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

A complete listing of his writings at http://psychologywritings.synthasite.com/.

CONTENTS

1. ONLINE INFIDELITY

1.1. UNEXPECTED SIDE OF THE INTERNET

One of the most unexpected uses of the Internet from the standpoint of the beginning of the 21st century was online relationships (Griffiths 2000), or what Young et al (2000) called "cyberaffairs". These are romantic or sexual relationships initiated and maintained online, which eventually become face-to-face encounters (Griffiths 2000) [1] [2].

The disinhibiting and anonymous nature of the Internet is important here. Put simply, individuals open up quicker online than offline (appendix 1A).

Focusing on "online infidelity" (or "virtual adultery"), Cooper (1998) proposed the "Triple A Engine" (access, affordability and anonymity) model, and Young (1999 quoted in Griffiths 2000) the "ACE Model" (anonymity, convenience, escape).

Both models outlined aspects of the Internet that make online relationships easier generally, and specifically online fidelity (Griffiths 2000):

- Access - ease of access of the Internet and many potential partners.
- Affordability - relative cheapness of Internet access.
- Anonymity - this encourages individuals to "take a chance" without fear of "being caught".
- Convenience - Internet access from home or familiar environments where individuals feel comfortable.
- Escape - A "high" from the pleasure of the online encounter and escape from everyday stresses [3].

Mileham (2007) concentrated on Internet chat room

[1] Some researchers include viewing Internet pornography as "online infidelity" (Mileham 2007).
[2] One study, for example, reported that over one-fifth of their sample divorced or separated as a result of online infidelity (Schneider 2000).
[3] Positive relationships are highly beneficial (appendix 1B).

contacts, and though these may not go beyond online interactions, the "categorisation as 'infidelity' is... grounded in the fact that most spouses feel as - or nearly as - betrayed, angry, and hurt by online infidelity as they would if skin-to-skin adultery had taken place" (p13).

Mileham (2007) interviewed 76 US men and ten women, who were recruited via chat rooms like "Married and Flirting". The age range was 25 to 66 with forty-two years old as the average. The online interviews lasted between one to three hours.

Analysis of the interviews produced three themes:

i) "Anonymous sexual interactionism" - The chat rooms and their anonymity allowed individuals to "'join the dating scene' while holding on to their family lives" (Mileham 2007 p16).

For example, one male interviewee said: "Well, I think it's the complete freedom to explore and yet be safe – that is what gets me. I am married and never never cheat. Yet this is an outlet to be younger and have fun, like reading a book or watching a porn movie. I truly enjoy making a woman feel good for at least an hour – just write and flirt – and if you enjoy, that is my bonus" (p16).

Another male interviewee emphasised the fantasy aspect: "[The chat room] gives us married people a fun way to flirt and feel desirable... The fantasy is always better than the reality" (p19).

ii) "Behavioural rationalisation" - The vast majority of interviewees "rationalised their chat room behaviours in a particular uniform way: since there is no physical contact, online-only liaisons are not a form of infidelity" (Mileham 2007 p20).

For example, one man said: "Cheating? No. It's more fantasy; it's not a relationship; it's not straight sex; it's more kinky... what people think they want, but don't get. You express it and suddenly it's more mainstream... not kinky anymore; the guilt of fantasies is gone" (p21).

Among the minority who accepted that their chat room interactions were infidelity, rationalisations like "helping the marriage", "relieving sexual tensions", and non-specific benefits to the spouse later were used.

iii) "Effortless avoidance" - Chat rooms offered the opportunity to avoid dealing with problems in the marriage (eg: lack of sex).

For example, one man said: "My wife is my best friend, my lover, my partner, and probably the most amazing woman I have ever known. I know your next question is then why are you in a chat room. I will answer that also. I am bored, we live during the week about three hours apart and she only comes in on the

weekends. I just plain get bored with painting, reading, and all other distractions, and so I jumped online. As a male, you like to hear someone that does not know you from Adam tell you that you make them hot just by talking to them online. You are a non-entity online yet you are also King Kong" (p26).

A few years later and the term "online infidelity-related (IR) behaviours" (eg: attracting other partners; engaging in "cybersex") is being used (McDaniel et al 2017) [4].

Research in recent years has shown that Facebook usage is associated with negative relationship outcomes (eg: cheating; break-up), but only in relationships of three years or less, and where there is conflict over Facebook usage (Clayton et al 2013). Likewise for Twitter, except that relationship length not important (Clayton 2014), and posting pictures on Instagram (Ridgway and Clayton 2016).

Couples are clear about what constitutes online IR behaviours - eg: flirting online; revealing certain personal details; cybersex; friending ex-partner; posting an inaccurate relationship status (McDaniel et al 2017).

McDaniel et al (2017) examined social media IR behaviours as part of the "Daily Family Life Project" in the USA. This study analysed data from 338 individuals (173 wives and 165 husbands) from 176 families with children.

The Social Media Infidelity-Related Behaviours (SMIRB) scale was created with seven items rated on a six-point scale - eg: "I would feel uncomfortable if my spouse/partner read my chats, comments, and messages to others on social networking sites"; "I sometimes hide the things I say to others online from my spouse/partner". A higher score signified a greater tendency to engage in online IR behaviours. Other measures were taken of relationship satisfaction, for instance.

Only around 10% of participants admitted in engaging in social media IR behaviours. However, McDaniel et al (2017) noted that couples' "willingness to participate in this study may be reflective of a greater level of openness and commitment than a couple who would not choose to participate in such a study, and the study's duration and intensity may have lessened the likelihood that people would admit to IR behaviours in self-reports (eg: social desirability). Therefore, our prevalence statistics likely represent a conservative estimate of these types of behaviours within married/cohabiting couples".

A higher SMIRB score was significantly related to

[4] Meeting someone special can seem improbable (appendix 1C).

lower relationship satisfaction, and higher ambivalence about the relationship. This is similar to offline IR behaviours (McDaniel et al 2017).

1.2. VICTIMS

Cravens et al (2013) focused on Facebook (FB) infidelity behaviours and their impact on the non-participating partner (victim). The data were collected via a Facebook page called "Cheating Stories", which provided a total of 90 stories and comments.

The experience of the non-participating partner was divided into a series of stages:

i) Warning Signs - "observable behaviours consisting of verbal or non-verbal cues that indicated the possibility of infidelity" (Cravens et al 2013 p80).

One husband reported: "her time on FB became more and more frequent" (p81), while another said: "For years we were able to log into each other's email accounts. Now she's changed the passwords and has also put a password on her phone" (p81).

ii) Discovery - "the point or event in which the infidelity behaviour was realised. Discovery sometimes occurred accidentally, before any investigation was conducted and perhaps before any warning signs had been observed. 'I accidently stumbled across his messages on Facebook and I found out he had been conversating [sic] with a woman in Michigan telling her ''good morning gorgeous, goodnight gorgeous, hope to talk to you soon'' and giving her his cell number'" (Cravens et al 2013 pp81-82).

iii) Investigation - Gathering "SOLID evidence" (as one husband wrote) before confronting the partner.

iv) Boundary/Damage Appraisal - "is the infidelity behaviour beyond the boundaries that the non-participating partner has for the relationship, or was this a one-time indiscretion that can be overlooked?" (Cravens et al 2013 p82).

For example, one woman wrote: "I know he won't do anything physically but it is the emotional side that hurts. Is it my fault? I don’t know the answer – to me it is cheating whatever way you look at it. He lies to my face. Maybe I should just leave????" (p82).

v) Act on the Appraisal - eg: confront, avoid, retaliate, or confront other parties involved. For example, in the latter case, one wife said: "I sent a message to her husband and told him to check what his wife was up to... I'm being cyber cheated on so is he -

he should know" (p84).

vi) Relationship Decision - "Some chose to stay together; others immediately ended the relationship, such as this participant: 'The next day I threw him out and never looked back as I knew I would never trust him ever'. Some people were willing to stay together and work on the relationship, but their partners were not, as described here: 'I offered marriage counselling, church, even to move out and pay for the apartment just so we could [have] time to figure all this out, but she said no to all and any options I offered'. Other people struggled greatly with how to proceed and were unable to decide the future of their relationship" (Cravens et al 2013 p84).

Throughout these stages, the key emotions experienced were hurt, loss of trust, shock, and anger.

The Facebook page studied was set up independent of the researchers for the purpose of sharing stories. Cravens et al (2013) admitted: "Participants who posted their stories on this website had access to each of the pre-existing stories prior to composing and sharing their own stories. It is likely that some of the content on the website was influenced by previous content, which is similar to a limitation found in focus group methods" (pp88-89).

1.3. APPENDIX 1A - MALE INFIDELITY GENERALLY

Fisher et al (2012) reported a survey of the literature on male infidelity/unfaithfulness generally up to 2012.

a) How much?

Figures vary, but at the top end of estimates, around half of married men admitted to extra-marital sexual affairs in their lives.

Fisher et al (2012) commented: "Moreover, the rates of infidelity are likely to be underestimated, because many subjects refuse to disclose such private information. In fact, infidelity is a difficult subject to talk openly about because of the associated social stigma and its potentially harmful effects on individuals, primary relationships, and families" (p1509).

b) Who?

- Individuals who self-report no religious affiliation more than religious service attendees.

- Ethnicity unclear (in US studies).

- Large urban dwellers.

- National differences (eg: Denmark more permissive attitude).

- Relationships that are longer (eg: critical point at eighteen years of marriage; Liu 2000), and/or with greater conflict.

- High work-related stress.

Fisher et al (2012) commented: "In conclusion, it is important to emphasise that male affairs have to be considered as a multi-causal and multi-dimensional phenomenon, in which several predisposing or precipitating factors can be involved" (pp1513-1514).

c) Difference between stable and occasional extra-marital affairs - eg; stable (long-term) affairs associated with marital dissatisfaction/problems. But studies are often correlational, so "it is possible that the disruption of the primary relationship is the consequence, rather than the cause, of unfaithfulness" (Fisher et al 2012 p1514).

d) Consequences

- Psychological distress (eg: sense of guilt).

- Sudden coital death (eg: Parzeller et al 2006 [5]).

Fisher et al (2012) commented: "Extra-marital sex may be hazardous and stressful because the lover is often younger than the primary partner, and probably sex occurs more often following excessive drinking and/or eating. Of interest and concern is the possibility of an enhanced physiological response to coitus with an extra-marital partner. It is possible that a secret sexual encounter in an unfamiliar setting may significantly increase blood pressure and heart rate, leading to an increased myocardial oxygen demand. Moreover, the physiological response to coitus might trigger the fracture or erosion of a vulnerable pre-existing plaque, resulting in sudden death or non-fatal cardiovascular events. Finally, the feeling of guilt for the primary partner may contribute to inducing psychological distress, capable of affecting cardiovascular risk" (pp1514-1515).

[5] Of 31 691 autopsies between 1972 and 2004 at a university centre in Frankfurt, Germany, 68 (0.21% of total) were sudden natural deaths linked to sexual activity.

1.4. APPENDIX 1B - HAPPINESS AND RELATIONSHIPS

What is the connection between happiness and social relationships? They are "typically viewed as enhancing one another in a reciprocal and symmetrical fashion" (Quoidbach et al 2019 p1111). So, engaging in social relationships promotes happiness, as shown in diary and experience-sampling studies, for instance, while many researchers argue that "a central evolutionary purpose of happiness is to foster and strengthen bonds between people, increasing reproductive fitness" (Quoidbach et al 2019 p1111).

Quoidbach et al (2019) noted that research is divided concerning happiness and seeking social relationships. For example, in experiments that alter emotional states, happy-mood induction leads to greater social interaction, but so does unhappy-mood induction. In a classic experiment, Schachter (1959) told participants that they would receive electric shocks in a short while, and offered them the opportunity to wait alone or with others. Individuals told that painful shocks were imminent preferred to wait with others.

Quoidbach et al (2019) investigated whether happiness promoted social relationships with experience-sampling data from 30 793 French-speaking adults collected over thirty days via smartphone. Randomly they were contacted during the study, and completed a short questionnaire, which included a happiness rating (from 0 to 100), and who they were with at that moment. Participants could reject the questionnaire or delay for ten minutes.

The researchers summed up the findings: "We found that patterns of social interaction followed the hedonic-flexibility principle [6], whereby people tend to engage in happiness-enhancing social relationships when they feel bad and sustain happiness-decreasing periods of solitude and less pleasant types of social relationships that might promise long-term payoff when they feel good" (Quoidbach et al 2019 p1111).

So, for example, if an individual rated their mood at noon as unhappy (eg: score of 10 out of 100), they were nearly twice as likely to be with a friend at the next contact later in the afternoon than if their mood at noon was rated happy (eg: score of 90). On the other hand, a happy rating at noon was followed more often by contact with a stranger later than an unhappiness rating (Quoidbach et al 2019).

These data were correlational, so a third variable

[6] (Taquet et al 2016).

could not be ruled out in establishing causality, nor reverse causality - eg: "knowing that they have to engage with strangers in an hour, people may try to proactively bolster their mood beforehand" (Quoidbach et al 2019 p1120). The measures were relatively simple - a single scale for happiness, and a fixed choice of who they were with (10 categories).

It is worth noting that "whereas the present results suggest that the most positive interaction partners (ie: best friends) are more strongly associated with happiness increases than the most negative interaction partners (ie: strangers) are associated with happiness decreases, the relative balance of effect sizes between positive and negative interactions may substantially differ if more categories of interaction partners (eg: one's rival) are included. In addition, it would be important to examine whether individual and cultural differences exist in the extent to which different interaction partners make people happy and in the extent to which affective considerations relate to people's daily patterns of interaction" (Quoidbach et al 2019 p1120).

The use of smartphones allowed the collection of a large amount of data that could be analysed. The average number of contacts were four during the twelve hours of the day (ie: no measures at night).

The researchers used statistical analysis techniques to rule out alternative explanations for the data, including that happiness and social behaviour is a product of daily activities.

1.5. APPENDIX 1C - IMPROBABILITY PRINCIPLE

The "improbability principle" states that "given enough opportunities, we should expect a specified event to happen, no matter how unlikely it may be at each opportunity" (Hand 2014 p58). It is a way of accounting for what appears to be amazing coincidences.

For example, the "birthday problem" - how many people must be in a room before two of them share the same birthday? The answer is a minimum of 23 (Hand 2014). Technically, with that number of people in the room, the probability that two of them will share the same birthday is over 50%.

This is Hand's (2014) explanation: "So let's look at the probability that none of the 23 people in the room share the same birthday. For two people, the probability that the second person doesn't have the same birthday as the first is 364/365. Then the probability that those two are different and that a third doesn't share the same birthday as either of them is 364/365 × 363/365. Likewise, the probability that those three have different birthdays *and* that the fourth does not share the same birthday as any of those first three is 364/365 × 363/365

× 362/365. Continuing like this, the probability that none of the 23 people share the same birthday is 364/365 × 363/365 × 362/365 × 361/365... × 343/365. This equals 0.49. Because the probability that none of the 23 people share the same birthday is 0.49, the probability that some of them share the same birthday is just 1 – 0.49, or 0.51, which is greater than half" (p60).

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2. ANIMAL-ASSISTED THERAPIES - THREE DIFFERENT EXAMPLES

2.1. PETS

"Animal-facilitated therapy" or "animal-assisted therapy" appeared after World War I with guide dogs for blind veterans, and "comfort dogs" in psychiatric units (Bolman 2019).

Brooks et al (2019) studied pets as a therapy for severe mental illness in interviews with twelve individuals in the UK (eg: diagnosed with schizophrenia) who identified companion animals as part of their personal support networks.

The researchers highlighted the following themes from the semi-structured interviews:

i) "Pet relationships: a source of reliability, positivity and vibrancy in an uncertain world" - eg: "... I guess it's just kind of a friend... in a way, kind of like so if you're having a bad day you can just sit and chat to her and just sort of like stroke her and stuff and watch her being silly in her cage, because she was a doughnut [laughs]. Would fall off everything, instead of running in her wheel she was on top of her wheel... And it's just kind of like just little things like that, just like... all the silly little things that pets do and the stupid stuff that they do and... and just, and just making you laugh and stuff when you feel really rubbish, and just kind of giving you that little sense of... kind of life" (ID8, male, one hamster; pp328-329).

ii) "Trust, predictability and acceptance: human-animal interactions in the creation and sustainability of personal identity" - eg: "She's kind of there throughout the night as well when I was really bad at night, and when other people were asleep, she was there. And even if it was the middle of the day or she was asleep because obviously they're nocturnal, she was kind of there and I could wake her up, she was kind of there and I could just talk to her. And she was always kind of there whatever, and she wouldn't mind me talking to her, she wouldn't get annoyed" (ID8, male, one hamster; p329).

While a female two cat-owner said: "We come back to

unconditional love, support, non-judgementalism. I won't say it's relaxing, it... it's reassuring, it's supportive, and it gives you a boost" (ID3; p329).

iii) The devastation of loss of the companion animal - For all the positives of animal companions, the negative side of loss was reported by five interviewees, like ID7 (a male three-bird owner): "And it broke my heart when he died... And I thought, I've lost everything now" (p330).

2.2. CARE FARMS

In the UK over 250 "care farms" have emerged as a form of therapy for a variety of disorders, including autism, mental ill-health, and individuals in the criminal justice system (Gorman 2019). Hine et al (2008) described them as "the use of commercial farms and agricultural landscapes as a base for promoting mental and physical health through normal farming activity" (quoted in Gorman 2019). Activities vary between caring for farm animals, maintenance work on the farm, and "nature" work (eg: conservation; gardening) (Gorman 2019) (appendix 2A).

Gorman (2019) focused on the human-farm animal interactions, and the "often-troubling anthropocentrism of the ways in which interspecies therapeutic practices are framed and performed within care farms" (p314).

One view of care farms is humans as parasites who take "well-being" for themselves from the animal bodies. Referring to his ethnographic work on such farms, Gorman (2019) stated: "Animals are attempting to live their own animal lives. Their life practices are potentially in conflict with human conceptions and imaginations of 'therapeutic spaces'. Animals are both complicit in, and importantly, resistant to, the various therapeutic practices and spaces in which they are enmeshed. I frequently observed animals keeping their distance, disrupting therapeutic 'territorialisations' [Deleuze and Guattari 2008]" (p316). Yarwood and Evans (2000) talked of the "sanitisation of livestock" involving "presenting clean and docile animals with 'pet' names, catalysing and paralysing animals to make them suitable for human contact" (Gorman 2019 p316).

Focusing on human well-being takes away from the farm animals, as a care farm project co-ordinator, "Valerie", explained: "It is a fine balance between making sure that the visitors are getting our utmost care and they always are a priority, but you also have priority of welfare of animals as well [...] Yeah so there'll always be negative sides, and I think also, some days it is a real battle to get everything done, and we

think actually, I wish I could have cleaned those chickens out better, or, I wish I could have given them a bit more food that day, but we always do the best we can and like I said, the key thing is always to reach the visitors" (p317).

Gorman (2019) described a second view of the human-farm animal relationship as commensal - one party benefits (human) and the other is not harmed, but receives nothing. For example, the presence of animals helps in human flourishing, as described by farmer, "Dan": "there's something really satisfying that makes me feel really well hearing the cock crowing down there and knowing there's a bunch of chickens in the orchard" (p318).

Finally, there is mutualism, where both parties benefit from a relationship. For example, farmer "Lisa" said: "We can't get anything with the sheep, if you know, you can't have a sheep die of maggots or you can't have something lame for too long, so they do get a better care because they've got more people looking at them, and feeling responsible for them [...] they get better care coz there's more people looking at them" (p319).

Gorman (2019) admitted that the benefits to the animal are partial as they do live on farms. This is summed up "Valerie": "I think also because we're with the animals all the time, they are more used to people being around, which means that sort of catching them for slaughter, 'oh look, there's my friends, I'll just get in this trailer', it makes it less stressful for them, collecting eggs from the chickens as well [...] they're more used to us being in there, they're not frightened of us" (p319) [7].

2.3. TRAUMATISED PARROTS

In the USA, the West Los Angeles Veteran Affairs Medical Centre has developed an experimental programme which "encouraged military veterans to care for abandoned parrots as a form of emotional labour that might reacclimate former soldiers to civilian life and alleviate residual experiences of post-traumatic stress" (Bolman 2019 p305). Both the humans and parrots are "traumatised beings", and Bolman (2019) described the relationship as "becoming-well-together".

The parrots in the programme are abandoned pets, and Siebert (2016) described them as "twice-traumatised beings: denied first their natural will to flock and then

[7] The relationship with care farm animals is complex when considering that the therapeutic "co-workers" can get eaten (Evans and et al 2012).

the company of the humans who owned them" (quoted in Bolman 2019) [8]. This is "denaturalisation" and "isolation", which could be applied to human veterans (separated from communities and comrades as they join and leave the military, and the battlefield trauma inbetween) (Bolman 2019).

"More than 'therapy dogs', often purpose-trained for the needs of specific human beings, the parrots here face a similar if not equivalent form of traumatisation to the humans they operate alongside of; it is caring-with rather than merely caring-for" (Bolman 2019 p307).

This is similar to Haraway (2008), who referred to the relationship between scientists and non-human laboratory animals as "becoming-with" - "laboratory creatures (humans included) learn to co-exist and transform each other through their interactions" (Bolman 2019 p308) (appendix 2B).

2.4. APPENDIX 2A - TIME IN NATURE

"A growing body of epidemiological evidence indicates that greater exposure to, or 'contact with', natural environments (such as parks, woodlands and beaches) is associated with better health and well-being, at least among populations in high income, largely urbanised, societies" (White et al 2019 p1).

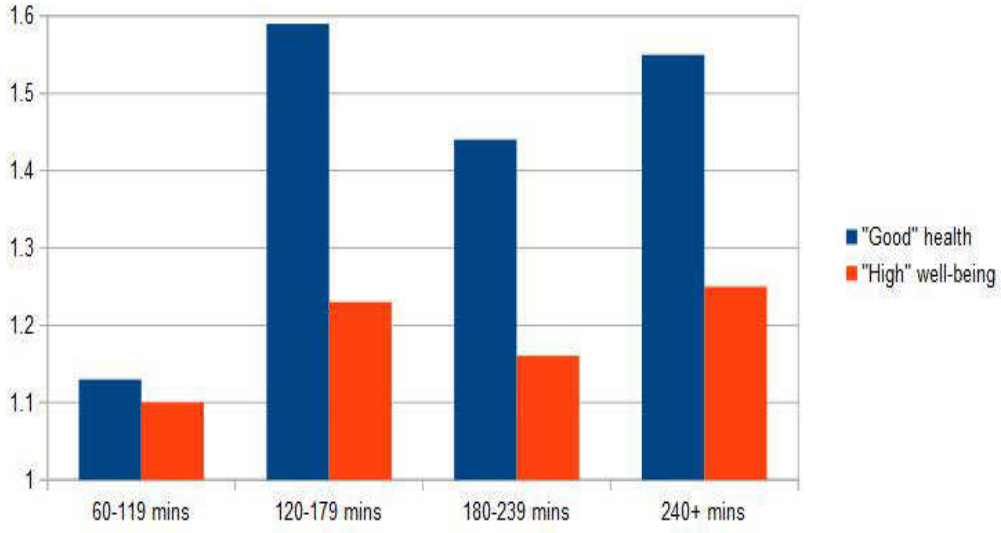
White et al (2019) furthered this work with an analysis of data from the Monitor of Engagement with the Natural Environment (MENE) survey. This survey is conducted in the UK on a weekly basis, and White et al (2019) focused on 20 264 adult respondents in 2014-15 and 2015-16 in England.

Health and subjective well-being were self-reported with items like "how is your health in general?" ("very bad", "bad", "fair", "good", and "very good"), and "overall how satisfied are you with life nowadays?" (0 "not at all" to 10 "completely"). Time spent in natural environments was recorded for the previous week (and excluded time in own garden). Control variables included neighbourhood greenspace, area deprivation, and air pollution (all scored from official sources).

Time spent in nature was coded in 60-minute categories, and health was dichotomised as "good" versus "poor" (around the 50th percentile), and well-being as "high" (top 60%) versus "low" (bottom 40%). Compared to 0 minutes per week in nature, all contact greater than 60 minutes was significantly associated with "good" health and "high" well-being. The relationship was strongest for

[8] Bolman (2019) noted: "New research suggests that parrots experience trauma or psychic pain from abandonment that may be analogical to human post-traumatic stress disorder (PTSD)" (p305).

120 minutes per week (figure 2.1) [9].



(Data from table 2 White et al 2019)

Figure 2.1 - Adjusted odds ratio for "good" health and "high" well-being (where 1 = 0 minutes time spent in nature per week).

The results held for demographic differences, like gender and age, but not for ethnicity. Individuals identifying as White British showed support for the general findings, but there was only a non-significant relationship for ethnic minorities.

Table 2.1 summarises the key strengths and weaknesses of this study.

[9] Cimprich and Ronis (2003) found that women diagnosed with breast cancer who spent 120 minutes per week in "natural restorative environments" scored higher on attention tasks than no exposure. "The authors argued that the 120 minutes per week of nature exposure helped the women restore cognitive resources depleted by the stress of their diagnoses and early treatment" (White et al 2019 p6).

STRENGTHS	WEAKNESSES
1. A representative sample of adults in England, collected by multi-stage sampling (areas chosen at random, then households within that area, and quotas within household). 2. Controlling relevant confounding variables. 3. Data collected by UK Government department with greater resources than individual researchers (ie: larger sample, and more frequent data collection). 4. Official data on neighbourhoods (eg: Index of Multiple Deprivation) based on 2001 Census. 5. Minutes per week in nature calculated by multiplying number of visits by duration.	1. Data were cross-sectional, and the researchers were "unable to rule out the possibility that the association is, at least in part, due to healthier, happier people spending more time in nature" (White et al 2019 p6). Causality needs to be established by prospective longitudinal studies. 2. Self-report measures. "For instance, self-reported duration is likely to be less accurate than measures obtained from geo-tracking individuals during specific visits, or over several days, and individuals may have been unsure about, or reluctant to discuss, certain issues which were included as covariates (eg: long standing illness /disability)" (White et al 2019 p6). 3. No details of "exposure quality". "Research considering the quality of the natural environment in terms of plant and/or animal species richness suggests that experiences may be better in more biodiverse settings. Contact with nature is more than just a complex multi-sensory experience, to varying degrees personal histories and meanings, longstanding cultural practices, and a sense of place play some role in the benefits realised, factors which may account for why we did not find the same pattern for health individuals not identifying as White British" (White et al 2019 p7). 4. Time in nature in previous week before questioning assumed to be typical of all weeks. 5. The researchers dependent on the questions asked as they had no involvement in survey design.

Table 2.1 - Key strengths and weaknesses of White et al (2019).

2.5. APPENDIX 2B - BIOMEDICAL ENTANGLEMENT

Animal models are central to much biomedical science. This means the laboratory non-human animal is "born, suffers, and dies for the life and health of human animals" (Friese and Latimer 2019 p121). Friese and Latimer (2019) continued: "Within the biomedical domain, laboratory animals are constituted as sacrifice-able

species that can stand for and represent human bodies and diseases... The use of animals as experimental models in biomedical research is justified by this distinction between species... — non-human animals can be modified, experimented on, and eventually killed in ways that humans can and should not be" (p121).

Yet, at the same time, animal models assume little distinction between species in order to make sense. Selective breeding and transgenics has "standardised" the laboratory animal to "better represent human bodies" (Friese and Latimer 2019). This has been called "human-animal entanglement" (Davies 2012).

Friese and Latimer (2019) reported on their ethnographic work in a life sciences research institute in the UK, which including shadowing animal technicians, where animal models included mice, yeast, worms, and cells derived from human blood. The focus was upon "how care is practiced".

Two issues emerged as important:

i) Pathogenic exchange - The exchange of "disease" between humans and laboratory animals. In relation to the animals, ventilated cages, and filtered air and water, as opposed to animal allergies among the staff. Biosecurity procedures (eg: special clothing and air shower on entering and leaving the animal housing sites) has "delimited physical contact across species [which]... shapes day-to-day experiences in producing bioscientific knowledge, isolating scientists from the animals that their research is based upon. The scientists are thus unable to engage in the kind of caring relations with their mice that at least some would like. This could be seen as a site of unintended dis-entanglement" (Friese and Latimer 2019 p126).

ii) Stress - the focus is usually on reducing stress for the laboratory animals, but Friese and Latimer (2019) observed the model organisms creating stressors for the researchers (eg: physically demanding work caring for animals and concern for the experiences of the mice).

Friese and Latimer (2019) emphasised entanglement "as a process that links humans and nonhumans in material ways and that has affective dimensions. The need to carefully control pathogenic exchanges between humans and mice shows the material entanglements of laboratory animals and their caregivers. But both model organisms and humans nonetheless continue to affect the health and well-being of one another: A young scientist expresses the stress of 'being married to the model'; the technician tells how affected she is by the stress and sickness of the mice she looks after; Balb C mice become stressed when handled too frequently; aged mice get cancer; worms are bleached to death" (p132). This

entanglement is "a crucial part of medical knowledge production" (Friese and Latimer 2019 p132).

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3. FEMALE-BASED KINSHIP

Female-based kinship (FBK), (ie: "family groups or structures oriented more strongly around related females than around related males"; p1) is common among mammals, but "comparatively rare" in humans (Mattison et al 2019). Why is this the case?

One answer is the "matrilineal puzzle", "which posits that matrilineal descent (effectively, a cultural and/or social emphasis on kinship relationships traced through the mother) may result in tension among men's allocation of authority between their natal and spousal kin" (Mattison et al 2019 p1).

Mattison et al (2019) were not satisfied with this explanation. Firstly, it is important to define the terms and concepts of kinship, particularly when making a comparison between humans and non-humans (table 3.1).

i) Lineage - patrilineal (based on male links), matrilineal (based on female links), or bilateral (both parents).

ii) Succession - the transfer of leadership or rank in status hierarchies from parent to offspring.

iii) Inheritance of resources ("silver spoon effect"; Mattison et al 2019) - Borgerhoff Mulder et al's (2019) study, for example, of fifteen human societies found no clear evidence of son preference over daughter preference (appendix 3A).

iv) Dispersal of adults - In non-humans, individuals move from their natal group to find a mate and/or avoid inbreeding, but among humans, mates are often found in the group before dispersal, and dispersal occurs for other reasons.

- Human post-marital residence - virilocal (or patrilocal) (reside with husband's family); uxorilocal (or matrilocal) (with wife's family); avunculocal (with husband's maternal uncle); ambilocal (with wife's or husband's kin); neolocal (couple reside away from kin).
- Human inheritance - primogeniture (eldest child); ultimogeniture (youngest child).
- Non-human philopatry - propensity to remain with natal group.

(Source: Mattison et al 2019 glossary)

Table 3.1 - Terminology in studying human and non-human kinship patterns.

Co-operation between females is an important driver for the evolution of EBK. For example, fertility of a mother was increased by the presence of younger maternal sisters in a study of semi-captive Asian elephants (Lynch et al 2019).

Other evolutionary drivers of FBK include inbreeding avoidance (eg: males leave natal group), sex differences in the costs and benefits of dispersal, and resources. For example, "it is hypothesised that moderate productivity subsistence systems (eg: horticulture) are conducive to FBK where such systems do not lead to disproportionate fitness returns to men" (Mattison et al 2019 p2).

But there are also costs with FBK. For example, Lukas and Huchard (2019) argued that resource competition can drive infanticide by close female kin in different mammals (appendix 3B).

APPENDIX 3A - BORGERHOFF MULDER ET AL (2019)

Borgerhoff Mulder et al (2019) analysed that data on wealth transmission between parents and offspring of fifteen groups around the world (eg: Lamalera (settled foragers); Chawa (horticulturists); Himba (pastoralists)). Various measures of wealth (eg: livestock; land; household wealth) were combined into a standardised wealth score.

There was no support for the hypothesis that son-preference among parents is more predominant than daughter-preference. But that does not mean sons and daughters are treated equally. "Systemic sexism can produce gender inequality even if parents invest in sons and daughters equally. Strictly speaking, our results show only that, for such populations, the daughters of rich families are just as likely to stay rich (relative to other women) in adulthood as are their brothers (and vice versa for the poor) – in other words 'silver spoon' effects exist equally for girls as they do for boys" (Borgerhoff Mulder et al 2019).

There are also differences in transmission - for example, material capital to sons and human capital to daughters in the Philippines (Borgerhoff Mulder et al 2019).

The fifteen groups studied was a convenience sample.

APPENDIX 3B - FEMALE INFANTICIDE

Lukas and Huchard (2019) summed up: "Specifically, female infanticide occurs where the proximity of conspecific offspring directly threatens the killer's reproductive success by limiting access to critical resources for her dependent progeny, including food,

shelters, care or a social position" (p1).

Male infanticide is more often seen where a dependent offspring stops the mother from becoming pregnant again, and so killing the offspring makes the female available for mating. This usually involves the killing of non-kin (Lukas and Huchard 2019).

Lukas and Huchard (2019) analysed data on female infanticide from 289 mammal species. Female infanticide was reported in 89 of the species, and was most frequent where females bred in groups. Female infanticide was present more often in species living in harsher environments (eg: lower rainfall), and in species with higher maternal energetic investment.

Lukas and Huchard (2019) outlined the possible explanation for infanticide by females and their findings:

1. "Exploitation" hypothesis - To eat the victim. No support that females different to males.

2. "Resource competition" hypothesis - To facilitate access to resources for themselves and their offspring. Female infanticide more likely where competition for resources was intense.

a) "Breeding space" hypothesis - To protect exclusive territory. More likely to kill non-kin intruders or neighbours (eg: black-tailed prairie dogs). Females protecting young in burrows killed non-kin young to maintain resources for their offspring.

b) "Milk competition" hypothesis - To discourage attempts to suckle by unrelated offspring, in cases of temporary groups (eg: northern elephant seals). To maintain limited milk supply for own offspring.

c) "Allocare" hypothesis - In co-operative care situations, it improves the chance of own offspring (eg: meerkats). Lukas and Huchard (2019) reported that the killer was usually the dominant breeder, and the victim was related.

d) "Social status" hypothesis - To improve chances of own offspring in social hierarchy (ie: eliminate future rivals) (eg: Old World primates). Lukas and Huchard (2019) found that the killers were high-ranking females.

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