studies are mixed about infant brain activity predicting cognitive abilities and skills (Troller-Renfree et al 2022). The BFY is an ongoing study.

The findings are general patterns as no baseline EEG measure was taken soon after birth, and so individual developmental patterns could not be established.

7.5. LOW BIRTH WEIGHT

"Low" and "very low" birth weight (less than 2500 g and 1500 g respectively) has negative health consequences later in life (eg: asthma; heart disease; diabetes). Low birth weight is more common for infants born to disadvantaged mothers (Currie 2022).

Variable here include quality and amount of pregnant mother's nutrition, smoking during pregnancy, maternal infection, and stress, as well as more widely,

environmental pollution. For example, based on birth records of eleven million newborns in five US states, it was found that living within one mile of a factory emitting toxic chemicals increased the likelihood of low birth weight by 3% compared to living further away (eg: Coates 2013).

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8. MENTAL HEALTH MISCELLANEOUS

8.1. RACISM IN PSYCHIATRY

Emil Kraeplin, a very influential figure in the history of psychiatry, is known now to have advocated eugenics, and been anti-Semitic and anti-homosexual (Arya 2024). How to view his work in this light?

One approach is "presentism". This "involves thinking about history from an exclusively present-day understanding and does not account for historical understanding. Within current-day thinking racist attitudes are not socially acceptable but they were in the past. To judge the past by today's standards would be to take a presentist stance. In addition, if we are to do this it means that we are penalising individuals for upholding commonly held views at the time" (Arya 2024 p471).

Contextualising the views of the time "does not mitigate current or subsequent perspectives on the offence but enables a fair assessment of the contributions of the individual to their field, psychiatry or otherwise" (Arya 2024 p471).

8.2. FIRST-EPISODE PSYCHOSIS

Early intervention for first-episode psychosis (FEP) involves specialised, community-based multi-disciplinary teams delivering intensive treatment for individuals in the early stages of psychotic illness. Are there disparities in outcome in this treatment for different ethnic groups?

Catalan et al (2021), for example, in a review of remission and recovery in FEP, found no socio-economic predictors in remission, but male gender associated with recovery. Chorlton et al's (2012) found little evidence of ethnic disparities in outcome. The studies, however, in the review varied in methodological quality (Nicholls et al 2024).

Griffiths et al (2023), on the other hand, did find differences based on ethnicity in a sample of nearly one thousand people with FEP accessing early intervention

services followed for five years (of which around two hundred identified as Black or Asian). This study concluded that "ethnic group status accounted for variation in symptoms and function and that social deprivation, interacting with ethnicity, further contributed to this variance" (Nicholls et al 2024 p556).

Nicholls et al (2024) analysed data from the "National Clinical Audit of Psychosis" (NCAP) in England in 2021-2022. Case-note data on 6183 patients were used. The outcome measure was "problems associated with hallucinations and delusions" ("Health of the Nation Outcome Scale" (HoNOS) item six; Wing et al 1998).

Between initial assessment and follow-up, all groups (age, gender, and ethnicity) showed improvement, but males improved on average less than females, and individuals aged 18-24 years less than other age groups.

Analysis then included moderating effects like initial severity, treatment uptake, physical health variables (eg: smoking; diabetes), and substance misuse, and it was found that "treatments are less likely to be effective for male patients, patients in the Black and Black British ethnicity category, and patients aged 25-34" (Nicholls et al 2024 p559). Wider interventions included supported employment, and dealing with weight gain were particularly helpful.

The researchers offered some possible explanations for the findings, including:

i) Age differences - Younger individuals "could be said to have worse outcomes because they take up treatment less often, and when treatment is taken up, they do as well as other age groups in terms of symptom improvement" (Nicholls et al 2024 p559).

ii) Gender - "The NCAP report showed that men are more likely to be offered clozapine than women and women are more likely to engage with CBTp [psychosis-focused cognitive-behavioural therapy) than men. Together these suggest that men, especially young men, are less likely to take up interventions or respond to anti-psychotic treatment and this largely, but not entirely, accounts for the variance in outcome by gender" (Nicholls et al 2024 p559).

iii) Ethnicity - Cultural and language barriers that delay help-seeking, and/or mental health services that do not address cultural and social needs could be relevant, though the researchers were not able to say definitely from their data. "Socio-economic disadvantage, which

shows intersectionality with ethnicity, may influence access to quality community-based support, including opportunities for supported employment and family support, merits further investigation as a factor that may contribute to this disparity in outcome by ethnic group" (Nicholls et al 2024 p559).

Nicholls et al (2024) concluded: "Addressing health inequalities in first-episode psychosis requires multi-faceted approaches. The persistence of disparities after adjusting for differing rates of treatment take-up suggests a significant effect of external factors that require further monitoring. Interventions should focus on improving access to early intervention services, ensuring culturally sensitive care, reducing treatment delays and providing comprehensive support tailored to the needs of disadvantaged populations" (Nicholls et al 2024 p561).

- Follow-up period varied between 0 and 365 days for different patients.
- Use of one outcome measure. This item has "imperfect inter-rater reliability and it is undocumented whether a different clinician made each assessment" (Nicholls et al 2024 p561).
- Official demographic categories of the "Office for National Statistics (ONS) used (eg: Asian or Asian British, Black or Black British, Mixed ethnicity, Other ethnicity, and White). "The failure of the ONS categories to capture some ethnicity categories (eg: Latinx), and the small non-binary gender sample mean that analysis for these groups that may have specific needs are not possible. Greater specificity in ethnicity coding is a priority if inequalities in healthcare are to be properly understood" (Nicholls et al 2024 p561).
- Some aspects of the treatment were not offered to all patients (eg: supported employment; clozapine).
- No measure of socio-economic status (SES) nor geographical information (eg: urban/rural).
- Variables not measured about FEP - eg: diagnostic category; duration of untreated psychosis; age of onset.
- Full data not available for nearly 4000 patients in NCAP.
- Random sample of patients with diagnosis of or suspected FEP with 1000 patients per early intervention in psychosis team.

Table 8.1 - Key limitations of NCAP data for Nicholls et al (2024).

This study used the official data of NCAP, and so dependent on the information recorded in the case-notes. Table 8.1 lists the key weaknesses from the researchers' point of view.

8.3. TRANS CLINIC

Magnus Hirschfeld, in early 20th century Germany, held views on sex and gender very different to the norms of the day. He believed in the idea of a "third sex" (Geschlecht) for individuals who did not fit gender binary or heterosexual categories. The term "sexual intermediaries" was used to cover a range of non-conforming individuals (including transvestite and gender non-binary) (Schillace 2021).

In 1919 Hirschfeld set up the "Institute for Sexual Research", which included surgery for Genitalumwandlung (literally, "transformation of genitals") (otherwise historically called "sex change" or "gender affirming" surgery). The Institute was closed down by the Nazi Party in 1933 (Schillace 2021).

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9. INEQUALITY AND EARLY COVID-19 RESEARCH

9.1. INTRODUCTION

In the second half of 2020 the journal "Research on Social Stratification and Mobility" produced a special section covering inequality and covid-19. The articles covered data from the first four months of the year in the main, which included periods of lockdown. Subsequent research has supported the findings with more details in some cases, but these articles give a feel of the immediate consequences of the covid-19 pandemic on different groups in society.

9.2. PRE-EXISTING HEALTH CONDITIONS

Wiemers et al (2020) asserted: "The covid-19 pandemic is not the great equaliser. Vulnerability to covid-19 based on pre-existing health conditions collides with long-standing US health disparities by income, education, and race-ethnicity, especially in midlife" (p1).

These researchers calculated the vulnerability to hospitalisation due to covid-19 based on pre-existing health conditions using data from the "Panel Study of Income Dynamics" (PSID). The PSID is a US longitudinal survey began in 1968, and the 2017 data on adults aged 25 years and above were used here (n = 13 150). Wiemers et al (2020) used a "relative vulnerability index" developed by DeCaprio et al (2020) to predict pre-pandemic in-patient hospitalisation from respiratory diseases, pneumonia, and influenza based on pre-existing health conditions, and previous hospitalisations, and gender, and age. The comparison standard was a thirty year-old female with no risk factors (ie: pre-existing conditions).

Relative vulnerability to covid-19 hospitalisation varied with number of risk factors, and age. For example, a middle-aged adult with three or more risk factors was

over 30 times more vulnerable than the standard. The most vulnerable group was adults over 65 years with three or more risk factors (70 times greater vulnerability than the standard).

Health conditions are associated with lower socio-economic status and related disadvantage, and if this is added to the analysis, relative vulnerability is increased by lower educational qualifications, lower income, and non-White ethnicity. The pre-existing health conditions describe susceptibility to illness, while exposure is another issue. This was also evident in Wiemers et al's (2020) analysis based on ethnicity.

9.3. EMPLOYMENT

The lockdowns in response to covid-19 meant that non-essential businesses closed and workers were laid off. Dias et al (2020) investigated the gender differences in the USA using data from the official "Current Population Survey" collected between December 2019 and May 2020. Every month around 60 000 households were surveyed.

Four groups were created for analysis purposes - male and female parents, and male and female non-parents. Prior to covid-19, fathers were more likely to be employed than the other groups, and this group was relatively less likely to be laid off in March and April 2020 (ie: during lockdown) (6.8% vs 10.1% for mothers, 10.6% for non-mothers, and 11.4% for non-fathers).

This is known as the "fatherhood premium", which was higher for lower- and mid-educated workers. The researchers argued that gender stereotypes influenced the decisions of companies of who to lay off.

In terms of the immediate impact of covid-19 on gender equality, Kristal and Yaish (2020) analysed employment data for early 2020. Over 2000 Israeli adults who were employed or self-employed were surveyed in the first week of March (prior to the lockdown of the economy) and again in late April (during the shutdown).

Overall, about one-third of respondents were not employed by the second data collection point, while low-wage workers saw a greater decline than high-wage workers. The main explanation was enforced unpaid leave during the shutdown.

Concerning gender differences, prior to the lockdown women were generally in a poorer position than men (eg: more women in lower paid jobs and fewer in managerial

positions). The impact of the shutdown was harsher on women than men, particularly younger and older workers. For example, 39% of women aged 18-24 years remained employed in April compared to 61% of men of the same age. "This finding might be explained by jobs held by young women compared to those of young men. For example, the catering industry was hit the hardest by the economic lockdown. In the catering industry young women are more likely to be employed as waiters whereas many young men are employed in errands, for which demand and employment opportunities have increased during the economic lockdown" (Kristal and Yaish 2020 pp2-3).

Hu (2020) analysed data from the "Understanding Society" (USOC) covid-19 survey in the UK. USOC is a longitudinal study began in 2009, and the covid-19 survey collected data from nearly 17 500 adults in April 2020 (during lockdown). The normal method is face-to-face interviews, but this time an online questionnaire was used.

An analytical sample of 10 336 20-65 year-olds was created, of which 8281 were employed or self-employed in January-February 2020. Change in employment status, and working hours, and income loss, and perceived financial hardship were measured. The categories of "White native", "White migrant", "Black, Asian and minority ethnic (BAME) native", and "BAME migrant" were the basis of analyses.

"BAME migrants" were most likely to lose their jobs during the covid-19 lockdown (eg: over three times more likely than "White natives"), but "BAME natives" were least likely to be furloughed. The BAME groups were less likely to see a reduction in working hours during lockdown. All groups experienced a loss of household income compared to the "White native" group. Hu's (2020) conclusion was that "the pandemic exacerbated socio-economic inequalities along intersecting ethnic and native-migrant lines" (p1).

9.4. ECONOMIC HARDSHIP

Qian and Fan (2020) noted that the "infectious nature of covid-19 has led some to tout the pandemic as a 'great equaliser', a systemic disadvantage that limits the economic activity of almost everyone regardless of social locations... Emerging evidence, however, begins to challenge this view, showing that some segments of the population are at a heightened risk of economic vulnerability" (p1).

These researchers analysed income data from China in support of this view. An online survey in March-April 2020 provided the data (n = 4715 respondents). Key questions related to the change of income (or not) from before the pandemic began, while measures of socio-economic status (SES) were educational level, family income, Communist Party membership [10], and rural/urban residence.

About half the sample reported a lowering of income from before the covid-19 outbreak, and 11% had a complete loss of income, while 6% had an increase. Three groups were created for analysis purposes - no income loss, partial income loss, and no income. The no-income loss group was more likely to include individuals with higher education, higher family income, Communist Party membership, and urban residence ("all long-standing status markers in China"; Qian and Fan 2020 p1). So the pandemic exacerbated pre-existing social inequalities, but also created new disparities in that "people who live in families or regions that were hit harder by covid-19 are more likely to experience income loss" (Qian and Fan 2020 p1).

Covid-19-induced economic hardships in the UK were examined by Witteveen (2020) using data from USOC in January-February and April-May 2020. Economic hardship was categorised as being furloughed during the lockdown (and receiving up to 80% of salary), reduced work hours, or being laid off. The alternative was no loss of income.

In terms of socio-demographic variables, the following observations were made:

i) Income groups - Low-pay workers (ie: lowest earning quintile) before the the pandemic were around two and a half times more likely to experience economic hardship during the lockdown than workers in the highest earning quintile.

ii) Gender - "Adjusting for earnings level, socio-demographics, and employment status, men are significantly more likely to experience covid-19-induced economic hardship than women" (Witteveen 2020 p3).

iii) Race/ethnicity - Contrary to other research, White individuals were more likely to experience economic hardship during the lockdown than BAME individuals, and the difference was particularly seen in the middle

[10] "People closely connected to the state and party apparatus are privileged, as marked by party membership and state-sector employment" (Qian and Fan 2020 p2).

earnings groups.

iv) Parental social class - Contrary to expectations, no class background inequality.

Witteveen (2020) suggested that the findings for gender and race/ethnicity were a product of women and ethnic minorities being employed in essential occupations, and thus continued to work during the lockdown. This would explain the lack of reduction of income at this time.

This study and Hu (2020) above used the same data source, but had different analyses and interests. The two studies have overlaps and agreements as well as disagreements.

9.5. SELF-REPORTED HEALTH AND WELL-BEING

Recchi et al (2020) described a counter-intuitive phenomenon in France during the lockdown that they called the "eye of the hurricane" paradox, where "the large majority of individuals who are not infected by the virus may be seeing their current condition in a more positive light than they normally would" (p1). In other words, subjective health and well-being was reported as higher than compared to pre-covid years. This phenomenon had previously been observed among young people in Japan after the earthquake in 2011 (Uchida et al 2014).

But there are differences between socio-economic groups in the "eye of the hurricane" paradox, and some groups did show declines in subjective health and well-being. Recchi et al (2020) used data from an online panel survey in six weeks in April and May 2020 to show which groups suffered. Over 1400 adults scored themselves on self-assessed health, from "very bad" (1) to "very good" (5), subjective well-being on six indicators (eg: "relaxed"; "happy"; "low"), and "lockdown-related stress ("not at all" (0) to "enormously" (10)). The measures were then combined to give a "personal" health score.

Overall, the highest category of this (ie: most positive) increased during covid in terms of number of respondents compared to 2017 and 2019. The exceptions were blue-collar/manual workers who had a decline in self-rated health, Paris residents and subjective well-being, and people working long hours at home reported more lockdown-related stress.

9.6. LEARNING OPPORTUNITIES

Jaeger and Blaabaek (2020) investigated the inequality in learning opportunities during covid-19 using families' daily take-out of digital children's books from free libraries in Denmark. The administrative data covered three months in early 2020, including pre-lockdown (1st February-12th March), and during three phases of lockdown (13th March-3rd April "first lockdown", 4-13th April "Easter holiday", and 14-30th April "second lockdown").

Parents' educational qualifications and income were the means of establishing SES. In total, there were 55 million take-outs in the study period. "High-SES families took out more digital (and physical) children's books before the covid-19 lockdown than low-SES families. During covid-19, the baseline SES gradient increased: high-SES families consistently took out more digital children's books than low-SES families in each of the three phases of the covid-19 lockdown" (Jaeger and Blaabaek 2020 p4).

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10. GENDER

10.1. DIVERSITY AT WORK

Social diversity in an organisation has both negative and positive consequences according to research. On the negative side, it can produce greater perceived interpersonal conflict and lack of trust, for example, but on the positive side, creativity and good decision-making are enhanced (Phillips 2022).

Here are three examples of studies showing the latter:

i) Gender (eg: Dezso and Ross 2012) - Gender diversity in the top management teams among 1500 top US companies between 1992 and 2006 linked to an increase in company equity value.

ii) Race/ethnicity (eg: Richard et al 2003) - Racial diversity at 177 national banks in the USA associated with better firm performance.

iii) Political affiliation (eg: Loyd et al 2013) - 186 US adults who identified as Republican or Democrat voters who were in groups with different party affiliates worked harder to convince others who disagreed than when in groups of same party affiliations.

Phillips (2022) concluded that diversity in organisations is like "the pain of exercise. You have to push yourself to grow your muscles. The pain, as the saying goes, produces the gain" (p77).

10.1.1. Gender Inequality and Employment

Revenga and Boudet (2022) outlined three factors that limit gender equality and employment around the world:

i) Responsibilities for care and housework predominantly placed upon women.

ii) Human capital investment - eg: less education for girls.

iii) Treatment by markets and institutions - ie: gender-based discrimination.

10.2. BRILLIANCE AND GENDER

Some academic fields place great emphasis on "brilliance" (or genius), and Cimpian and Leslie (2022) wondered whether this was a way of keeping certain groups, not viewed as brilliant (eg: women; Black individuals), out.

Leslie et al (2015) surveyed around 2000 academics in thirty fields about the value placed on brilliance (operationalised as a "field-specific ability belief index"), and then correlated that with the number of PhDs given to women and Black individuals.

Academic fields with high value on brilliance (eg: physics, mathematics, philosophy) awarded fewer PhDs to females and Black individuals than the lower-value fields, like neuroscience and psychology. "The results suggest that many fields implicitly equate brilliance with White males" (Cimpian and Leslie 2022 p87).

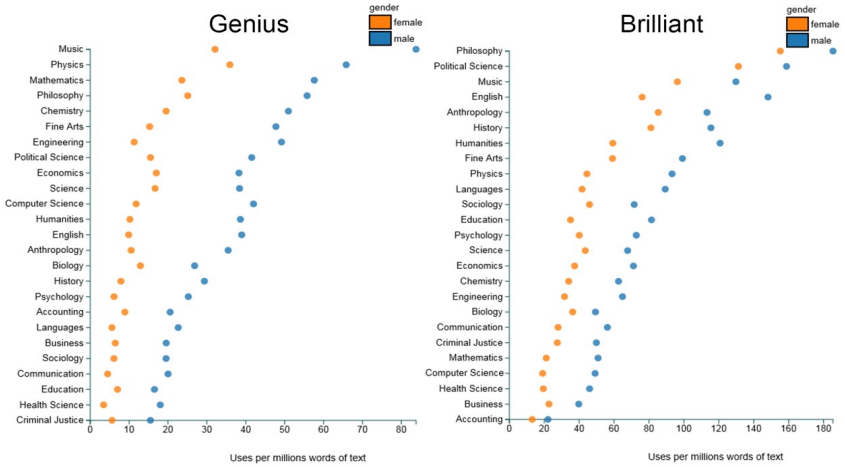
Subsequent research (Storage et al 2016) showed that students perceive "brilliant" and "genius" as male characteristics. This study analysed US undergraduate ratings of their professors on "RateMyProfessors.com". The frequency of the two words came from over fourteen million reviews covering eighteen academic fields.

The findings can be summarised as:

i) There was a significant gender difference with "brilliant" being used nearly twice as often for male than female professors, and "genius" over three times more often (figure 10.1).

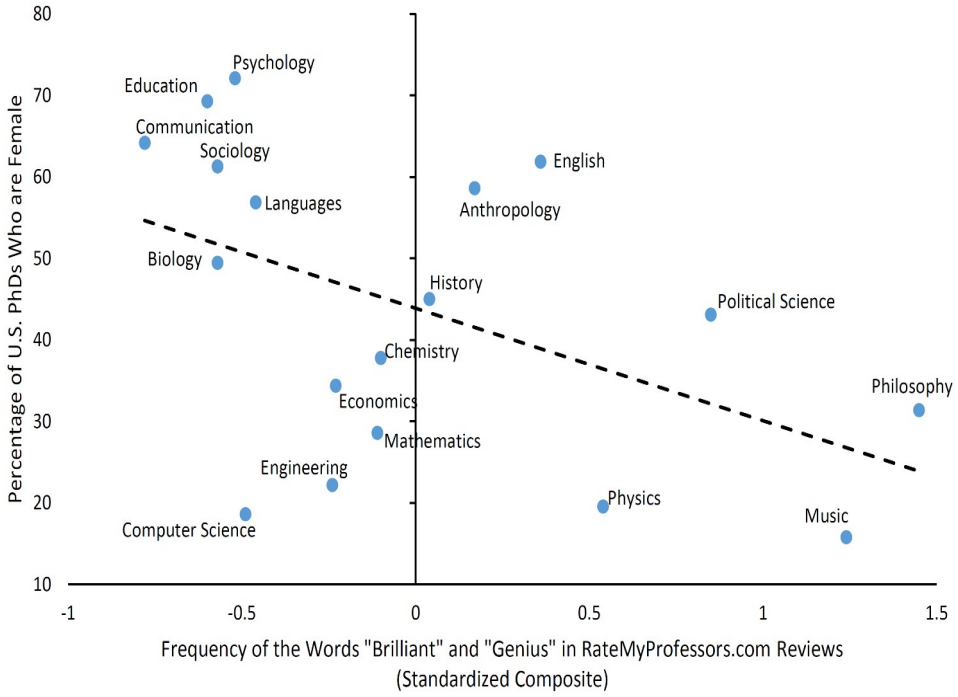
ii) The academic fields with more "brilliance language" had fewer female PhDs (figure 10.2), and less African American PhDs as of 2011 (figure 10.3). These differences were also seen for undergraduate degrees. These relationships did not hold for Asian Americans.

The study measured the frequency of the use of the two words, and did not include information about the type of educational institution, or the gender or race/ ethnicity of the rater, for example. Storage et al (2016) defended their choice of words: "The words 'brilliant'



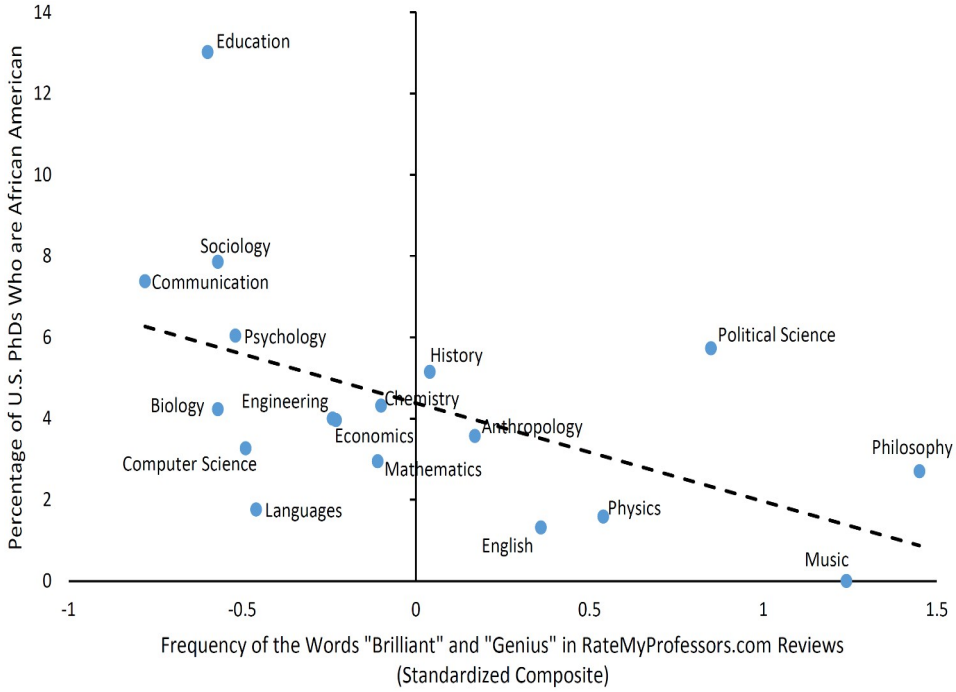
(Source: Storage et al 2016 figure 1)

Figure 10.1 - Frequency of use of "brilliant" and "genius" on "RateMyProfessors.com" by academic field and gender.



(Source: Storage et al 2016 figure 2)

Figure 10.2 - Use of words "brilliant" and "genius" on "RateMyProfessors.com" and percentage of female PhDs in each academic field.



(Source: Storage et al 2016 figure 3)

Figure 10.3 - Use of words "brilliant" and "genius" on "RateMyProfessors.com" and percentage of African American PhDs in each academic field.

and 'genius' were chosen because they map most directly onto the intellectual traits that are prized in fields such as mathematics, physics, philosophy etc. We found the same results, however, when we included the weaker term 'smart' in the set of words denoting a brilliance focus. Thus, our results do not hinge on a particular configuration of search terms. It is also worth noting that other terms were considered but could not ultimately be used because they appeared very infrequently in the reviews (eg: 'gifted' was only used an average of 5.81 times per million words, vs. 75.10 for 'brilliant' and 27.27 for 'genius') or because they do not uniquely target intellectual ability (eg: a person can be 'talented' in many ways)" (p6).

Society generally stereotypes the genius as male (eg: 5-7 year olds and "really really smart"; Bian et al 2017)(Cimpian and Leslie 2022).

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11. STUDIES ON DISCRIMINATION

11.1. DISCRIMINATION

In societies like the USA toleration of difference is rising (for example, based on surveys), yet discrimination towards minorities persists. Hambrick (2022) described the explanations for this fact as between two competing hypotheses:

i) "Dispersed discrimination" – The majority of people in a society or an organisation openly favour tolerance (explicit attitudes), but they show implicit/unconscious/ unaware bias and discrimination.

ii) "Concentrated discrimination" – Discrimination is maintained by a small number of explicitly biased individuals in a society or an organisation. This fits with the "Pareto principle" that asserts that a majority of results come from a minority of inputs (Campbell and Brauer 2021).

Which of the hypotheses that is accepted will influence anti-discriminatory policies. For example, implicit bias training for all fits with the dispersed discrimination account, whereas policies aimed at the explicitly biased individuals is better with the concentrated discrimination account. The wrong policy can have consequences. "If, for example, a small number of explicitly prejudiced people are responsible for most or all of the discrimination occurring in a company, an intervention that requires all employees to undergo implicit bias training will probably fail to address the problem. Research suggests that interventions that convey the message that nearly everyone engages in discriminatory behaviour may even make the workplace atmosphere worse for marginalised employees because after the training, non-marginalised employees may avoid interacting with them out of fear of unwittingly committing discrimination" (Hambrick 2022 p9).

However, it is not easy to distinguish between the two explanations in terms of proving definite evidence. Campbell and Brauer (2021) attempted to do so with a

series of surveys and field experiments (14 individual studies in ten groupings) (table 11.1), most of them at the University of Wisconsin-Madison, USA.

STUDY	METHODOLOGY
1	Archival data on IAT
2	Survey of campus climate
3a/b	Surveys on campus inclusion and discrimination
4	Survey of engineering college students
5	Experiment on helping behaviour (holding a door open for a following person)
6a/b	Experiments on helping behaviour (giving directions on campus)
7a/b	Experiments on helping behaviour (dropping a stack of cards in a lift)
8	Experiment on social distance (whether a person would sit in a vacant seat next to a confederate)
9a/b	Experiments on student job application and name of applicant
10	Meta-analysis of findings from Studies 5 to 9

Table 11.1 - Studies by Campbell and Brauer (2021).

Study 1 - Archival data from the Implicit Association Test (IAT) (table 11.2), which measures implicit bias, showed "a moderate bias towards Whites on the Black-White IAT" (Campbell and Brauer 2021 p760). The data came from four studies and included nearly 2000 students at Wisconsin-Madison.

- Implicit bias is often measured exclusively by the IAT. The stability of this test is low (ie: consistency between test and retest), but that does not mean implicit bias does not exist. Such logic would be the "Divining Rod Fallacy" - "just because a rod doesn't find water doesn't mean there's no such thing as water" (Payne et al 2022 p10).

- The use of IAT scores to predict an individual's future behaviour is an example of the "Palm Reading Fallacy". Tests in psychology predict how groups will respond on average, not how a particular individual will behave (Payne et al 2022).

Table 11.2 - Implicit Association Test.

Study 2 - A survey of over 8600 students in 2016 on the campus. The questions asked about students' perceptions of the campus climate (eg: "Important that one's university is committed to diversity"; "How respectfully are ethnic minority students treated?"). Positive responses were given by the majority of White, and to a slightly lesser extent by non-White students. "Although Students of Colour and other students from marginalised backgrounds generally felt less positively than White students, possibly due to experiences of discrimination or hostile behaviour, the fact that they generally report feeling quite welcomed and respected is inconsistent with the account that discrimination is perpetrated by the majority of individuals with whom they interact" (Campbell and Brauer 2021 p762).

Study 3 - Two more direct surveys of over 2000 undergraduates on inclusion and discrimination at the same university. The overwhelming view from all students was that only a minority of peers engaged in discrimination. "Students seem to agree that a highly biased numerical minority, not a subtly biased numerical majority, is responsible for discriminatory conduct on campus, lending strong support for the concentrated discrimination account" (Campbell and Brauer 2021 p764).

Study 4 - A general survey of nearly 1500 students at a college of engineering in the Midwest USA. The key questions were, "In your opinion, what proportion of engineering students engage at least occasionally in exclusive behaviours towards women (people from races or ethnicities different from their own)?". The vast majority of students, including in male and female, and home and international student sub-categories, chose "none or nearly none" and "less than half, but not none" responses.

Study 5 - An experiment to test actual behaviour in relation to discrimination and helping, rather than what people say or perceive. Specifically, if a student would hold the door open for a following person. In total, 480 students were targeted by a Black or White confederate who walked fifteen feet behind the chosen participant when entering a busy building. There was no significant difference in door-holding behaviour based on the race/ethnicity of the confederate (82% for Black actor vs

87% for White one).

Study 6 - In two versions of the experiment, a confederate asked students (n = 108 and 100) for directions on campus. The confederate was either a White, Asian, or Muslim female in the first experiment, and a White male wearing a pro-gay or neutral t-shirt in the second. The details of the instructions, and the length of the interaction were scored between 1 to 3 by an observer. There was no significant difference between the conditions in both experiments.

Study 7 - Two experiments involving dropping a stack of fifty notecards in a lift and whether a student(s) would help pick them up. In the first experiment, 165 participants were tested in two conditions (White or Muslim individual dropped the cards), and 138 participants in the second experiment in either a White or Asian condition. Four measures were taken in each case - help or not, time spent helping, number of cards picked up, and delay before helping.

The results were unclear in terms of a definite pattern. Significantly more White than Muslim confederates received help (74 vs 56%), but there was no significant difference on the other measures. In the second experiment, the Asian confederate received help significantly more than the White confederate (82 vs 62%), but there was a longer delay before helping the Asian confederate. Campbell and Brauer (2021) asserted: "Taken together, though, there is little evidence that participants were systematically less helpful when interacting with members of particular social groups" (p768).

Study 8 - On a busy campus bus, a White female and a Muslim female confederate sat on one or two seats. On a total of 21 rides, the experiment investigated if a student would sit in the vacant seat. In the main, there was no significant difference based on the confederate's race/ethnicity, but non-significant evidence "for the idea that Muslim women experience greater social distance than White women when seated in a campus bus" (Campbell and Brauer 2021 p769).

Study 9 - Two experiments around applying online for

student jobs on campus. In one experiment, the name of the applicant was prototypically White ("Christopher O'Donnell") or Arab ("Abdul Rasheed") (for 42 jobs), and in the second experiment, it was White ("Cody Miller") or Black ("DeShawn Washington") (for 24 jobs). The applications were identical otherwise. No difference in response to the application or invitation to an interview based on the name.

Study 10 - A meta-analysis of the findings from Studies 5 to 9 found no significant overall pattern.

Campbell and Brauer (2021) concluded: "The concentrated discrimination account, which maintains that discrimination is largely perpetrated by a highly biased numerical minority of individuals, is a better fit with the results obtained in our studies (at least for the campus on which the studies were conducted)" (p773).

Hambrick (2022) noted some particular limitations of the research:

a) Individuals with highly negative views may not have participated.

b) The field experiments involved helping with little effort.

c) The study involved students on a university campus, and egalitarian views are higher than the general population.

d) Other aspects of discrimination, like offensive language, were not included.

e) The study examined individual acts of discrimination, and "did not address structural bias in health care, education, policing, housing, or other areas" (Hambrick 2022 p9).

11.2. MICRO-AGGRESSIONS

"Micro-aggressions" are "the everyday slights, insults, put-downs, invalidations and offensive behaviours that people of marginalised groups experience in daily interactions with generally well-intentioned people who may be unaware of their impact" (Sue 2022

p22), or more specifically for racial micro-aggressions, "generally well-intentioned White Americans who may be unaware that they have engaged in racially demeaning ways toward target groups" (Sue et al 2019 p129).

Sue (2022) emphasised the key points that micro-aggressions are continual reminders of being a "second-class citizen", which are cumulative and energy-depleting, including leading to "racial battle fatigue".

The concept of micro-aggressions has been criticised as no different to everyday rudeness and incivilities in social interactions (eg: Schacht 2008). Sue et al (2019) countered that they are more than "everyday rudeness" as (racial) micro-aggressions are "(a) constant and continual in the lives of people of colour, (b) cumulative in nature and represent a lifelong burden of stress, (c) continuous reminders of the target group's second-class status in society, and (d) symbolic of past governmental injustices directed toward people of colour (enslavement of Black people, incarceration of Japanese Americans, and appropriating land from Native Americans)" (p130).

The prefix "micro" is used not to downplay the event, but to emphasise the everyday nature of it, and to distinguish it from "macro-aggressions" (Huber and Solorzano 2014). This latter term is "reserved for systemic and institutional forms of racism that is manifested in the philosophy, programmes, policies, practices and structures of governmental agencies, legal and judicial systems, health care organisations, educational institutions, and business and industry. Unlike micro-aggressions which have a more limited impact on an individual level, macro-aggressions affect whole groups or classes of people because they are systemic in nature" (Sue et al 2019 p131).

Sue et al (2019) outlined four types of micro-intervention strategies as ways to respond to micro-aggression by the targets/victims, "White allies" (dominant group members who support equality), and bystanders. The researchers defined micro-interventions (or "micro-affirmations") as "the everyday words or deeds, whether intentional or unintentional, that communicates to targets of micro-aggressions (a) validation of their experiential reality, (b) value as a person, (c) affirmation of their racial or group identity, (d) support and encouragement, and (e) reassurance that they are not alone" (Sue et al 2019 p134).

i) "Make the 'invisible' visible" - eg: challenge the stereotype.

Sue et al (2019) gave this example: "a White teacher says to a third-generation Asian American student, 'You speak excellent English!'. The meta-communication here may be 'You are a perpetual alien in your own country. You are not a true American'. In using a micro-intervention tactic, the student responds, 'Thank you. I hope so. I was born here'. This tactic may seem simplistic, but it does several things. It acknowledges the conscious compliment of the perpetrator, lowers defensiveness for the comeback to follow, subtly undermines the unspoken assumption of being a foreigner, and plants a seed of possible future awareness of false assumptions" (pp135, 138).

ii) "Disarm the micro-aggression" - eg: challenge and counter the comments.

For example, a colleague makes the comment that an employee with a visible disability only got the job because of his "handicap". Responses include direct disagreement, asking for tolerance, or pointing out rules of the organisation (Sue et al 2019).

iii) "Educate the offender".

For example, a student in a chemistry class says of another student, "Maryam" (an Arab-American), that she's hear to learn how to make a bomb. Responses include: "I know you didn't realise this but that comment you made was demeaning to Maryam because not all Arab Americans are a threat to national security", or "That is a negative stereotype of Arab Americans. Did you know Maryam also aspires to be a doctor just like you? You should talk to her; you actually have a lot in common" (Sue et al 2019 p137).

iv) "Seek external intervention" - eg: report the incident to the appropriate authorities.

Sue et al (2019) emphasised the importance of context in terms of which strategy to use; for example, "adjust your response as the situation warrants. If something was done out of ignorance, educate rather than just confront" (p139). These authors were also pragmatic about micro-intervention strategies: "it would be a monumental mistake to believe micro-interventions alone would cure the omnipresent onslaught of micro-aggressions, and lead to the enlightenment of perpetrators" (Sue et al 2019 p140). There are wider

issues in society to change, they argued.

11.1. FIXED-PIE BIAS

Brown et al (2022) began: "Members of societally advantaged groups frequently support the concept of equality and yet use their advantaged position to implement policies that perpetuate inequality. This tendency persists even as inequality threatens the prosperity of disadvantaged and advantaged groups alike" (p1). These researchers suggested that advantaged group members misperceive equality-enhancing policies as absolute losses for themselves and their group. This is linked to the "fixed-pie bias" (eg: Thompson and Hastie 1990) (or zero-sum game) where gains for one group are seen as automatic losses for the other. Nine studies were undertaken by Brown et al (2022) to show this behaviour.

Study 1a - Five hundred and ninety-four White US adults recruited online were presented with vignettes, like: "According to a recent report, in 2018, White homebuyers received roughly $386.4 billion in mortgage loans from banks, while Latino buyers only received around $12.6 billion in mortgage loans overall" (p13). Then the participants were randomly assigned to one of three conditions:

i) "Equality-enhancing policy" - eg: "Several banks propose increasing the total amount of mortgage loans to Latino homebuyers by $7.3 billion and not changing the total amount of mortgage loan funding to White homebuyers. Ultimately, these banks predict that this proposal will narrow the gap in mortgage loans between Latino and White homebuyers over the next year" (p13).

ii) "Status quo policy" - eg: "However, several banks propose not changing mortgage loan funding over the next year" (p13).

iii) "Inequality-enhancing policy" - eg: "Several banks propose decreasing the total amount of mortgage loans to Latino homebuyers by $7.3 billion and not changing the
total amount of mortgage loan funding to White homebuyers. Ultimately, these banks predict that this proposal will widen the gap in mortgage loans between Latino and White homebuyers over the next year" (p13).

The outcome measure was: "How do you think the proposed changes will affect [advantaged groups] chances of [receiving resources]?" (p13). The response options varied from -3 ("greatly harm"), to 0 ("no effect"), to +3 ("greatly improve"). Participants misperceived equality-enhancing policies as harming their interests. So, a relative loss was misperceived as an absolute loss in the equality-enhancing policy condition.

Study 1b - This was a replication of Study 1a with 399 White US participants, but it included no "status quo policy" condition. This study confirmed Study 1a that "advantaged group members misperceive reductions, preservation, and increases in their relative advantage (ie: inequality) as changing their resource access in an absolute sense" (Brown et al 2022 p4).

In both studies, the mean score for the equality-enhancing options was negative (ie: harm advantaged group's chances), and the inequality-enhancing policies was positive (ie: benefit advantaged group's chances).

Study 2 - Using the same basic design as Study 1a, this study included a comparison of two ingroups - eg: "According to a 2019 report, while White homebuyers in a neighbourhood received an average of $273,000 in mortgage loans from banks, comparable White homebuyers in the same neighbourhood received an average of $249,000 in mortgage loans. There was no available explanation for this gap" (p14).

The "equality-enhancing policy" condition proposed gains to the disadvantaged White group - eg: "Several banks propose increasing mortgage loans by an average of $24,000 to the group of White homebuyers who tend to receive less and not changing the total amount of mortgage loan funding to the other White homebuyers. Ultimately, these banks predict that this proposal will erase the gap in mortgage loans between these homebuyers over the next year" (p14). The participants were 387 White US men.

Brown et al (2022) explained that "participants perceive policies that make everyone more equal as unharmful when the definition of 'everyone' is restricted to people like them" (p5).

Study 3 - Three hundred and ninety-three White US adults were presented with an equality-enhancing policy

that explicitly benefitted or cost the whole of society after reading vignettes from Study 1a. The former example: Several banks propose increasing the total amount of mortgage loans to Latino homebuyers by $7.3 billion and not changing the total amount of mortgage loan funding to White homebuyers. Ultimately, these banks predict that this proposal will narrow the gap in mortgage loans between Latino and White homebuyers over the next year. These banks stated that this policy will have the additional effect of stimulating greater mortgage investment nationwide, increasing the total benefits for homebuyers of all racial groups" (p14). The word was changed to: "These banks stated that this policy will have the additional effect of reducing mortgage investment nationwide, decreasing the total benefits for homebuyers of all racial groups" (p14), in the cost condition.

Study 4 - Similar to Study 1a, but this study linked the equality-enhancing policy to unlimited resources (eg: banks will "fund mortgage loans for as many people as they want"; p14) or limited resources (eg: banks will "need to reorganise their budgets to fund these mortgage loans"; p14). The participants were 393 White US adults. The misperception that the equality-enhancing policy would be harmful to White individuals persisted even when unlimited resources were emphasised.

Study 5 - Three hundred and ninety-nine White US participants saw materials from Study 1a, and an equality-enhancing policy that explicitly harmed the ingroup or not. For example, the former included the wording that "the proposal will cause some White applicants to not receive funding" (p15). Even when the ingroup would not be harmed by the equality-enhancing policy, the negative perceptions of the policy remained.

Study 6 - The previous studies were online experiments, but this study involved a real life situation. It was a short longitudinal study in October and November 2020 with California residents before a vote on "Proposition 16": "Allows Diversity as a Factor in Public Employment, Education, and Contracting Decisions, Legislative Constitutional Amendment. Permits government decision-making policies to consider race, sex, colour, ethnicity, or national origin to address

diversity by repealing constitutional provision prohibiting such policies. Fiscal Impact: No direct impact on state and local entities. The effects of the measure depend on the future choices of state and local government entities and are highly uncertain" (Ballot paper quoted in Brown et al 2022).

The perceived consequences for non-under-represented groups were measured among White and Asian American voters (n = 821 at Time 1 and 648 at Time 2). Perception of equality as having negative consequences for the advantaged group was associated with intention to vote "no" in ballot.

Study 7 - This online experiment with 496 US adults appeared to assign them to two teams - "the Rattlers" and "the Eagles" - based on a personality test. In fact, all participants were assigned to the Rattlers (ingroup). A series of problem-solving games were played with rewards for both teams (apparently), and the Rattlers won most (ie: received bonuses). This created a situation of advantage for the Rattlers, and then the researchers proposed a redistribution scheme based on two independent conditions - "win-win" or "lose-lose". In the former condition, participants were told: "We are implementing a new procedure to allocate bonuses more equally across the groups. With this change, we will provide 50 additional bonuses to Eagles and only 5 more bonuses to Rattlers" (p15). In the lose-lose condition, the researchers said: "We are implementing a new procedure to allocate more bonuses to whichever group previously received more bonuses. With this change, we will provide 50 fewer bonuses to Eagles and only 5 fewer bonuses to Rattlers" (p15). Attitudes towards the new bonus scheme were measured.

The win-win option was perceived as more harmful to "Rattlers" than the lose-lose option (mean: -1 vs +0.7).

Study 8 - This was a replication of the previous study with 492 US adults, but with a consultation variable. Participants were told that they could vote on two policies ("joint policy condition") or one bonus policy ("single policy condition"). In the joint policy condition, the participants were told: "After teams complete the tasks each week, we randomly select participants to receive a bonus for their efforts. In previous weeks, Rattlers have been selected to receive bonuses more often than Eagles. We are considering

implementing a new procedure to allocate bonuses more equally across the groups. We are considering two options: Option A is to provide 50 additional bonuses to Eagles and not change the number of bonuses to Rattlers. Option B is to provide 50 fewer bonuses to Rattlers and not change the number of bonuses to Eagles" (p16). The single policy condition involved only option A.

In the joint policy condition, there was greater support for option A than B, but participants still perceived equality as harmful to Rattlers interests.

Brown et al (2022) concluded overall: "The misperception that equality is harmful is stubbornly persistent, resisting both reason and incentivisation. Specifically, this misperception prevails when resource scarcity concerns are addressed by framing resources as unlimited (study 4) or when participants are directly informed that equality-enhancing policies would not limit the advantaged groups' access to resources (study 5). The irrationality of this misperception is underscored by the fact that it persists when participants are encouraged to think more deliberatively about policies by jointly presenting truly unharmful and harmful equality-enhancing policies side by side (study 8). Perhaps, then, it is no surprise that participants continue to misperceive equality as harmful even when it financially benefits them (study 7). These grim results suggest that perceiving equality as harmful to advantaged groups is a powerful heuristic" (p12).

"Vladimir's choice" (Sidanius et al 2007) is a variation of the findings of these studies - namely that "people will choose to receive fewer resources if that choice secures their group's relative advantage over an outgroup" (Brown et al 2022 p1). So, in summary, Brown et al (2022) argued that "people fundamentally misperceive losses of relative advantage as losses in absolute terms" (p1).

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12. ENVIRONMENTAL MISCELLANY

12.1. ENVIRONMENTAL INEQUALITY

Countries with more inequality have more air and water pollution, and less access to clean drinking water and sanitation facilities for all, as well as higher rates of species classified as threatened by the "International Union for Conservation of Nature" and species loss (Boyce 2022).

More that that, the negatives are concentrated in the poorer communities. For example, higher air concentrations of particulate matter and nitrogen oxides are found in poorer neighbourhoods in countries including England, the Netherlands, and India (Boyce 2022). While a classic study found that hazardous waste sites in Houston, Texas, were mainly located in areas of the city termed "Black neighbourhoods" (ie: predominantly African American residents) (Bullard 1983).

Tessum et al (2021) found that fourteen groups of emission sources of air pollution disproportionately impacted non-Whites in the USA, though PM2.5 particles (2.5 microns or smaller particulate matter). The researchers analysed 2014 data from the Environment Protection Agency's National Emissions Inventory covering more than 5400 types of pollution sources (grouped into fourteen types of emitters - eg: road dust, heavy-duty diesel vehicles, residential wood combustion, industry). Computer modelling was used to calculate the average concentrations of fine-particulate matter at the level of a neighbourhood block (Lloyd 2022).

12.2. HEAT

"More frequent global extreme heat events prompt behavioural adaptations, such as reducing outdoor activities to relieve potential distress" (Zhang et al 2025 p170). An example of such a behaviour is the use of food delivery services in cities.

Zhang et al (2025) analysed food delivery service data in 100 Chinese cities between 2017 and 2023 based on outdoor temperature. Lunchtime orders increased by over 10% when the temperature was 20-34 °C, and by over 20%

when 40 °C temperature compared to the average.

The increase was pronounced for female, high-income, and older individuals, while delivery riders suffered the burden of the heat. This is a social equity issue.

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13. EVOLUTIONARY MEDICINE AND HEALTH DISPARITIES

13.1. INTRODUCTION

Using the US "Centers for Disease Control's" 2017 definition of health disparities as "preventable differences in the burden of disease, injury, violence, or opportunities to achieve optimal health that are experienced by socially disadvantaged populations", Ogbunugafor and Jackson (2023) described these disparities as an "information science" - ie: "human experiences, culture and evolutionary and ecological forces are all critical dimensions to understanding how disparities arise and persist" (p126).

Taking an evolutionary medicine approach, Ogbunugafor and Jackson (2023) outlined three drivers of health disparities:

i) Genetic variation - ie: this "does not resemble genes 'for' any disparity, but rather, an important dimension that can play a role in how disease phenotype manifest" (Ogbunugafor and Jackson 2023 pp126-127).

ii) Evolutionary history - ie: "the complicated historical experience of Homo sapiens that has left signatures in genomes and contributes to how disease manifests" (Ogbunugafor and Jackson 2023 p127).

iii) Socio-ecological context - All factors that are not covered by the above categories (eg: social; environmental).

Ogbunugafor and Jackson (2023) summed up that "it is neither evolution alone nor any single kind of information that makes sense of these inequalities" (p128).

13.2. RACISM AND HEALTH INEQUITIES

Henry et al (2023) began by admitting that "the field of evolutionary medicine has not adequately addressed why some groups of people are consistently sicker than others" (p113). These researchers concentrated specifically on racial discrimination and health inequities. They applied an evolutionary explanation known as "niche construction theory". Put very simply, "individuals are not the only active constructors of their environment, but share environments actively constructed by others" (Henry et al 2023 p116).

The theory includes the idea of "niche exclusion", "whereby resource holders (attained by luck, 'first-come' status, inheritance or force) secure a dominance advantage by displacing and subordinating others, reducing competition over optimal or favoured resources. Niche exclusion requires means to secure, sequester and defend high-value resource patches, while diminishing the capacity of others to safely obtain them. Racism facilitates this subordination, as efficiency and effectiveness feedbacks from discriminatory cultural innovations (eg: ready social cues, biased institutions and technologies) in the segregated niche benefit dominant groups, reifying constructions of 'race' as barriers to resource acquisition" (Henry et al 2023 p116).

An "ecology of fear" is another idea, where the mere presence of a predator influences the behaviour of prey (and their fitness/health). Racism can be viewed as "a persistent 'ecology of fear'" (Henry et al 2023 p116).

Throughout their analysis, Henry et al (2023) emphasised the socially constructed nature of "race". They stated: "Evidence that humans do not have biological races has been written extensively. Geographically based biological variation does exist within our species, and some of that variation is relevant to potential differences in disease prevalence between human groups around the world. In addition to this biological variation, some cultures have devised socially defined races, resulting in artificial (but socially realised) 'races' delineated via a shifting hodge-podge of criteria including physical and cultural traits, such as skin colour, religion and language. Similar socially defined classifications facilitate other forms of sub-group discrimination (eg: caste, colourism, ethnicity), and share origins in stratified socio-political hierarchies" (Henry et al 2023 p113). It goes without saying that "race" as a social construct has no less impact on health

differences.

"Evolutionary mismatch" is also relevant to Henry et al's (2023) analysis. They explained: "Humans live in environments that differ drastically from those in which our shared African ancestors evolved. This discordance between evolved phenotypes and novel ecologies we now experience is of central interest to evolutionary medicine, as biological and behavioural mismatches can result in poor health and disease. Similar to adverse alterations in diet, activity, pathogens and microbiota, racism and racially stratified hierarchies are a consequential evolutionary mismatch for human health. From a medical view, evolutionary mismatch is typically concerned with biological traits, but expansion to examine mismatches of social traits is necessary, as culture and behaviour are likewise rooted in evolutionary processes of our species' history, with the potential consequences for well-being" (Henry et al 2023 p114).

13.3. BREAST CANCER RISK

Adverse events in early life, like abuse and neglect, parental loss or divorce, and poverty, particularly experienced as multiple events, can increase the risk for poor health outcomes in later life. Boddy et al (2022) concentrated on the case of breast cancer risk.

Data were taken from Utah in the USA, specifically the "Utah Population Database" (UPDB), and the "Utah Cancer Registry" (UCR). The UPDB contains data on over eleven million individuals from the late 18th century onwards, while the UCR was started in 1966. The researchers developed a "cumulative adversity score" (CAS) using six socio-demographic variables - parent's age at time of birth (eg: teenage mother), family socio-economic status (SES) during childhood, death of mother, father, and/or sibling during childhood (ie: before ten years old), and number of siblings. The reproductive history of the individual was a variable also measured - ie: age at first birth (AFB), and number of children.

In total, 24 957 women were identified with breast cancer diagnosis and they were matched with 124 785 controls. Full data were available on 14 859 cases and 72 022 controls born between 1910 and 1970.

A higher CAS was associated with earlier AFB, but not higher breast cancer risk. Women with later AFB (ie: 24 years or older) and less children (ie: one) were in the highest risk category for breast cancer.

Evolutionary medicine makes use of principles from

evolutionary theory, like life history theory (eg: Stearns 1989). "Life history theory postulates that organisms encounter trade-offs between the allocation of resources toward reproduction and survival. Environmental conditions affect both selection for life history strategies (eg: timing of first birth) and calibration of life history strategies to meet the challenges and demands of the environment. Applying these life history principles to human health, individuals that experience adverse conditions early in life may shift investment into reproduction over somatic maintenance" (Boddy et al 2022 p430).

The study supported life history theory in that a higher CAS was associated with earlier AFB. But earlier AFB indirectly protected against breast cancer.

An alternative evolutionary explanation for breast cancer could be "evolutionary mismatch" (Boddy et al 2022).

13.4. SEX RATIO AT BIRTH

The average sex ratio at birth (SRB) globally today is 107 males to 100 females (Marphatia et al 2022). In a review, West and Grech (2020) identified ten factors influencing SRB. including biological ones like maternal stress at conception, and environmental/social ones, like pre-birth information on sex of child and abortion of female foetuses.

From an evolutionary point of view, mothers could maximise their evolutionary fitness by producing sons in good environmental conditions and daughters in poor conditions. This idea is based on the "Trivers-Willard hypothesis" (Trivers and Willard 1973), and the "frail male hypothesis" (Marphatia et al 2022). The environmental conditions during conception and pregnancy are key.

Marphatia et al (2022) investigated the SRB with data from the "Low Birth Weight South Asia Trial" (LBWSAT) in rural lowland Nepal. This trial was investigating the impact of interventions during pregnancy, like maternal food supplementation and unconditional cash transfers, on birth weight and early growth of the child. Full data on 12 495 women were analysed. The SRB was calculated at 112 males to 100 females.

There was support for the idea that girls will be produced in adverse conditions. The following characteristics of the mothers were associated with

giving birth to girls - being uneducated, poorer, marrying earlier, and physically shorter.

Applying the findings to inequality, it meant that "girls start life facing composite disadvantages" as they were more likely to be born into poverty than boys (Marphatia et al 2022 p339).

13.5. COVID-19

"One Health" is an approach that sees "the interconnections between the health of humans, non-human animals, and the environment" (Solis and Nunn 2021 p71). Solis and Nunn (2021) expanded this approach as "aspects of the social environment can help to explain variation in health disparities for zoonotic diseases, such as covid-19" (p71). This, the researchers called, a "One Health Disparities" approach.

The transmission of pathogens between animals and health is key in the One Health approach, while the One Health Disparities approach asks: "which individuals are most likely to be exposed to a new zoonotic infectious disease, and what are the social drivers of exposure?" (Solis and Nunn 2021 p71). For example, Li et al (2019) found that individuals in close contact with animals in China had coronavirus infection, and low socio-economic status (SES) was associated with more exposure (Solis and Nunn 2021).

Next, there is human-to-human transmission, which is also influenced by low SES (eg: jobs that do not allow working from home and require physical contact with people). This is exposure to disease, while susceptibility, and disease expression are the other key components (Solis and Nunn 2021).

Disparities in susceptibility (ie: "the probability of becoming infected following exposure to SARS-CoV-2"; Solis and Nunn 2021 p72) can be linked to genetic differences (eg: in angiotensin-converting enzyme-2 (ACE-2)) [11], and in social environments. "For example, lower income and less social integration lead to an increase in chronic diseases, such as liver and kidney disease, diabetes, heart disease, asthma, and stroke, which may also increase susceptibility to SARS-CoV-2" (Solis and Nunn 2021 p73).

Disease expression is the severity of the symptoms when infected. "Chronic lung diseases, such as chronic obstructive pulmonary disease (COPD), asthma, pulmonary

[11] Non-human primates (ie: close evolutionary relatives) appear to be susceptible to SARS-CoV-2 via ACE-2 receptors (Solis and Nunn 2021).

fibrosis, and lung cancer, appear to increase the severity of covid-19. A variety of environmental and social factors can lead to health disparities in these chronic lung diseases. Air pollution impacts 90% of the global population living in urban environments and can lead to an increase in COPD, lung cancer, asthma, and respiratory infections" (Solis and Nunn 2021 p73). Obesity, diabetes, and vitamin D deficiency also increase the severity of symptoms, and these diseases are associated with low SES. Access to healthcare is another factor and this can vary with income.

13.6. DISRUPTED SLEEP

Despite the benefits of sleep, individuals are vulnerable during this period, and behavioural strategies have evolved to offset the risk. For example, birds briefly opening their eyes periodically during sleep to scan for predators in the vicinity. Sleeping in groups reduces the risk as does the evolution of different types of sleep and levels of wakefulness/awareness (McKinnon et al 2023).

"The sentinel hypothesis [eg: Snyder 1966] proposes that the combination of sleeping asynchronously in groups coupled with brief, passive periods of awakening around rapid-eye movement (REM) sleep staging allow for environmental scans within a socially protected sleep site which maximises the balance between sleep continuity and alertness for danger. Alternation between NREM and REM sleep in human sleep cycles is proposed to serve a protective function, in which consecutive time in high arousal threshold sleep (ie: 'deep sleep') is short, thereby minimising time that danger can approach undetected" (McKinnon et al 2023 p54). Early human groups would also literally have sentinels during the night.

The need to be so vigilant during the night is less of a concern for modern humans living inside buildings. So there is a mismatch between evolution and the modern environment.

McKinnon et al (2023) investigated sleep disturbances as a product of sentinel behaviour with data from nearly 2000 individuals in four samples:

i) Hadza hunter-gatherers in Tanzania (originally reported in Samson et al 2017a).

ii) Malagasy rural community in Madagascar (Samson et al 2017b).

iii) Non-Hispanic Whites in the "Midlife in the United States" (MIDUS) longitudinal study.

iv) "Hispanic Community Health Study/Study of Latinos" (HCHS/SOL) in the USA.

Sleep was measured by actigraphy, which produced data on sleep times, wake times, night-time wakings, and naps. "Wake after sleep onset" (WASO) was a key measure which describes wakings during the night. Fear of danger was self-reported by participants.

WASO was higher in the two non-industrial groups (Hadza and Malagasy) where there was a potential risk during the night. In the two industrial society groups, WASO was higher in the HCHS/SOL sample, and it was significantly associated with perception of neighbourhood violence. Note that this was not direct danger to the individual themselves, but the perception of danger in their neighbourhood as a whole. McKinnon et al (2023) concluded: "Consistent with principles central to evolutionary medicine, we propose that evolved mechanisms to increase vigilance during sleep may now be mismatched with relatively safer environments, and in part responsible for driving poor sleep health" (p53).

The findings also fitted with the "smoke detector principle", which suggests that "defence mechanisms that cost less than the potential threat they protect against will often trigger false alarms. In other words, the fitness costs of brief sleep disruptions would have been less than even a small risk of predation in our evolutionary history. From a fitness perspective, over-reactions in the awakening response to potential danger would have likely been favourable to under-reacting and sustaining serious injury or death" (McKinnon et al 2023 p63).

The researchers did not control for sleeping conditions (eg: sleeping alone), nor for "a complex interaction of different types of night-time disturbances, including noise from animals, other people, children crying, co-sleeping, breastfeeding and childcare responsibilities, sexual activity, or other factors that are unrelated to vigilance mechanisms" (McKinnon et al 2023 pp63-64).

13.7. ADOLESCENT GROWTH

Burris et al (2022) investigated adolescents' growth in El Alto, Bolivia, an area in the Andes undergoing

rapid change. Adolescence is "the only time besides infancy when the growth rate accelerates, potentially affording an opportunity for catch-up growth that may compensate for growth faltering from harshness experienced in earlier life. In addition, the tempo and magnitude of adolescent weight gain may be a bellwether for adult obesity, itself a risk factor for several chronic diseases" (Burris et al 2022 p410). Data were collected in 2003 from 101 11-15 year-olds, and they were compared to studies of similar groups (eg: living at altitude; rural/semi-urban; in Bolivia).

In summary, "Andean adolescents exhibited elevated rates of stunting; their height varied with socio-economic status within and between high-altitude communities. Unlike some lowland populations, the prevalence of overweight/obesity was not elevated" (Burris et al 2022 p410). Female height was particularly associated with household SES.

This study showed that the variation in human growth was related more to social factors than as an consequence of adaptive mechanisms, specifically to living in high altitude conditions.

Burris et al (2022) explained the theory: "Rather than necessarily being predetermined, evolved biological responses to both social and ecological challenges are often characterised by contingent trade-offs in the pace and magnitude of growth and reproduction. When challenges are few and resources are abundant, an individual can potentially grow to a larger size, better fend off disease, and have a relatively greater number of healthy offspring. But when resources are inadequate, individuals and their children are, metaphorically, making the best of a bad situation, trading off growth, reproduction, and health against each other. Faced with scarcity, the evolutionarily adaptive response may well not result in the healthiest state for the individual or their children" (p412).

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14. COVID-19 POLICING IN VICTORIA

"Pandemic policing" refers to law enforcement measures related to breaches of public health orders introduced during covid-19, like "on-the-spot" fines for breaking stay-at-home/lockdown rules. "The expansion of policing powers during the pandemic produced various direct and indirect adverse impacts with significant collateral damage for vulnerable and disadvantaged populations" (Walker et al 2025 p2).

For example, penalty notices in the USA for physical distancing breaches were more likely to be issued to Black and Latina individuals (eg: Leal et al 2025). As well as ethnic minorities and Indigenous individuals, sex workers, and people who use drugs were more likely to experience interactions with the police related to public health orders (Walker et al 2025).

Walker et al (2025) concentrated on the last group in their study in the state of Victoria, Australia. In the main city, Melbourne, there were six lockdown periods between March 2020 and October 2021, and the police had the authority to issue fines for failing to wear a facemask in public spaces, and for breaching stay-at-home orders, for instance.

The researchers included both quantitative and qualitative data. The former came from the "Melbourne Injecting Drug User Cohort Study" (SuperMIX) (covering over 1300 individuals since 2008), and the "Understanding Methamphetamine Use in Victoria Study" (VMAX) (with over 850 adults since 2016). The qualitative data were collected via in-depth interviews (mostly by mobile phone or video-call) with 38 SuperMIX and 38 VMAX participants between August 2021 and April 2022, and thirteen telephone interviews in January 2024.

Around 11% (n = 125) of the SuperMIX and VMAX respondents reported at least one interaction with the police during the study period. The most common reason was breaching night-time curfew.

One-third of the in-depth interviewees (n = 28) had interactions with the police and four themes emerged from the qualitative data analysed:

i) "Increased police presence in the 'hoods'" - eg: "Jen" described the situation: "During covid it was full on, with coppers everywhere. Personally, I think it was a quota thing, like they're trying to get their numbers up, especially in the high rises and certain spots in the street. But I think once you've had a bit of a hard time from the coppers, you always do worry that you'll be more

singled out. But yeah, the police, the presence in this area was through the roof. Heaps of people were getting arrested, but just for the littlest things. Like for example I got pulled over for shoplifting... like it was for chocolate, and made a really big thing of, and I got a fine. In the past that wouldn't have happened. But if they know you've done time and you're in the drug scene you're targeted, but especially through covid. Like I said, the police presence, it was like... we were more watched" (p6).

ii) "Healthcare rights denied" - "Many participants were required to travel outside restricted travel zones and curfews to access drug treatment and harm reduction services during the pandemic. Some who were approached by police at these times described experiencing a lack of care and concern for their health and well-being" (Walker et al 2025 p7).

iii) "Yeah... we're targeted!" - Most interviewees had a history of police contact, and they believed that meant being targeted, as "Ben" explained: "You couldn't go out after 12 o'clock... a pandemic thing in lockdown. They'd stopped it, and then it was back in, but I didn't know. It was half an hour past 12 o'clock. I was out with my mates. We got pulled over and they said, 'Oh, the law's come back in. You've got to be in for 12'. I was, like, 'What?' I said, 'It's only half past 12, mate [and] we're going home'. They charged the five of us $1,350 each. To be honest, I felt dumbfounded. Yeah, in a way I felt, like targeted. I felt like I was picked on" (p7).

iv) "Covid-19 fines, arrests and prison" - eg: lacking the money to pay fines led to prison for two participants.

Combining the data, Walker et al (2025) explained how the "findings match those of other studies [eg: Boon-Kuo et al 2021] that point to how existing public order policing towards the 'usual suspects' was intensified during the pandemic" (p9). Specifically, "people who use drugs are more susceptible to heightened police scrutiny, surveillance, interference and harassment, because of their visibility in areas where drugs are often purchased and used" (Walker et al 2025 p9).

It was not possible to compare the experiences of the participants here to those of the general population as accurate data on covid-19 fines in Victoria were not publicly available. But Walker et al (2025) tried, saying

that "based on crude estimates, findings suggest our study participants were fined at a rate almost three times (38/1130; 2.9%) higher than that of the general community (1%) given approximately 50,000 covid-19 fines were administered in the state of Victoria... in a population of approximately 5 million adults" (p9).

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