ASPIRE JOURNAL

EXPLORING BIG QUESTIONS & IDEAS

VOLUME 2
SPRING 2025

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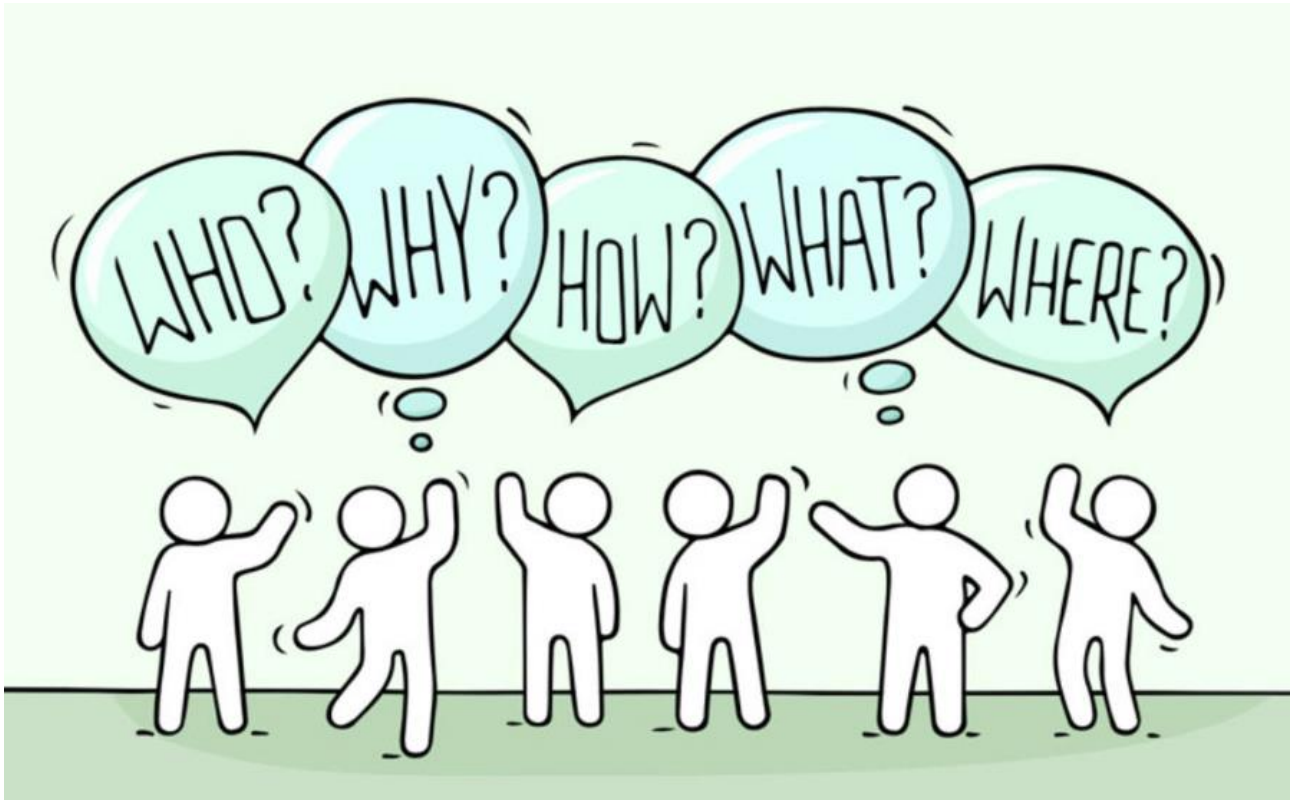
Foreword



Step-up and Aspire is an integrated partnership between King's "Aspire" programme and the "Step-up" programme that is run by New College, Oxford. The Year 12 Aspire side of the programme is primarily designed to provide a vehicle for 'super-curricular exploration' - that is delving more deeply into a subject of interest - within a school community of like-minded individuals.

At the heart of this super-curricular exploration is the concept of "big questions". Big questions tackle complex ideas and reflect the kind of critical thinking students undertake at university. They aim to challenge students with debates and ideas that go beyond what is covered in the classroom – both in a subject-specific and more general sense – as well as promote broader thinking and encourage intellectual curiosity. By regularly engaging with big questions students will develop fluency in expressing ideas with clarity and thinking through unexpected problems.

This journal therefore reflects some of the big questions that our Year 12 Aspire students have been wrestling with so far this year. To help them tackle these questions, students have been developing skills relating to academic research, extended writing and dialectical reasoning. Dialectical reasoning is a method of reasoning that firstly develops a thesis and then develops a contradictory antithesis, both with rationales, and then combines and resolves them into a coherent synthesis, with the ultimate goal being the search for truth.

You will see this process of dialectical reasoning in the articles contained within this journal, with some of the articles being streamlined "think pieces" and others being more in-depth pieces of research. But, whatever the case, we can assure you that no AI was used! All articles were fully researched and written by students who not long ago were sitting their GCSEs and who are currently undertaking their A-Level studies alongside the Aspire programme.

Finally, whilst the students were instructed to advance a line of argument in their articles, we are of course aware that their conclusions do not represent "right answers". Indeed, big questions very rarely have an answer that everyone can agree on. Instead, we hope that the pieces get you thinking and talking about a wide range of super-curricular topics...

Mr Harris

THE ARTS

Does our history matter in the present day?

By Billy G

When discussing the importance of history at present you must consider both sides of the argument, each of which holds equal validity. History enthusiasts will argue that the study of history is crucial to society. This argument is based on the ideas that understanding the events of the past can unlock a more critical way of thinking which is crucial when addressing current issues, developing a love for personal history can empower individuals especially in the face of adversity, and we can easily be inspired by events of the past, building up an admiration for the people of the past, even following in their example. On the other hand, those who see history as an unnecessary study will argue that dwelling on disagreements in the past can lead to continuous conflict, the cherry-picking of history to match an agenda could be a danger to society, and a focus on the past may distract attention away from the present and future – the areas of life that in their eyes matter most. Having reviewed both sides of the argument, this essay will argue that history doesn't just matter at present but should be essential to both gain a better understanding of human nature and secure our cultural identities.

As just stated, there are some powerful arguments for the case that the study of history is not necessary at present. The first and arguably most relevant is that the recurrence of conflict is widely influenced by the heavy focus on past disagreements within the history of certain peoples. Such a case can be made around the convoluted origins of the Troubles, a period of conflict within Northern Ireland spanning from the late 1960s to its formal end in 1998. Although there is a much longer history of British maltreatment of the Roman Catholics of Ireland, the key root of this conflict can be found during the 17th century with the Plantation of Ulster, a Protestant migration from mainland Britain, which would establish the sectarian division in Ireland that would be so relevant during the Troubles. Due to this at the time of the Troubles the views of both camps were intensified by the contents of their history: Irish Nationalists held a deep resentment for the British and longed for a united Ireland; whilst the prideful English, clinging to their fading imperial title, backed the Ulster Unionists who wished to remain under the British umbrella. As David McKittrick puts it in his book *Making Sense of the Troubles*, 'the troubles can be seen as a more violent expression of existing animosities and unresolved issues of nationality, religion, power and territorial disputes'.[1] Therefore, the horrific acts of terror and communal violence during the Troubles, which ultimately cost over 3500 lives, may

have been prevented through a more peaceful settlement if both sides could look past their own history.

Furthermore, the interpretive nature of history can have a negative effect if not studied effectively and impartially. American writer Mark Twain once said, "the very ink with which all history is written is merely fluid prejudice" setting out the widespread idea that history is only written by the victor and therefore in a biased manner. In 2021, Columbia University published an article highlighting how the US education system did conform with Twain's ideas, the history taught in their schools was being cherry-picked into an oversimplified Americentric form and the subjective topic of history was being turned into one of objective truths. According to the article, this improper form of education has conditioned students to accept what information is given to them making 'Americans vulnerable to misinformation, which, most recently, has allowed for the spread of racism'.[2] So, to some, if the study of history in the USA puts public health at risk, then it should not be studied at all, especially with the only solution seeming to be a revamp of courses into a form more complicated than most would want.

Finally, some argue that the study of history detracts attention as well as resources away from planning for the future. In the fast-moving world of the present, in which new plains of technology and social thinking develop rapidly, the study of history can be seen as obsolete. Futurism is a political idea that may grow more relevant in this time of accelerating change, especially with tech tycoon Elon Musk, a believer in the superficially similar long-termism, being wrongly labelled as one. Futurism borrowed on the ideas of the artistic movement of the time in early 1900s Italy in which technology was glorified and movements based on historical tradition were opposed. Although the Futurist Party offered a radical

[1] David McKittrick and David McVea, *Making Sense of the Troubles: A History of the Northern Ireland Conflict, 2000*

[2] https://www.publichealth.columbia.edu/news/cherry-picked-history-threat-public-health

program that would not get far in the current political climate, their ideas on prioritising innovation and casting aside historical study may be adopted by more as we progress into a very technological future. Many current affairs now stress a need for immediate action such as the importance of urgency in relation to climate change, in 2019 the UN warned that there was only 11 years left 'to prevent irreversible damage from climate change'.[3] Now at the beginning of 2025, that sets 5 years for action, 5 years which many say should be filled with direct action on the matter with attention pointed towards innovation and the present rather than the study of the past.

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the first argument that looking into history can allow conflict to re-emerge is flawed due to its heavy reliance on the example of the Troubles which had concluded in 1998, leading to a collective reconciliation effort which in many aspects has allowed the youth of Northern Ireland to move on from the conflict of their parents or grandparents. There are a wide range of community efforts across Northern Ireland, one such group is that of the Peace and Reconciliation Group (PRG) which has worked towards promoting an inclusive society in the critical areas of Northern Ireland by allowing the people of once opposing sides to come together in the form of group activities.[4] Therefore, the idea that dwelling on past disagreements can lead to repeated conflict is not valid at present, at least in the case of Northern Ireland that has seen a drastic decrease in hate crime and communal violence.

Similarly, the third argument about how the study of history does not help us going forwards in our fast-moving world is flawed as history cannot be put down as near to useless when approaching the future as it does assist us by offering a better idea of what the future will or may offer, thus making the time ahead less precarious. In terms of the climate crisis, which the argument stresses is an urgent issue, we would not have been able to identify and hence act on the changing climate without the study of history. Instrumental records of temperature date back to the 1850s and beyond this point temperature data can be gathered by examination of climate sensitive materials such as tree rings and agreed upon by the estimations of historians through the study of primary sources.[5] History can also teach the lesson of caution when approaching the future as new innovations may not be as expected, such as that of nuclear weapons which provided a far more devastating result than Oppenheimer anticipated with estimations of a blast equivalent to 0.3 kilotons of TNT instead producing an explosion of 21 kilotons – this immense power would also open up a new threat to the human population in the form of nuclear war.

It is therefore more convincing to argue that history does in fact matter in the present day. Firstly, the study of history unlocks an approach to current affairs and the future that is better equipped especially with a greater focus on caution. In his book *Why History Matters*, John Tosh argues that history 'can empower through enhancing the intellectual resources available to the active citizen'.[6] He goes on to explain how further reading of history improves critical thinking and effective use of analogies can provide beneficial predictions to be used when deciding on a response to events of the present so to best benefit the future. Greater study of history develops more critical citizens, those interested in public affairs and the improvement of society, who are more likely to enter the public sector, providing a boon in policymaking. According to a report by the Institute for Government, 'history is seen to add value, providing context and a conceptual toolkit for policy issues' making clear the importance of historical knowledge within modern politics.[7] A past example of history influencing policy can be seen through the allies less punitive approach to reparations on Germany following WW2 with the knowledge that the harsher punishments following WW1 were largely at fault for the subsequent war emphasising more wariness. WW1 reparations saw Germany paying £6.6 billion (equating near to £100 billion in today's money), ceding much of their territory, and having to accept war guilt. On the other hand, the reparations of WW2 would mainly consist of the occupation of Germany by the key victor states leading to their control of German industry, this initially seemed costly to Germany but in the long run proved beneficial with the Allies offering aid to German reconstruction through schemes such as the Marshall Plan. Although George Santayana's idea, 'those who cannot remember the past are condemned to repeat it' is largely a platitude within historical education, the use of historical thinking can allow you to identify patterns within human nature so to better predict the outcome of events and even prevent the same mistakes reoccurring, which at least makes the future less precarious but may lead to the motto of 'never again' becoming a reality.

Secondly, looking into your own personal history can allow you to feel a sense of belonging to a larger ethnic body or nation which can empower you, building upon your own identity. In his famous show Civilisation, Art historian Kenneth Clark quoted, 'history is ourselves' so we can be seen as lost and rootless without knowledge of our own individual history.[8] Born into the colony of British Guiana, poet John Agard was taught under a British education system that told him of a history that was not his own making him oblivious to his own origins at a young age causing a crisis of identity which he explores in his poem *Checking Out Me History*. In this poem Agard undergoes a journey to discover his own heritage by casting aside the seemingly trivial British

[3] https://press.un.org/en/2019/ga12131.doc.htm
[4] https://www.peaceinsight.org/en/organisations/peace-and-reconciliation-group-prg/?location=northern-ireland&theme#
[5] https://royalsociety.org/news-resources/projects/climate-change-evidence-causes/basics-of-climate-change/#:~:text=Climate%20records%20show%20a%20warming%20trend&text=Going%20further%20back%20in%20time,ice%20cores%2C%20and%20marine%20sediments.

[6] John Tosh, *Why History Matters, 2019*
[7] https://www.instituteforgovernment.org.uk/sites/default/files/publications/Making%20History%20Work%20Report%20-%20Final_0.pdf
[8] https://www.goodreads.com/quotes/338907-at-this-point-i-reveal-myself-in-my-true-colours

history, which he aligns with fictional folk stories of Europe such as Dick Whittington and Old King Cole, whilst embracing the history of his ancestors that he was obscure of for so long. Agard's almost transcendental description of the figures from his personal history makes clear the strikingly powerful influence they have had in shaping the man he is today; in his own words, 'I checking out me own history I carving out me identity'.[9]

Finally, further reading of history can uncover stories of bravery and human goodwill, many of which flower from the dark events of the past that can often shroud history under a stigma, thus making these stories of man's kindness all the more inspiring within our everyday lives. Such a story, which follows, is that of two pilots, which should be told by a rough account as an example of the hopeful tales history offers. During the harsh animosity of the Second World War, Charlie Brown an American airman found himself in a dire situation following a bombing on Germany which left his crew's plane badly damaged with all other members of the crew dead or incapacitated. As this plane struggled its way home it would encounter a German aircraft piloted by Franz Stigler. Stigler, wondering why the American aircraft was not firing on him drew closer to find a vulnerable Brown pushing onwards alone. Instead of firing on his sworn enemy, Stigler would defy all imagination by escorting the damaged aircraft, and what was left of its crew, past German anti-aircraft stations who would hold their fire in the sight of a friendly aircraft. Stigler dragged Brown to safety. In Adam Makos's recount of the tale what happened that day was 'an act of peace and nobility' that unfolded in 'an era of pain, death, and sadness'.[10] Therefore, if people in the past such as Stigler could carry out such extreme acts of kindness, even under such harsh circumstances where he risked his own death as a traitor, then why can't we learn from them and act with more kindness in everyday life.

Furthermore, the arguments presented here are particularly convincing as they hold extra depth to back their validity. For example, the argument that the study of history can unlock a historical train of thought that identifies patterns in the past so to prevent the recurrence of mistakes at present is even more applicable to the world around us as there is sufficient evidence that history holds patterns that do in fact repeat with extreme similarities even if not under the exact same circumstances. There are a wide range of repetitive patterns throughout history with some examples holding clear similarities. In 1079, the Polish Catholic primate Stanislaus was murdered by former friend King Bolesław the Bold, this event closely resembles the ordered murder of Thomas Becket, England's Catholic primate, by his former friend King Henry II in 1170. Although this mirroring of events offers little in the present it highlights the fact that events repeat themselves, sometimes in more drastically similar ways than others. If we can identify more relevant patterns, such as extreme economic lows in weakened countries, we may be able to focus on aiding the nation to prevent the rise of a dictatorship as seen under Hitler and Peron.

Similarly, the argument around the study of personal history building a stronger identity under a unified body is made stronger by the evidence that decolonised nations initially face problems as they struggle to gain a coherent sense of nationhood. As decolonisation occurs, in some cases imperial powers leave a nation stripped of what was once its history leaving behind a husk of a culture that has no unifying power, whilst in other cases there are too many different cultures with their own history in the region which simply cannot hold as they are bolted together into a new 'nation'. Such an instance, as of the latter possibility, can be viewed in the decolonisation of Indonesia and the Philippines which would produce violence in the region. In Karl Hack's book *Beyond Empire and Nation* he presents the idea that, 'the challenge of decolonisation was precisely that colonial societies had many layers of identity[...]that were not in the first place "national"'.[11] So, the lack of a shared history within a vulnerable group, such as that seen in Indonesia and the Philippines following their independence, in many ways prevents unity with no binding sense of identity.

In conclusion, our history does in fact matter in the present day both on an individual level and as a society. It is reasonable to argue that this conclusion is not accurate with the study of history seemingly producing dangers in the world; some conflicts appear to be rooted in historical tensions, seen during the Troubles, and the cherry picking of history can set damaging agendas within society. However, the points on this side of the argument are ultimately flawed and overshadowed by the strength of those for this conclusion. The arguments in support of this conclusion are more credible with history proving to be core to society at present by: offering crucial conceptual knowledge when approaching current affairs and the future; as well as providing stories that can help us build an identity and approach the world with good morals in mind, like those displayed in such stories. History is the tale of how we have reached this current point in time, so history is what makes us. Why would we cast it aside? To lose all our identity and sense of belonging.

[9] John Agard, *Checking Out Me History,* Half-Caste, 2005
[10] Adam Makos, *A Higher Call: The Incredible True Story of Heroism and Chivalry during the Second World War, 2012*
[11] Karl Hack, *Beyond Empire and Nation: The Decolonization of African and Asian societies, 1930s-1970s*, 2012

Should healthcare be free to access for everyone in the UK?

By Jennifer M

In a country currently battling a healthcare crisis, due to long-term underfunding, the legacy of Covid-19 and numerous other reasons, it can be very tempting to scrap a system as soon as it feels like it's failing, such as the NHS. The need to reform or modify healthcare is a complex process, that every country handles differently. The term free healthcare in this essay is relating to the UK's NHS healthcare system. There are strong arguments both for and against free healthcare. Some people will favour the approach of free healthcare and how everyone should be able to freely access it in the UK. They may think that healthcare is a right not privilege and that it can help quash diseases or viruses that many people fall victim to each year. Not only could the impact lie individually but also communally as free healthcare can transform economies and communities leaving astronomical positive impacts on society. Conversely, others may argue that healthcare shouldn't be free to access. Being able to access public healthcare can make people very irresponsible or downgrade the quality of care as there is a lack of provision. It also can take up extreme proportions of the government's budget that could fund causes elsewhere. After analysing both sides of this argument, this essay will argue for the case of free healthcare universally, as it's essential that health is treated as a human right, not a privilege that can be bought by the wealthiest members of society.

As stated, there are some powerful arguments against free access to health care. Firstly, healthcare can make people very irresponsible. It removes the incentive of good health such as eating a balanced diet, regular exercise and not smoking. People become complacent and think that they can live their lives to excess and then use free healthcare as a backup to help fix any issues that they may have indulged themselves into. A survey by Kitchen Stories on peoples eating habits in the UK found that only 40.42 percent of people were deemed to eat healthily regularly[12]. To place this into even more perspective, just over 1 in every 4 adults in England alone are living with obesity. Obesity is responsible for costing the NHS around £6.5 billion each year[13], which has several issues as obesity is a massive risk factor for many non-communicable diseases and in general poor for the healthcare industry. Similarly, research shows that around should 16% of adults in the UK smoke[14].These poorer health choices potentially show that people are over reliant on healthcare and willing to take away funding, time and medical experts from others who genuinely need assistance or care for illnesses that have not occurred through these poor health choices.

Likewise, free healthcare can downgrade the quality as people don't have to pay for their own treatment, and instead its paid by government causing huge

underfunding. It also creates waiting lists where people all wait for the same operation, yet the severity of their condition and age ranks them in accordance to how important they are for that operation. Currently, the waitlist to even start a routine hospital treatment is at an all-time high of 7.47 million. Astonishingly, 385,000 people on that waiting list have been waiting over a year for treatment[15]. If people had to pay for their own healthcare, they wouldn't have to worry about the mass build-up and queues for appointments and checkups because they could pay to instantly have a consultation and treatment.

Furthermore, free healthcare can take up extreme proportions of the government's budgets and fundings to keep it free. If people had to pay for healthcare, this would reduce the demand for money from the government's budget to start to stabilise the healthcare sector as there would be less pressure of underfunding as everyone would have to pay for their own treatments. Consequently, the government could prioritise their funding on reducing the risk factors for the biggest issues people need healthcare for in the first place, such as learning to live a healthier lifestyle. In the years 2023-24 the government spent £221 billion pounds on the healthcare public sector. This is the highest it has ever been[16]. Yet as previously mentioned, the backlog and waiting list is still growing for medical appointments. If people were made to pay for their own healthcare in the UK rather than using the NHS, large portions of the £221 billion could be looked to be spent elsewhere for other such as reducing obesity schemes or studies into the effects of risk factors.

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the argument about free healthcare making people irresponsible in their choices is flawed because people do have free will and are able to judge and make decisions for themselves, whether it is the healthier choice or not people have a right to live their life how they would like to. By saying free healthcare makes people irresponsible does not cover the whole scope of freedom, in fact many other contributing factors play an influential part in making people 'irresponsible'

[12] UK: healthy eating 2019 | Statista
[13] Government plans to tackle obesity in England – Department of Health and Social Care Media Centre
[14] Share of adults who smoke, 2020
[15] NHS waiting lists hit record high in England - BBC News
[16] UK health spending 2024 | Statista

and by making people pay for healthcare isn't instantly solving the issue. Indeed, in countries such as America where healthcare is not free to access, the country has one of the highest obesity rates in the world, thus proving that healthcare being freely accessible does not necessarily make people 'irresponsible'. Additionally, the government cannot force people to exercise more or eat healthier and therefore this isn't a straightforward solution to a growing issue.

Similarly, the argument about healthcare being downgraded due to being free is weak because it can be easily counteracted by saying that any free healthcare offered is much better than none. A system based on the wealthiest and more established classes earning more than others in society means that people who may need desperate medical attention cannot access it as they are unable to afford the medical fees. And yet a wealthier citizen could seek medical advice for a small issue or concern that they may have creating a clear division for people who wouldn't be able to afford healthcare if it wasn't funded or free. Furthermore, the groups in society that could afford to pay for their healthcare are statistically less likely to need it as they are more likely to have the provisions to look after their health in the first place.

It is therefore more convincing to argue that healthcare should be free for every person to access. Firstly, healthcare is recognised by the WHO standards as a fundamental human right rather than a privilege[17]. If healthcare weren't free this would make the idea of healthcare a luxury where the better off and more comfortable people in life can visit specialists and seek medical advice. To put this into context, if something is a right such as freedom, and you had to annually pay to exercise this right, the quality and contentment of life would severely decrease. Could you imagine a life where you couldn't afford freedom? Alternatively, imagine having to pay for an abortion or IVF in its entirety: many would be forced into a choice they wouldn't want to make. This same principle applies to healthcare, it's a necessity not a luxury therefore the only way to equally implement this policy is to make healthcare free for all to access and keep the NHS system funded and working.

Secondly, if everyone was able to access free healthcare universally not just in the UK, then world-wide health care can help stop the world's biggest killers. In lesser developed countries having free healthcare could help to reduce illness and disease, and even better reduce mortality rates. In countries such as Nigeria, where you must pay for any consultation or treatment regarding health, cases and rates of malaria are closely linked to health implications or even death. The reduced or delayed diagnosis, and clinical care shortages, disrupt the immediate action that could be taken on malaria, consequently leading to a lack of medication and treatment to aid people. Nigeria has the highest death rate of malaria in the world with 112 people per 100,000 reported to die from it[18]. If people in Nigeria could access free healthcare and receive medicine or treatment to prevent death then the positive impact would far outweigh other arguments.

Thirdly, good healthcare can help transform economies and communities. People with access to healthcare can and are able to work much more fruitfully and productively than those who can't. If people can attend work and earn a living, not only will this help make someone financially stable, but allows people to invest back into the economy, creating this positive economic cycle. If people are positively contributing to society then industries such as healthcare are less in demand as people are looking after themselves. Employed people pay annual taxes that the government distribute to help specific sectors boost and grow. At present, it is easy to think that free healthcare seems a waste of government spending, however the positive legacy that healthcare can have will positively help communities, not just people receiving the healthcare. It is reported that 2.5 million people in the UK are forced to miss work due to health issues[19]. If the support of the NHS was removed, this number would only increase because so many others not in the statistic rely on the NHS to be able to work. Therefore, it is essential that free healthcare is in place to maximise the positive impacts on communities and work.

Furthermore, the arguments presented here are particularly convincing. For example, the main idea is healthcare is almost a long-term investment that needs refining in order to continue to have these positive impacts. Despite the current state of the NHS, being on the verge of breaking it may seem easier to scrap the system in despair. However, having free healthcare such as the NHS benefits and creates a fitter, healthier more functioning community that can invest and boost other areas of society.

Similarly, the argument about healthcare being a right is strong because, healthcare is an essential sector, in pretty much all countries, and although each country approaches it differently, the UK and NHS seem to be well regarded and respected for their work in public healthcare, so the UK should continue to have free healthcare.

Finally, not only does basing healthcare on someone's ability to afford to look after their health feel like discrimination against the people that can't afford the potential medical bills, but also visibly separates the highest earners by having this proposal of healthcare as a luxury to the people supposably left to suffer due to their lack of disposable income for them to spend on medical and health bills.

In conclusion, healthcare should be free for everybody to access because the right to be entitled to healthcare when feeling ill or needing assistance should not be based on income or one's ability, but the genuine need to help gain support for their issue. Equally healthcare can transform so many other aspects positively, such as the economy. This said, there are still some issues with free healthcare such as funding from government being

[17] Health is a fundamental human right
[18] Death rate from malaria
[19] Number of people not working due to illness hits record high

an issue, taking as it does large proportions of the budget and people's taxes. Ultimately, the ability for it to return to society with more jobs and better communal health means that healthcare should be free for everybody to access. In the aftermath of Covid-19, the NHS can seem like a failing opportunity, but the prospects it provides are so influential. Despite the NHS being in need of many reforms and desperate attention, undoubtably not just the UK but the whole world should be allowed free universal healthcare accessibility. After all, imagine if your loved one needed lifesaving treatment, that you wouldn't be able to afford if there was no NHS to fund it for you.

Is religion the main reason why the US has never had a female president?

By May P

There are some strong arguments that suggest religion is the main reason why the US has never had a female president. For example, it is estimated that 63% of the US population are Christian, Christianity being the largest practiced religion there. It is obvious that there is not equal gender representation within the church in the US, with only 12% of practicing pastors being women. Given women hold a minority of US church roles, how can women be inspired and expected to run for presidency? By contrast, there are arguments which suggest that there are other key reasons which have resulted in there never being a female president, for instance, the conservative values of the South or the growing role of popularism in US politics. This article will explore whether overall religion is the fundamental reason why the US has never had a female president but will ultimately argue it is due to other factors, such as traditional American values surrounding gender roles.

As stated, there are some powerful arguments to suggest that religion is the main reason why the US has never had a female president. Firstly, the traditional values surrounding gender roles highlighted in some religious texts may align more with conservative parties such as the Republican Party, which has never nominated a female presidential candidate. For example, Ephesians 5:24 from the Bible says, "now as the Church submits to Christ, so also wives should submit in everything to their husbands". This suggests that, according to the Bible, women should avoid leadership scenarios and instead obey men, meaning that many Christians may interpret this in modern-day circumstances and therefore oppose the idea of a woman running for presidency. Subsequently, this may result in them aligning with more right-wing parties, such as the Republican Party, who have never appointed a woman to run for presidency. The highest role a woman has ever had in the Republican Party is arguably the vice-president nominee Sarah Palin, who held the post from December 2006 to July 2009. There are multiple studies into how different religious groups in the US vote, but overall, it is estimated that between sixty and seventy percent of Christians describe themselves as "Republican or Republican leaning". This demonstrates how religion may affect political alignment and may suggest that religion is the key reason why the US has never had a female president, both because Christians are more likely to oppose the idea of female presidency generally but also because they are more likely to then

go and vote Republican, who still have not appointed a female presidential candidate.

Secondly, it could be argued that the role of Christian influencers who oppose female presidency and advocate for traditional gender roles may deter Christian voters from supporting a female presidential candidate. James Dobson identifies as Christian and founded 'Focus on the Family' in 1977, which is a fundamentalist Protestant organization based in Colorado Springs. 'Focus on the Family' advocates 'complementarian' gender roles, describing men and women as "separate yet equal". It is contested exactly how many supporters 'Focus on the Family' have, though it is expected to be a minimum of two million. Similarly, John Piper, a well-known American pastor, theologian and author founded 'Desiring God Ministries', which describes the role of women as "gracious submission" whereas describes men as having "the responsibility to lead, provide for and protect women". 'Desiring God Ministries' have distributed over 12,000 resources highlighting their beliefs and influencing the American public. Due to these influential Christian figures and organizations, it is unsurprising that America has never had a female president given the widespread support of these organizations which present the ideal woman as submissive. Therefore, it could be argued that the role of persuasive Christian people and organizations, such as 'Focus on the Family' and 'Desiring God Ministries', explain why some would suggest that religion is the main reason why the US has never had a female president due to their misogynistic beliefs suggesting women are unsuited to leadership scenarios and widespread support from the American public. Also, 'Focus on the Family' openly endorsed the Republican candidate Trump during the 2024 presidential campaign, reiterating the idea that religion may be the main reason why there has never been a

female president due to Christians politically aligning more with the Republican Party.
Thirdly, some people may argue that religious community norms prove that religion is the main reason why the US has never had a female president. Different religious communities interpret Bible teachings about gender roles and other societal issues in different ways, often depending on wider cultural context, and persuade others to follow the same practices as them. Some Christians choose to be more lenient when observing parts of the Bible portraying beliefs that many would see as outdated, though others promote these beliefs more than ever in our modern world. An example of a more extreme religious community is the 'Twelve Tribes', who formed in Tennessee during the 1970s. They are still widely based in America, though do run the occasional 'Yellow Deli' in other places as well, including locally, in Honiton. They strictly adhere to parts of the Bible such as Timothy 2:12, which states, "I do not permit a woman to teach or to assume authority over a man". This extract from the Bible clearly suggests that women aren't suited to leadership roles such as the presidency. Therefore, some people who believe religion is the main reason why the US has never had a female president may point to the beliefs and practices held and performed by prominent religious communities in America, the Twelve Tribes being one of many.

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the argument about the role of religious public figures and organizations in discouraging female presidency fails to mention the numerous Christian organizations that encourage gender equality, such as the Christian Community Development Association (CCDA) and the Sojourners. Similarly, the argument about the practices of religious communities which may dissuade female presidency is weak as it does not mention the many Christian individuals and groups who are passionate about gender equality. For instance, the United Methodist Church and the Episcopal Church focus on empowering women in leadership roles during the congregations, suggesting that there are perhaps other reasons why the US has never had a female president.

It is therefore more convincing to argue that the main reason why the US has never had a female president isn't due to the role of religion and is due to other key factors instead. Firstly, it could be argued that traditional gender roles are naturally favored in many large parts of the United States and that women still face a substantial degree of sexism. For example, since the Supreme Court's decision to overturn Roe V Wade in 2022 (scrapping the national right to abortion), seventeen states have enacted a near-total abortion ban, banning it directly after conception or the first six weeks. Nebraska and North Carolina have also banned it after twelve weeks, Guam after thirteen weeks, Arizona after fifteen weeks and Utah after eighteen weeks. Most of the states that have imposed stricter regulations on abortion are in the South, which has held more conservative values than northern states such as California since the Civil War (1861 to 1865). This partially could be because the South tends to be more rural than the North and therefore tends to hold more conservative values (as urban areas tend to be more diverse and therefore more progressive). Some people consequently may argue that religion is not the main reason why the US has never had a female president and may instead point to more general conservative attitudes in the South, seen by how Southern states reacted to the overturning of Roe V Wade.

Secondly, internal party dynamics and funding could explain why the US has never had a female president rather than religion. Women have always tended to receive lower nomination rates than men in politics. In the 2020 Democratic Primary, several women, including Elizabeth Warren and Kamala Harris, ran for the nomination. However, Joe Biden won significantly more support from party leadership, linking to how women only hold 30% of Democratic National Committee (DNC) positions and only 17% of Republican National Committee (RNC) positions. This indicates that sexism is prevalent within parties themselves rather than just in the public, linking to how women candidates tend to receive less campaign funding than men. A study by the Center for American Women and Politics (CAWP) found that in the 2018 midterm elections, women tended to receive an average of $1.2 million to fund their campaign compared to the average $1.5 million received by men. According to a report by the Women's Donor Network, female candidates only received about 27% of Political Action Committee (PAC) contributions, illustrating the funding gap that still exists. This highlights how political funding and dynamics could be the crucial reason why the US has never had a female president, rather than religion.

Thirdly, the rise of populism in the age of Donald Trump could explain why the US has never had a female president. In recent years, there has arguably been progress in tackling misogyny in America. For instance, the Violence Against Women Act (VAWA) was reauthorized in March 2022 and provided additional funding for victims of domestic abuse, sexual harassment and stalking, threats which are more commonly faced by women than men. This would indicate that it is now more likely for a woman to be elected president than it has been historically, however, Donald Trump's personality has won him much popularity both within politics and generally in the media, linking to how he has just been named Time Person of the Year for a second time. After Kamala Harris replaced Joe Biden as the Democrat presidential candidate, the party's approval rating increased, suggesting that it is plausible that the US could have had a female president in recent years if it wasn't for the media sensation Donald Trump has become and that any candidate regardless of gender would've struggled to compete against in the current political climate.

Furthermore, the arguments presented here are particularly convincing. For example, the argument about the role of conservative gender roles in determining election outcomes is relevant to other legislation today, as well as than the overturning of Roe V Wade, again suggesting Southern contempt for female politicians. For instance, Southern states such as Alabama and

Louisianna have expressed opposition to the Equal Rights Amendment (ERA), which aims to guarantee legal rights to citizens regardless of sex and update the constitution, citing concerns that it may have implications on other laws and policies. Similarly, the argument about the popularity of Donald Trump outside of politics and within the media is strong because of how during the 2024 presidential election he was endorsed by multiple big names such as Elon Musk, chief executive of Tesla and Space X, and Joe Rogan, a podcaster who has around 32 million subscribers on YouTube and Spotify, and is particularly popular with young men, a demographic Donald Trump prioritized to persuade to vote for him.

Ultimately, the evidence suggests that America has never had a female president due to a multitude of reasons and that the role of religion is not the most significant reason why this is the case. Although parts of religious texts present women as unsuited to leadership roles and Christian groups such as Desiring God Ministries are influential in the United States, overall, there are more important factors to acknowledge when analysing this topic, such as general conservative attitudes in the South. To conclude, there is arguably not one single reason why the United States has never had a female president, however, the role of religion is far from the most significant.

Who is the better role-model for modern women; Athena or Aphrodite?

By Madeleine W

There are strong arguments debating which feminine Greek deity is a better role-model for modern women. Some would argue that Athena's unwavering commitment to leadership and empowerment is testament to her role-model potential, and that she embodies strength and confidence – shattering stereotypes of what women can achieve. Additionally, some would argue that she is highly representative of female capability that is needed today, and that her intelligence and wisdom inspire women and shows that when a woman recognises the keen way her mind works as a feminine quality related to Athena, she can develop a positive image of herself. By contrast, others would argue that Aphrodite is an advocate for feminism. For example, the fight for legalised abortion can be seen as an Aphrodite fight as it is a fight for sexual freedom. Similarly, Aphrodite never fell victim to male power by negotiating her many love affairs unscathed, which portrays her as a fighter, and that she is a symbol of female empowerment who defies patriarchal expectations, choosing her lovers and allies according to her desires rather than societal norms. Ultimately, having reviewed the arguments on both sides, this essay will argue that Aphrodite is the stronger role-model for modern women, due to her feminist qualities and her quiet, often disregarded, strength. Additionally, Athena could not be a suitable role-model for modern women as she is a defender of the patriarchy and consistently favours men over women.

As stated, there are some powerful arguments to support Athena as the better role-model for modern women. Firstly, Athena is a committed leader and empowered which is testament to her influence as a role model for ambitious women everywhere. She embodies strength and confidence – shattering stereotypes of what women can achieve which is very relevant today with conflict around the world considering women's rights. This makes her a suitable role-model for modern women as she inspires others. Secondly, she is highly representative of the female capability that is needed today. As a goddess of war strategy, Athena represents

not brute force but intelligent planning and calculated action, and her strength is balanced with composure and purpose. Her wisdom and strategic mind inspire the idea that true power lies not in sheer aggression, but in the ability to think critically, adapt, and lead with vision and integrity. Thirdly, her intelligence inspires women, as when a woman recognizes the keen way her mind works as a feminine quality related to Athena, she can develop a positive image of herself and continue to be proud of her intelligence and utilise it accordingly. This encourages achievement for women who are often put down for trying hard in schools.

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the argument that she is empowered and is a committed leader which is testament to her influence as a role model for ambitious women everywhere is flawed because she had power and was a strong leader, but she was a defender of the patriarchy and was intentionally upholding unjust systems. She is strongly male identified, assisting male heroes, and generally unconcerned with women or mistreating them. Instead of empowering other women, she is a woman who sided with men at the expense of other women. Similarly, the argument that Athena represents not brute force but intelligent planning and calculated action, and her strength is balanced with composure and purpose is weak because Classical mythology often depicts Athena as a vain and hot-tempered deity- punishing others such as Medusa in ways that certainly aren't composed with calculated action.

It is therefore more convincing to argue that Aphrodite is the stronger female role-model for modern women. Firstly, Aphrodite is a strong advocate for feminism. For example, the fight for legalised abortion is an Aphrodite fight as it is a fight for sexual freedom and empowerment. Feminism is a fight that it incredibly important to and prevalent in the vast majority of all modern women as it is the fight for gender equality, so Aphrodite being a supporter and advocate of this makes her a culturally relevant and strong role-model for these women. Secondly, Aphrodite never fell victim to male power by negotiating her many love affairs unscathed. This portrays her as a fighter, not necessarily in the same sense as Athena in a war and conflict environment, but in an often unrecognised sense- but no less important. Thirdly, she is a symbol of female empowerment by defying and rebelling against patriarchal expectations, choosing her lovers and allies according to her desires rather than societal norms. Additionally, she is one of the few goddesses who currently has a noticeable following- if you visit Paphos, in Cyprus, you can go to Aphrodite's rock, the exact place where she is said to have stepped out of the Mediterranean Sea. It is a very popular destination crammed with tourists eager to make their offerings and prayers to the deity to attempt to improve their experiences with love and relationships. This is evidence for her influence and power over modern women, supporting the argument of her as a powerful role-model for women today.

Furthermore, the arguments presented here are particularly convincing. For example, the argument about Aphrodite being a strong advocate for feminism is powerful because it is incredibly relevant to today's society, particularly America, where women are having to fight for abortion rights, or elsewhere in the world where millions of women still don't have access to contraceptives.[20] Or a more local issue that many women can relate to, eating disorders and body dysmorphia. These are all issues that heavily involve Aphrodite's role in society as being a symbol of sexual liberation and freedom and beauty and self-love as well as romantic and platonic love. Aphrodite is a role-model for these women to encourage them to keep fighting; whether that's for their basic human rights, for their personal mental health issues, or for rebelling against repression. Similarly, the argument presenting that Aphrodite never fell victim to male power by negotiating her many love affairs unscathed is strong because that contrasts with many female deities across ancient history and mythology. She does not refrain herself from interactions with men and does not vow to chastity like many goddesses choose to (think Artemis and Athena), instead she utilises the power of love and friendship to enhance her experiences and power, and does so generally unscathed, which, if you are familiar with any Greek myths, you will know is an achievement in itself. This shows her maturity, empathy and her strength. Additionally, this also makes her a more relevant role model to modern women than Athena, as most women in the 21st century no longer vow to chastity or stay away from men as a group.

Overall, I think it is fair to conclude that Aphrodite is the better role-model for modern women as opposed to Athena, but it is important to acknowledge that the argument of Athena as a promising role-model does have some merit regarding her intelligence and ambition- traits that many women today embody or strive to achieve. However, Aphrodite as a role-model is more credible due to her emotional intelligence and her feminist tendencies. Ultimately, Aphrodite stands as a timeless role-model, inviting women to embrace their femininity and compassion as a powerful and modern woman.

Are privately educated children fast tracked to success?

Jess M

There are two convincing arguments in relation to this question. Many argue – as does this essay – that children privileged enough to be privy to the luxuries of private education are more likely to climb higher up the ladder of success at a faster pace. This can be argued by simply referencing the substantial funding private schools receive, along with the varied extra-curricular opportunities available. However, others argue that education does not necessarily correlate with success. To many, success is a very individual term, defined differently for all, possibly without a link to educational attainment at all. There is no guarantee that a more privileged education will impact a person's success within or outside of their career.

As stated, many people argue against the statement and believe private education has no impact on future success. Some even argue that private school has a detrimental effect on students due to a lack of diversity. From a sociological perspective, most private school students are from a middle to upper class background,

[20] https://www.theguardian.com/global-development/2019/nov/12/access-to-contraception-falling-far-short-of-global-targets-report

with – according to the British Sociological association – only 1% of pupils attending school on a full scholarship, and a meagre 7% receiving partially funded scholarships. This ultimately leads to private schools being populated by wealthy students and families leading to minimal experience of “the real world”. Comparing this to the variation of pupils who attend state schools, it is not hard to understand the detrimental effects of private education on a child's understanding of how society functions as they are only exposed to a very niche segment of the population. Many privately educated students – despite having received a higher level of education – have an obscured vision of how society is run with a combination of multiple ethnicities, different levels of wealth, and genders. Building on this, the concept of single sex schools can have an augmented negative impact on students for many reasons. Students attending single sex schools are not given the opportunity to spend time with children of the opposite sex and build the fundamental relationships with people different to themselves which are so important to ensure that a child is well rounded and understands the views of others. Children attending both single sex private schools and in regular private education are, in the opinions of some, effectively living in a bubble. Ill-exposed to the varied nature of society, students are likely to be equipped with high career prospects, although to the detriment of the real-world experience that state educated children are likely to receive. This returns the point to individual definitions of success, which are portrayed differently for everyone.

In addition, the idea that private education fast tracks a student to academic and career success is most likely true. However, this does not allow for the impact that segregating children may have on their view of the world we live in. It is arguably damaging for children to be segregated from peers at an age as young as 4, in favour of surrounding those children with peers extremely similar to themselves since many children put through private education from a young age will not have a balanced and varied understanding of society itself. This could be detrimental to children when they encounter diversity within backgrounds at university or in a job, as they would not have been exposed to the realities of society.

However, this argument is heavily flawed. Arguing that private school is detrimental to the future of the students who attend is extremely subjective and backed by few statistics. For children who attend private school, the way their education impacts their association with the rest of society is very individual. For example, privately educated children may have relations and friends who are part of the state school system, leading to a variation in the types of people they are surrounded by, and rejecting the idea that privately educated children are not exposed to the realities of society. The argument is subjective and so it is unlikely that all privately educated children are hindered by their disassociation from society.

On the other hand, there are some powerful arguments to suggest that privately educated children are fast tracked to success compared to state educated children. According to ‘Cambridge home school online’ private school children are 10% more likely to be accepted into university programmes compared to their state educated counterparts. This evidences the argument that attending a paying private school increases the chances of achieving typical success. This statistic suggests the head start in life that money can buy. Furthermore, it has been shown that 60% of private school children gain admission to Russell group universities compared to 48% of state school children. This highlights the level of success that privately educated children achieve compared to state school children and additionally denotes the higher level of education that private school children receive to be admitted to more prestigious universities. For many private schools, it is expected that the children attend a highly successful university and are successful in life and career as they have had the advantage of a paid education. The view that a private school fast tracks students to success is not obscure as it is backed by clear statistics favouring the private school system. For many, especially those in state schools, the idea that a student is 12% more likely to be accepted into a Russel group university for being privately educated is angering and defeating. The fact that no matter how hard a state school pupil works they are still less likely to attend a certain university than a private school student is clear and unwavering evidence for the argument that children whose families paid for their education are fast tracked to success. Furthermore, the Sutton trust states that acceptance rates of the most prestigious Oxbridge universities are higher for independent schools than for state schools with around 34% of independent applications receiving an offer. This shows clearly the non–disputable fact that attending a private school is more likely to earn you a place at one of the world's most prestigious universities – a clear argument that paying students are fast tracked to success. In addition, attending a top university is undoubtedly impressive to employers, gives the opportunity for students to network throughout university, and ultimately continues the privileged and successful life privately educated students have always experienced. This argument is backed by a multitude of statistics and shows all too clearly the hierarchy of education that children are fed into in the UK.

Secondly, many privately educated children are aware of the level of education they receive and the array of skills they are taught. This often manifests itself in a higher level of confidence for children who attend private school. There are many explanations for this, for example the expanse of extra-curricular opportunities for children who attend private school compared to the options for state educated children. This further reflects itself in a recent survey into the level of education adults believe they received from a variety of schools. Research found that just 45% of comprehensive school attendees felt they received a good education, while 77% of adults who received independent education believed they had a good education. This suggests the differing levels of trust that students place in their education which arguably influences their success levels, which may correlate with confidence. A belief in the education you were given is unlikely to have a negative effect on a student and is more likely to increase their self-belief and

confidence, arguably increasing their success levels as a result.

Thirdly, when applied to the career world, children who are privately educated have a higher chance of achieving high status jobs in CEO positions for example. A study into 41 of the UK's top 100 CEOs found that only 34% of CEO's were state school educated. This data proves that privately educated children will gain higher positions in companies due to the education that they received. This argues strongly that if you are educated privately, you are fast-tracked to success as you leave education with a multitude of extra skills preparing you to achieve a high-level job. This supports the saying 'money breeds money' which is true when considering the perks of private education. The cycle continues as children receiving an education that has been paid for are more likely to be employed in a high earning, successful position, thus putting their own children through the private education system. This further contrasts the argument that suggests a detriment of private education is a lack of real-world experience. This is a clear detriment, as if a student attends private school, and then attends a prestigious university, and ultimately has a high power and high salary job – they are likely to have been surrounded by other privately educated peers throughout their journey. This suggests that an ability to relate to the rest of the population seems to be not of the highest importance, as it is likely that students may pass more time with peers of a similar background than with peers of diversity in all its forms. This argument for the statement that privately educated children are fast tracked to success is strong as although the system of private education is unequal, and implements the idea of segregating children from as young as 4, attending an independent school is a clear way to fast track your children to a more successful career and more comfortable life, compared to those who cannot afford to be in private education.

In conclusion, it is clear that private education does fast track students to success. The studies and statistics throughout the essay are a clear portrayal of the divide between state education and private education, impacting not just school experience but career prospects and ultimately impacting the levels of success likely to be achieved. It is primarily unjust and outdated in society today to have normalised a classist education system whereby those who have wealthier families are entitled to a better education and a more successful future. To expand, the concept of segregating children at such a young age is incomprehensible in today's society, teaching young children to sperate themselves from their peers seems a step backwards. Ultimately, the statement that privately educated children are fast tracked to success is accurate as they are exposed to a more personalised and privileged level of education and further opportunities compared to state educated children, ultimately leading to a more successful lifestyle.

To what extent is the class system still prevalent in our modern-day society?

By Rose K

Both sides of the discussion involving class contain strong arguments. Some would argue that class still affects most, if not all social groups within our everyday lives. Particularly those with working class backgrounds often comment that public examination results in education, or higher education are significant evidence that those from working class backgrounds are disadvantaged when choosing career paths and integrating themselves into society. On the other hand, often those from the middle and upper classes argue that in our modern society, social mobility is significantly less out of reach for those in working classes than it has been in years prior. They may point to evidence of class development to support their reasoning that the individual can work hard to determine their own wealth and opportunities, rather than the deterministic attitudes often presented by those arguing the latter. Ultimately, this essay aims to support the belief that although the class divisions are not as clear as they once were, class is still an underlying decider of many important social roles in society today.

As stated, there are some powerful arguments suggested by those who think class is irrelevant within our modern society. Firstly, some people argue that social mobility has increased, meaning that we are seeing more evidence of working-class people shifting into middle and upper classes as a result of education and hard work. The University of Southampton found that in the later decades of the 20th century 70-80% of the public experienced some social mobility.[21] Secondly, those who believe class is not an important factor of modern social life would argue that classes have been fragmented into different subcultures and social groups, weakening class as a form of identity. Thirdly, some would make arguments pointing to the welfare state,

[21] Trends in social mobility in the UK- evidence briefing.

arguing that although people may start in a disadvantaged background, the government has policies in place to aid them out of poverty and create careers for themselves.

However, these arguments have some faults. For example, the argument that there is more social mobility is flawed because it fails to account for a difference in culture between the middle and working classes. This stems from typical childhood learning, for example more working-class parents must work long hours so may not have time to spend teaching their children basic literacy skills from activities like bedtime stories. Those from working classes who have shifted to middle class, may be culturally different to many people they are surrounded by, this can lead to imposter syndrome and provide an imbalance in power even within the typically middle class career or social group they are in. Therefore, even if the working class can gain affluence, they will still be culturally different and forever not given equal opportunities as middle class persons. Similarly, the argument that the welfare state provides opportunities is unfair as the welfare state is barely a living wage, for example if you are single, 25 and younger you are allowed £311.68 monthly**.** So, this provides evidence that the welfare state is hardly a substitute for the culture and opportunity imbalance that working class individuals are faced with.

It is therefore more convincing to argue that class is a relevant factor today because we can reference trends linking prime ministers we have elected in the UK and their schooling. Schooling is a strong indicator of class, and when only eleven out of fifty-eight UK prime ministers have been state educated, we can begin to question whether our country is run by a more privileged class to benefit other middle and upper class people. Whilst these Prime Ministers may not label themselves with class system labels, the evidence clearly shows the correlation between wealth and holding power. This then creates dilemmas around laws and who is advocating for the working class of our country, if there is no one who has experienced life outside of wealth in our parliament how can we be sure that laws are made with the less wealthy in mind. Following this, success in education is also an indicator of the relevance of class in our society. Generally, we use free school meals to measure class within schools. Students on FSM typically don't go into higher education, as of the Office for National Statistics website, "Just under half (48%) of those eligible for free school meals during their KS4 year had gone on to complete a qualification above GCSE level. That compares with 71% of state-educated students who were not eligible for free school meals". This is further evidence that class does influence our society as those on Free School Meals typically will not go onto get degrees leading to higher income futures.

In conclusion, class may not be used as a label in our modern society as frequently as it used to be, however the trends of wealthy, educated people being in power and those who are less affluent being less likely to continue with education post-16 is still strong. Whilst there is some evidence for social mobility in the UK, we still see trends of those who originate from working-class backgrounds being less successful than those who begin as wealthy. Although there are exceptions to this, it does suggest that ultimately the wealthy gain more wealth and power and starting from less wealth will often be a factor that stunts success and opportunities. Ultimately, the evidence points towards the class system still being a key feature of society in the UK.

Does the media deter or encourage serial killers?

By Brenna L

Over the past, the media has presented stories of serial killers and their crimes in multiple different fashions. Examples of these can include documentaries, movies, newspaper articles or TV shows. There are strong arguments that these displays are a positive thing that stops serial killers but similarly there are also arguments that present them as a negative thing that can actually encourage rather than deter their actions. Although both arguments are feasible, this essay will argue in favour of the first argument that they are in fact a good thing that has a negative impact on serial killer actions and henceforth a positive outcome for society.

As mentioned in the introduction, there are arguments made that suggest media portrayal and publicisation of serial killers and their crimes actually stimulate them to continue and increase their actions. To begin with, there is a very famous case from the 70s which highlights how sometimes killers are drawn to the limelight and use it to try and entice victims. In 1978, Rodney Alcala was a bachelor on the popular gameshow 'Dating Game' whilst

hiding the fact he was currently during his known killing period of 1977 to 1979[22]. It is proven that Alcala was responsible for the murders of 7 females during this period, but American authorities believe he could be, although unproven, the killer of up to 130. In addition to

[22] Rodney Alcala - Wikipedia accessed 20/12/24

this he was a convicted sex offender who would sexually assault his victims before ending their lives. The gameshow Alcala appeared on involved three 'mystery bachelors' and one single woman who would ask questions to pick who she would go on a date with. In this case, Alcala's intention became reality, and she picked him. However, before he could make her his next victim, she deemed him to be "creepy"[23]. Making this decision could have kept her alive. This case demonstrates the opinion that the media encourages serial killers as Alcala felt protected and confident enough to go on live national television to find his next victim. Secondly, another way that media can encurage serial killers is by almost 'inspiring' people to become one. A real-life example of this is originated from the incredibly popular TV show 'Dexter' which follows the fictional story of a forensic technician who is secretly a serial killer who only kills murderers who haven't been properly bought to justice. The show ran from 2006 to 2013[24] and became extremely popular with over 1.2 billion weekly views, becoming the second most-watched series ever. One of these fans was Mark Twitchell, a Canadian filmmaker who became so infatuated with the show that he started doing things like posting on Facebook as the character and made short films inspired by it. And so, he then decided to act on these ideologies and began posing as a woman on dating apps consequently attracting the attention of Johnny Altinger. He then sent Altinger an address, met him and bludgeoned and stabbed him to death. He was eventually arrested on the 31st of October 2008, exactly 21 days on from the murder.[25] This is just one of many murder cases committed after being inspired by a true crime series. This can be used to explain how the media is encouraging serial killers because it was proven in his court case and many others that he was in fact motivated by Dexter, and he isn't the only one that was proven to have been inspired by this too.

However, although being feasible arguments and points which are backed by reliable evidence, there are weaknesses to them. For the first point made regarding killers being drawn to the cameras and fame, although proven through a genuine case, this is in the minority of situations. It is very rare, but not unheard of, to find that people who participate in TV shows or are regular faces on the big screen are in fact killers. This is because it is extremely common amongst serial killers to be very impulsive. Henceforth implying that a plan has developed as going through the whole process of being on the TV whether it be a show or a film would be unlikely to appeal to more 'stereotypical' or common killers. This is due to the extent of applying, auditioning, briefing and possible multiple script reading sessions etc. which is a process lasting anywhere from three days to six weeks, therefore not fitting in with an impulsive trait. As for the second point of killers being influenced and inspired by the stories and presence of killers in the media, leading them to do the same thing, there is also a flaw, which is that in the four years between 2020 and 2024, on average 6.4775 billion people watched TV per year[26] worldwide and there were on average 440,000 murders. The likelihood of there being a correlation between these two figures is incredibly low as even if all those murders were done by someone who watched TV it would account for 0.00000679% of annual TV watchers. And even then, people admitting they were influenced would be an even smaller percentage. This subsequently proves that this is a significantly rare case.

Moving on to the argument that the media deters serial killers. We can start by exploring the idea that media coverage and communication of serial killers helps bring evidence to the public and henceforth can aid in solving cases. Examples of this, although not about serial murder, are the cases that BBC's 'Crimewatch' has helped to solve. There are a few high-profile cases that 'Crimewatch' has helped to solve, one of which being the murder of two-year old James Bulger on the 12th February 1993. On the 18th of February 1993, BBC's 'Crimewatch' aired CCTV footage of the two child murderers and toddler, along with a description of the killers, and appealed for any information on the two. The boys were consequently identified by viewers and were found to be Jon Venables and Robert Thompson, both boys of 10 years old. The boys were convicted in November 1993. [27][28]

Secondly, media coverage brings awareness of crimes to the public which reduces the success rate of the crimes of serial killers. This is because when people are aware of what to look out for and how to stay safe, they become more vigilant and wearier. As a result, successful killings are reduced. From 29th August to 5th September 2022, YouGov ran a survey in the US based around true crime shows. Results came back which prove the just-mentioned point. They found that 29% of the 1000 people questioned believed it made people less likely to commit a crime and a huge 62% thought that it made people more vigilant and aware.[29]

The first argument is convincing because without 'Crimewatch' it is highly likely that the process of catching the James Bulger's killers would have been significantly longer. Also, it's important because of how quickly they were identified and caught after being shown on national television, which reduced the killers' chances of committing an additional offence. The Bulger case is one of hundreds helped to be solved by 'Crimewatch'. It ran from 1984 to 2017 with an episode every week and presented 3 to 4 cases per episode, a total of up to 322 installments. That is a total of up to 1284 cases shown and 1 in 3 appeals led to an arrest and 1 in 5 led to a conviction. This shows how successful the show was in both solving and reducing crime.

In conclusion, there are strong arguments for both sides of the answer to the question "does the media deter or encourage serial killers?" On the one hand, we have the argument that killers are attracted to the limelight and attention the media brings, and this pushes them to go further. We also have the argument that watching shows or listening to the podcasts about serial killers acts as inspiration and creates new killers. This is arguably the

[23] https://en.wikipedia.org/wiki/Rodney_Alcala accessed 28/12/24
[24] Dexter (TV series) - Wikipedia accessed 28/12/24
[25] Mark Twitchell - Wikipedia accessed 28/12/24
[26] Global: number of TV viewers 2020-2029 | Statista accessed 28/12/24
[27] Murder of James Bulger - Wikipedia accessed 3/1/25
[28] The big cases Crimewatch helped solve - BBC News accessed 3/1/25
[29] True Crime: Insight Into The Human Fascination With The Who-Done-It - Social Science Space accessed 3/1/25

worst-case scenario because it increases the number of active killers rather than just making the original ones worse. On the other hand, we have the argument that shows like 'Crimewatch' are incredibly powerful in deterring and helping to quickly detain killers because of how influential they are in solving cases and bringing awareness to the whole of the UK. This is linked to the argument that media coverage also helps the public change their own behaviour and actions in order to protect themselves from these heinous crimes. The second argument is more powerful because without awareness of murders then people would not know how to keep safe. As such, media coverage isn't just an act of solving or deterring crimes, but an act of respect for those whose lives have been lost to serial killers and their loved ones that must live with ongoing trauma.

Is it ever right to ban books?

By Izzy W

With Donald Trump being re-elected as president of the USA, the topic of book bans has reignited. More than 10,000 books were banned across public schools in the USA in the 2023-2024 academic year, this nearly tripled the previous year's 3,362.[30] This is likely to increase with a Trump presidency as Project 2025 has mentions of certain issues not being protected by the First Amendment of free speech.[31] Project 2025 is a 900-page document, written by the Heritage Foundation which contains many of Trump's former White House officials and contains policy ideas not too dissimilar to Trump's. There are compelling arguments for and against banning certain books. Most people argue that no books should be outright banned, and free speech should protect the publishing of all books. By contrast, defenders of book banning site protection of children from explicit topics as being the most important thing. Ultimately, having reviewed the arguments on both sides, this essay will argue that it is never right to ban books.

As stated, there are some powerful arguments for banning certain books. Firstly, the protection of children against explicit topics. This is clearly stated in the Republican document Project 2025: "Pornography, manifested today in the omnipresent propagation of transgender ideology and sexualization of children [...] has no claim to First Amendment protection. [...] Educators and public librarians who purvey it should be classed as registered sex offenders."[32] This shows how books are categorised as pornography in certain circumstances by those who want to ban books. This is exaggerated language as many of the books that they are targeting do not come close to erotica which would be the correct genre of book that they do not want in school libraries. One book that is constantly mislabelled as pornography is *All Boys Aren't Blue* by George M. Johnson, as it contains two scenes that describe sexual situations that he has been in.[33] The first of these is when he was sexually assaulted by a family member and is intended educational about his feelings on the situation

as he looks back on this. The other scene is his first consensual sexual experience which is used to educate the reader on how he overcame his past traumatic experiences and to talk about the importance of consent. This book is clearly labelled as young adult which typically means that it is for teens and above so there is no need for it to be banned from public libraries as it is obvious that it is for older readers.

Another argument for banning is that books that contain misinformation can be harmful if there is no warning that the information is fake. Rebekah Robinson found many books on Amazon about vaccines that contain misleading and completely false information that is harmful if it is believed.[34] One of the books she found said that the smallpox vaccine is more harmful than the disease itself which is extremely dangerous misinformation. Other harmful books such as Hitler's infamous *Mein Kampf* and others containing dangerous political propaganda based on false information are examples of books that we can all accept should have some restrictions. These books should have pages explaining that they contain false information and not available as personal reading to gain political information. *Mein Kampf* has never been illegal in the

[30] https://www.theguardian.com/us-news/2024/sep/23/pen-book-bans#:~:text=US%20public%20schools%20banned%2010%2C000%20books%20in%20most%20recent%20academic%20year,-This%20article%20is&text=More%20than%2010%2C000%20books%20were,states%20pass%20new%20censorship%20laws. (Accessed 15/11/2024)

[31] https://lithub.com/the-republicans-project-2025-is-disastrous-for-books/ (Accessed 15/11/2024)

[32] https://static.project2025.org/2025_MandateForLeadership_FULL.pdf (Accessed 15/12/2024)

[33] https://www.ala.org/bbooks/frequentlychallengedbooks/top10 (Accessed 03/01/2025)

[34] https://www.codastory.com/newsletters/amazon-books-misinformation/ (Accessed 15/12/2024)

USA, and is available in many public libraries, so it is concerning to me that books are being challenged solely for having LGBT content in this same country.

In turn, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. For example, the argument about children being exposed to inappropriate topics can be questioned as children of different ages require different levels of censorship. We can argue for age rating for books or not to put adult books in children's libraries, but it does not mean that these books should be outright banned. Many books with LGBTQ+ characters are overexaggerated as being sexual when this is not the case and books with scenes of same sex characters are more likely to be challenged than the same situation taking place between two heterosexual characters. This is clear with an increase of books with LGBTQ+ themes being targeted by those wanting to ban books.[35] This shows that it is not the sexual content in general that is being targeted but the fact that it is LGBT characters. In this situation, diversity is being infringed upon and books that are suitable for children are being prejudiced against unfairly. Parents can decide for themselves whether they want to censor their children from diversity, but they should have the choice to allow their children to read books about the real world when age appropriate.

Furthermore, many adult books with discrete covers already have warnings that they contain explicit content on the back cover or in one of the front pages to warn the reader, so these warnings are readily available within the book. Age ratings for books can also be quickly accessed online if someone is unsure of the contents within the book. Websites such as *The Storygraph* contain lists of content warning for almost every book possible based on reviews and ratings from others using the website, so it is available for those unsure on the content within a book.

Overall, it is clear that it is never right to ban books in any circumstance. This said, it is understandable that some books can contain content that is not suitable for all audiences including some that are not appropriate for children. To help combat this issue, we should make the age-ratings of books clearer and more available so that it is obvious for the reader and their parent, if necessary, to decide for themselves whether the book is suitable for them. Many books with challenging topics already contain trigger warnings and some books with harmful misinformation have warning pages and explain that they are there for historical information rather than a depiction of historical “truth”. So, after considering both sides of the argument, it is clear that the banning of any book is almost always wrong.

THE SCIENCES

Are mitochondria really the ‘powerhouses’ of the cell?

By Millie A

Since Philip Siekevitz called the mitochondrion the ‘powerhouse of the cell’ in his 1957 ‘Scientific American’ article of the same name, mitochondria have been widely recognised as having a central role in ATP production (adenosine triphosphate, the source of energy at a cellular level).[36] However, recent studies suggest that the role of mitochondria expands beyond just ATP synthesis. For example, Mustafa Khokha, MD claims that “Mitochondria aren’t just providing power” with academic research backing up his claims, such as discoveries linking mitochondria to calcium signalling and apoptosis (cell death).[37-38] Therefore, although the mitochondrion’s main and most well-known role is ATP production, does the term ‘powerhouse’ really represent the mitochondrion in its entirety?

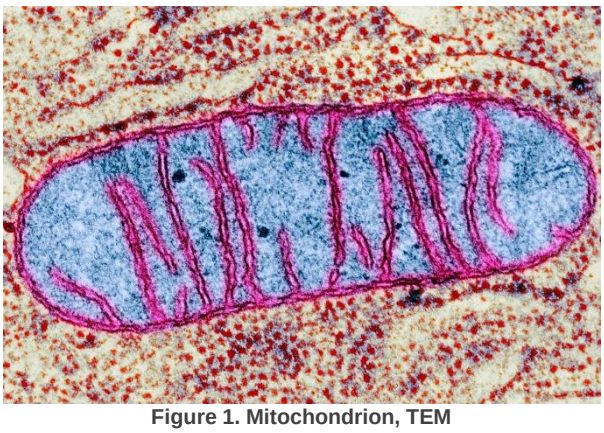


Figure 1. Mitochondrion, TEM
CNRI/SCIENCE PHOTO LIBRARY

[35] https://www.theguardian.com/books/article/2024/aug/19/uk-school-librarians-asked-remove-lgbtq-books-index-on-censorship (Accessed 29/11/2024)
[36] Siekevitz, P. (1957). ‘Powerhouse of the Cell’, Scientific American (acc. 22/11/2024)
[37] Sauer, R. (2023). ‘Not just the powerhouse of the cell’, Colorado Arts and Sciences Magazine (acc. 22/11/2024)
[38] Blackman, I. (2023). ‘Mitochondrial Function: Beyond Serving as the ‘Powerhouse of the Cell’’, Yale School of Medicine (acc. 22/11/2024)

By referring to mitochondria as simply the 'powerhouses' of the cell, we are neglecting to mention their pertinent role in other functions, including apoptosis (cell death), calcium homeostasis, heat production and immune response.[39] Martin Picard, Ph.D., argues "the powerhouse analogy is outdated and one-dimensional and can impede science by limiting researchers' perceptions of what mitochondria can do."[40-41] Similarly, William Aisenberg, Ph.D. explains how "context adds richness to every subject […] that richness is lost when we try to synthesize them [mitochondria] down to a single simple idea" and that, by removing mitochondria from their cellular context, results in an incomplete understanding of a complex organelle.[42] Through looking at mitochondria in the context of the cell, studies have revealed their other vital functions within the cell. One example of this is mitochondrial Ca^{2+} homeostasis. High calcium levels can trigger processes such as necrosis (cell death), so mitochondria absorb and release calcium to act as a buffer by the calcium uniporter protein in the inner mitochondrial membrane.[43] In addition,

mitochondria play a role in apoptosis (cell death).[44] The Bcl-2 family of proteins regulate mitochondrial permeability, with antiapoptotic proteins including Bcl-XL (against apoptosis), and proapoptotic proteins including Bax and Bak (for apoptosis).[45] For example, when a cell is severely damaged, Bax and Bak - two nuclear-encoded proteins - pierce the mitochondrial outer membrane to allow the release of the protein cytochrome c (Cyt c) into the cell's cytoplasm. Cytochrome c binds with other proteins in the cytoplasm to form the apoptosome, which activates caspase proteases which break down the cell's components, including proteins and DNA.[46] This causes the cell to break apart into smaller fragments which can be removed by phagocytes via phagocytosis. Thus, through research into mitochondria in their cellular context, studies have shown their roles expand beyond simply ATP production, therefore suggesting that the coined term 'powerhouse' does not represent the mitochondrion in its entirety.

However, despite the seemingly convincing nature of these arguments, there are several flaws in the reasoning. Although the mitochondrion's role is clearly broader than initially assumed, their main role remains the production of adenosine triphosphate, the source of energy at a cellular level. Due to mitochondria generating the majority of ATP, this is seen as their main role and thus their label as the 'powerhouse' is well founded. Others may argue that ATP production occurs elsewhere, and although this is true, much less ATP is produced.[47] For example, ATP production also occurs through glycolysis in the cytosol of the cytoplasm, where one glucose molecule is broken down into two pyruvate molecules.[48] However, because of the anaerobic conditions, pyruvate undergoes fermentation in the cytoplasm rather than progressing into the Krebs (citric acid) cycle in a mitochondrion. This produces a net gain of 2 molecules of ATP.[49] Thus, much less ATP is produced due to the absence of the Krebs cycle and electron transport chain which produce more ATP.[50] On the contrary, if oxygen is present (aerobic conditions) then the pyruvate molecules go to a mitochondrion where they are split apart and combined with coenzyme A (CoA) to produce acetyl-CoA. In the mitochondrial matrix, the acetyl-CoA molecules start the Krebs cycle where they release carbon dioxide and high energy electrons. Through oxidative phosphorylation, electrons move through proteins in the electron transport chain, which provides energy for hydrogen ions to be pumped across the mitochondrion's inner membrane, creating a concentration gradient. The H+ ions then flow back into the mitochondrial matrix through the enzyme ATP synthase, which provides the energy needed to attach a phosphate group to ADP to produce ATP.[51] Oxygen then combines with the H+ ions and electrons to form water. Therefore, in the matrix of mitochondria through aerobic respiration, 32 ATP molecules are generated per molecule of glucose that is oxidised. In contrast, the cytoplasm only produces 2 molecules of ATP.13 Therefore, although it has been revealed that the mitochondrion's role expands beyond simply ATP production, mitochondria are still the 'powerhouses' of the cell in relation to this feature since more energy is released through cellular aerobic respiration than glycolysis in the cytosol.

Furthermore, the Cambridge dictionary defines the noun 'powerhouse' as: a country, organization, or person with a lot of influence, power, or energy. Due to the mitochondrion's central role in energy production, this feature of ATP production to release energy fits the definition. Studies argue that mitochondria are not the powerhouse of the cell due to their role being broader than once initially assumed, however, the reveal of the multiple other roles of mitochondria (including apoptosis and calcium homeostasis) do not in fact, neglect their coined term of the powerhouse, but rather complement this intricate definition. Due to the definition including an influential nature, the mitochondrion's influence in the context of the cell fits the definition. Thus, at first glance the definition of a powerhouse is perceived as not a direct link to mitochondria, with the noun power seeming as a synonym for energy; however, the coined term of powerhouse could instead link to the influential nature of

[39] Newman, T. (2023). 'What are mitochondria?', Medical News Today (acc. 22/11/2024)
[40] Picard, M. (2023). 'Exploring the Mind-Mitochondria Connection', Columbia Neurology (acc. 22/11/2024)
[41] Gerhard, D. (2023). 'Rebranding Mitochondria', The Scientist (acc. 08/01/2025)
[42] Aisenberg, W. (2019). 'The Powerhouse of the Cell: The Branding of Mitochondria', Biomedical Odyssey (acc. 24/11/2024)
[43] Zhang, D. et al (2022). 'Mitochondrial Ca2+ Homeostasis: Emerging Roles and Clinical Significance in Cardiac Remodeling', Int J Mol Sci, (acc. 03/01/2025)
[44] Wang, C. 'The Role of Mitochondria in Apoptosis', Annu Rev Genet (acc. 03/01/2025)
[45] Jakubowski, H., & Flatt, P. (2023). 'Programmed Cell Death', LibreTexts (acc. 30/12/2024)
[46] LeClair, R. (2021). 'Apoptosis', LibreTexts (acc. 30/12/2024)
[47] Wakim, S., & Grewal, M. (2024). 'Cellular Respiration', LibreTexts (acc. 20/11/2024)
[48] Chaudhry, R., & Varacallow, M. (2023). 'Biochemistry, Glycolysis', StatPearls (acc. 22/11/2024)
[49] Melkonian, E., & Schury, M. (2023). 'Biochemistry, Anaerobic Glycolysis', StatPearls (acc. 22/11/2024)
[50] Kaiser, G. (2023). 'Fermentation', LibreTexts (acc. 20/11/2024)
[51] Ahmad, M. et al (2023). 'Biochemistry, Electron Transport Chain', StatPearls (acc. 20/11/2024)

this organelle, both in the context of an organelle (ATP production) and in the context of the cell (apoptosis and calcium homeostasis).

However, if we argue that the coined term 'powerhouse' still applies to mitochondria, despite new advances in discoveries of its roles, this means that the mitochondria is the most influential organelle in the cell (as well as being most efficient in ATP production). However, some may argue that the nucleus is in fact the 'powerhouse' of the cell, if the definition includes the organelle having 'influence'. Due to the nucleus being the holder of genetic information (DNA - deoxyribonucleic acid) and the cell's control centre, it could be argued as the most vital organelle of the cell and therefore the most influential. DNA replication, transcription and RNA processing all take place in the nucleus and without these processes, new proteins would not be able to be made. Even mitochondria, to some extent, are controlled by the nucleus, since despite mitochondria having their own genome (mitochondrial DNA), over 95% of their proteins are encoded by nuclear DNA.[52] Thus, if we are determined to sustain the mitochondrion's coined term 'powerhouse', we must assess which organelle most fits the whole definition – including influence as well as energy. Therefore, even if we broaden the use of the term 'powerhouse' to its whole definition rather than solely energy, then we need to make sure that there isn't another organelle (such as the nucleus) which is more influential than a mitochondrion.

On the other hand, to examine the true nature of the mitochondrion we must explore the theories of their evolutionary origin. Lynn Margulis' endosymbiosis theory, presented in her 1967 paper 'On the Origin of Mitosing Cells' proposed that mitochondria evolved from independent, aerobic prokaryotes (free-living bacteria).[53] This links to the theories that the mitochondrial endosymbiont was an obligate aerobe, meaning that it required oxygen to grow and survive.[54] Margulis describes how prokaryotes developed nucleotide sequences that coded for porphyrins (molecules that could bind with oxygen) due to oxygen accumulating in the atmosphere.[55-56] This mutation protected these cells from the harmful effects of oxidisation by evolving to contain mechanisms that used oxygen to produce ATP (adenosine triphosphate, the molecule that stores energy in cells).[57-58] To survive to the oxygen rich atmosphere 1.2 billion years ago, Margulis further claims that eukaryotes originated from an anaerobic proto-eukaryote which engulfed the aerobic prokaryote (proto-mitochondrion), resulting in an endosymbiotic relationship.[59-60] This theory of mitochondrial evolution and origin supports the argument of the mitochondria being the 'powerhouses' of our modern eukaryotic cells, since ancestral mitochondria enabled proto-eukaryotes to survive in the oxygen-rich environment and to produce ATP for energy storage in cells. Thus, if indeed this theory of mitochondrial origin is correct, with the proto-mitochondria being aerobic and proto-eukaryote being anaerobic, then the term of mitochondria being 'powerhouses' comes to fruition.

Margulis' endosymbiotic theory proposed that the symbiotic relationship protected the anaerobic proto-eukaryote host against oxygen, which was taken up by the aerobic prokaryote (ancestral mitochondrion). However, the flaws in this argument are that oxygen free radicals, rather than oxygen itself, are toxic.[61] Mitochondria generate many free radicals, so their host proto-eukaryote would have been exposed to greater damage rather than protection. In modern mitochondria, reactive oxygen species (mtROS) are produced as a side effect of the electron transport chain.[62-63] ROS refers to highly reactive species containing oxygen, which include the free radicals $\cdot O_2^-$ (superoxide anion) and $\cdot OH$ (hydroxyl radical), and non-radical H_2O_2 (hydrogen peroxide).[64] These are very reactive due to having unpaired electrons so can damage lipids, proteins and DNA. Therefore, it would have not been a beneficial symbiosis if the dependence was on oxygen due to the production of reactive oxygen species.

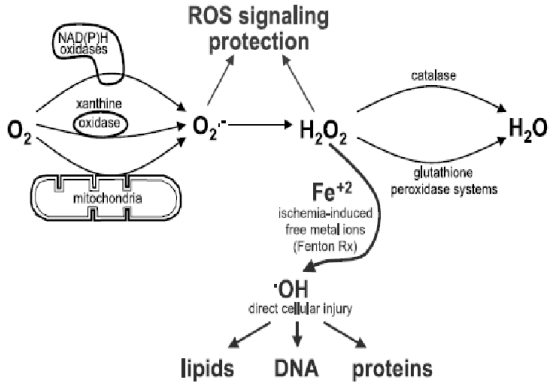


Figure 2. Describes the generation of free radicals and some mechanism of removal of ROS Seifu, D. et al (2012). 'Medicinal plants as antioxidant agents', Trams world research network

[52] Walker, B., & Moraes, C. (2022). 'Nuclear-Mitochondrial Interactions', Biomolecules (acc. 07/01/2025)
[53] Sagan, L. (1967). 'On the origin of mitosing cells', J Theor Biol. (acc. 08/02/2025)
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[56] Haskett, D. (2014). '"On the Origin of Mitosing Cells" (1967), by Lynn Sagan', ASU (acc. 08/02/2025)
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[58] Gray, M. (2012). 'Mitochondrial Evolution', Cold Spring Harb Perspect Biol. (acc. 08/02/2025)
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[60] Roger, A., Muñoz-Gómez, S., & Kamikawa, R. (2017). 'The Origin and Diversification of Mitochondria', Current Biology, Volume 27, Issue 21, R1177 - R1192 (acc. 08/02/2025)
[61] Floyd, R. (1990). 'Role of oxygen free radicals in carcinogenesis and brain ischemia', FASEB J. (acc. 10/02/2025)
[62] Zhao, R. et al., (2019). 'Mitochondrial electron transport chain, ROS generation and uncoupling (Review)', Int J Mol Med. (acc. 08/02/2025)
[63] Ray, P., Huang, B., & Tsuji, Y. (2013). 'Reactive oxygen species (ROS) homeostasis and redox regulation in cellular signalling', Cell Signal (acc. 08/02/2025)
[64] Soderberg, T. (2021). '3.9: Hydrogen Peroxide is a Harmful Reactive Oxygen Species', LibreTexts (acc. 08/02/2025)

Thus, Martin and Müller propose the 'hydrogen hypothesis', which suggests that the ability of the ancestral mitochondria to produce hydrogen – rather than use oxygen – was the basis of their symbiosis that gave rise to eukaryotes.[65] They argue that the host to the proto-mitochondrion was an anaerobic, hydrogen-dependant archaeon. This then took up a respiring a-proteobacterium, which generated hydrogen and carbon as waste products of anaerobic heterotrophic metabolism.[66] The hypothesis suggests that the endosymbiosis was driven by the metabolic syntrophy between the two: the waste product of one was used as an essential metabolic resource by the other. It was not until after the symbiosis was well established that the host cell is suggested to have started exploiting the ability of the proto-mitochondria to use oxygen.[67] According to Martin and Müller, the host was a methanogenic archaebacterium, which used hydrogen and carbon dioxide to produce methane, whilst the proto-mitochondrion was a facultatively anaerobic eubacterium that could respire aerobically in the presence of oxygen, or by fermentation in its absence. The symbiosis, based on hydrogen rather than oxygen, contrasts with Margulis' theory and suggests that oxygen was not the molecule that drove the evolution of complex life. Thus, the 'powerhouse' analogy when describing the role of mitochondria in ATP production – using oxygen – was not the original role of the a-proteobacterium (ancestral mitochondrion) when it entered a symbiosis to form an early eukaryote. Therefore, the hydrogen hypothesis of the origins of mitochondria does not link with their current description of a 'powerhouse' of the cell, and thus suggests that this analogy does not account for the origins and evolution of this organelle.

Both the 'endosymbiosis theory' and the 'hydrogen hypothesis' debate upon the origins and evolution of mitochondria, questioning whether the purpose of the symbiosis was oxygen or hydrogen. However, since neither theory have been proved, the question of mitochondrial ancestry remains – at least partially – unanswered. Thus, to conclude this debate, we must assess the context at hand through analysis of our modern mitochondria rather than hypothesising their evolution to assess the suitability of the 'powerhouse' analogy.

In conclusion, to some extent, mitochondria are not the powerhouses of the cell, due to the term being coined by Philip Siekevitz as a result of their role in ATP production. Indeed, after recent discoveries, the mitochondrion's role is revealed to expand beyond simply ATP production. Thus, on one hand, the term 'powerhouse' does not describe the mitochondrion in the context of an organism, where it is also responsible for cell death, immune response, calcium signalling, and more. Some may argue that by analysing the definition of the original coined term 'powerhouse', the mitochondrion still fits this term ('a lot of influence, energy or power') due to being influential in the context of an organism. However, if we expand this definition to include influence, other organelles – such as the nucleus – must be looked at beneath this definition also. Therefore, the nucleus could also be called the powerhouse of the cell due to containing the cell's DNA (genetic information), which even codes for 95% of mitochondrial proteins. So, does this mean that mitochondria cannot be the classed as the powerhouses of the cell because its role expands beyond ATP production? The problem here is that if we expand the definition to include influence, other organelles (such as the nucleus) seem more influential than a mitochondrion. However, definitions are constantly changing and in each dictionary the definition differs slightly. It is semantics debating whether mitochondria are the 'powerhouses', or the 'energy centres' (as claimed by Doctor Mike on 'X'), of the cell.[68] Both terms are equivalent analogies. In regard to the extent of mitochondria being 'powerhouses' (or even 'energy centres'), someone who has a job as a plumber could also have a job as a painter, meaning that mitochondria can be both 'powerhouses' (ATP producers) but also cell death communicators, calcium signallers, and other names linked to their other roles. Although the term 'powerhouse' seems like an attempt at synthesising a complex organelle down to a simple idea, it is merely a way of describing the mitochondrion's most well-known function in order to make biochemistry accessible for everyone.

[65] Martin, W., & Müller, M. (1998). 'The hydrogen hypothesis for the first eukaryote', Nature (acc. 08/02/2025)
[66] Travis, J. (2009). 'The hydrogen hypothesis: How did complex cells get their power stations?', Science News, Volume 153, Issue 16, pg 253-255 (acc. 08/02/2025)
[67] Lane, N. (2010). 'Hydrogen bombshell: Rewriting life's history', New Scientist (acc. 08/02/2025)
[68] @RealDoctorMike (2020). 'Chill… it's the energy centre of the cell', X - formerly Twitter (acc. 08/01/2025)

How effective is sports phycology in enhancing performance?

By Sophie B

There are arguments for and against the effectiveness of sports psychology. Some may argue that it is not effective purely because there are too many factors to consider and get right to achieve the desired results. Sports psychology can often be poorly delivered and many athletes may simply not want to engage with it in the right way. By contrast, supporters of sports psychology may argue that the best results in their performance are achieved when an athlete is in touch with both their mind and body and is able to work with them integrated together. Ultimately, having reviewed the arguments on both sides, this essay will argue that sports phycology can achieve undeniable results in terms of improving performance. However, this improved performance is wholly dependent on the athlete's willingness to engage with the mental activities and the ability of the coaches and phycologists to carry out their sessions effectively.

As stated, there are some powerful arguments around how sports psychology is not as effective as many claim it to be. Firstly, an athlete may seek a psychologist to help them prepare themselves for a specific game or upcoming competition. This is often a way for the athlete to come up with temporary fixes that they are struggling with in order to cope with the demands of their sport. The problem with an athlete seeking phycological help like this is they often only find temporary fixes and solutions to what they need addressing in the moment, rather than tackle underlying problems they may be facing in the long-term experience of their sport. Athletes can feel as though they are under extreme amounts of pressure at certain moments during their sporting career, and many can start to feel as though they are 'not worthy' if they don't manage to perform at their best. Sports psychology is supposed to be able to help athletes feel secure within themselves and what they are doing all the time, however for this to be achieved, mental practice must take place on a regular basis. The problem is most athletes only commit to a few sessions occasionally to 'fix' them until they next need help. This causes them to regress back to where they started in the medium-term, and what they did learn about integrating the body and mind into one can be lost if it is not practiced regularly enough. When their ability to work mind and body together starts to deteriorate, their performance levels will decrease too, thus resulting in the time spent on mental practice being rendered useless.

Secondly, many athletes view seeking a sport phycologist's help as a 'weakness' and something to be ashamed of. There's still a rather large stigma around talking about your mental health and training yourself to cope with the demands of the sport, as many athletes and coaches have a 'no pain, no gain' mantra. This mindset is often interpreted to younger athletes that if you aren't pushing yourself to breaking point, then you aren't doing it right. This discourages people from seeking psychologists and carrying out mental training as it is viewed as a 'cop out' and not being able to cope

with the demands of the sport. These attitudes overall mean that many young athletes don't participate in mental practice and, if they do, they often don't engage with it to the level that's necessary to achieve desired results. This means that when you look at where mental practice has gone, it appears to have had very minimal effect. However, despite the seemingly convincing nature of this argument, there are several flaws in the reasoning. Indeed, we currently live in a much more progressive society with many movements pushing people to be more aware of mental health. This ties in perfectly with sports phycology as its centred a lot around how athletes may be experiencing certain mental blocks. Furthermore, there are now high-profile professional athletes covering a wide range of sports who have taken breaks due to the struggling to deal with the mental demands of their sport and who have in turn publicly advocated for more emphasis on sports phycology for the new generation of athletes. For example, Ben Stokes - England's Test Cricket Captain - took a 6-month break from cricket to prioritize his mental health in 2021. As said, these type of role models are all over the sporting community, so it now seems to be a weak argument to claim that people who participate in sports psychology are looked down upon in such a way.

Another argument against the sport psychology is that it can be very difficult to get the right pairing between a sports psychologist and a given athlete. When pairing an athlete or group of athletes with a psychologist, it's very important that the athletes feel as though the psychologist is a good fit for them. This will result in the athletes feeling much more comfortable working through their mental practice meaning progress is likely to be made much faster. When looking at training the top athletes, many things are taken into consideration: rest to work ratio, diet, training types and fitness. However, often it seems that sports psychology is pushed to the bottom of the priority list. This in itself sends a message to young athletes that it is not worth the time and discourages them from engaging in it. This may also mean that when you do find them engaging with it, it's often reluctantly and so results are usually quite minimal and less appealing to the results of other forms of training. When sports phycology finally is taken into

consideration, it's often a last thought and the first psychologist available is handed to the athletes and they're told to get on with it. The problem with this, as mentioned before, is that you can't guarantee the psychologist is going to 'gel' with the athletes. If this happens, the mental practice sessions can become awkward and possibly even a bit forced from the athlete's perspective and will ultimately result in very little progress, no matter how much effort the psychologist is putting in on their behalf.

However, once again, this argument is flawed purely because this problem has quite an easy fix. The phycologists are the professionals and are experienced in working with clients. As such, it is up to them to work out that the athletes are not engaging properly and, at this point, there's two options: Firstly, the phycologists are usually skilled enough to work with the athletes to get to a point where they are comfortable around each other. Alternatively, the phycologist should recognise that they aren't making sufficient progress and step down in order for a new one to come in, who the athlete may get on with better.

Taking all this account, it is clearly more convincing to argue that psychology is effective in enhancing performance. Firstly, many professional athletes will agree that when the mind and body is integrated, you perform better. Practicing sports phycology effectively can help athletes to improve their focus and concentration levels both in training and competitive situations. This allows them to ignore external stimuli that are just distractions and only focus on the task in hand, in turn allowing them to have more effective training sessions and perform to the best of their ability. Sports phycology can promote positive self-talk and help to build confidence within oneself. This is especially helpful for athletes returning from injury as they are often likely to experience many mental obstacles and barriers from having been away from their sport for any period of time. Furthermore, the arguments presented here are particularly convincing, most notably the idea that 'when the body and mind are integrated, you perform better'. Scientific evidence consistently shows that mental training improves the efficiency and thickness of the myelin sheaths in the relevant part of the brain associated with those specific motor skills. Myelin sheaths are the insulating layer formed around nerve cells and, the more efficient they become, the faster the body can transmit electrical signals across it in order to carry out tasks. This means that mental training can help an athlete to relay messages within their body more efficiently, which will in turn improve performance. This further backs up our original statement of 'when the body and mind are integrated, you perform better'.

Secondly, UK Coaching states that understanding sports phycology is important to coaching any athlete. This is because it allows coaches to understand the performer as both an athlete and a person. This helps to develop trust between athlete and coach, and training can be catered specifically to each performer leading to more effective sessions. The essence of the mental training is to combine phycology, mental health and mental well-being to cater to each athlete's individuality and allow them to train at their best. This results in higher levels of motivation and confidence which are directly reflected in their performance levels increasing. In addition to this argument, leading and legendary athletes such as Michael Jordan and Simone Biles are well known for their use of phycologists alongside their other forms of training. They openly speak about how phycology helped them to gain another perspective to learn from and enhance their ability to train and get better. In the case of Simone Biles in the 2020 Tokyo Olympics, she experienced a case of the 'twisties' which caused her to eventually pull out of four of her events and prioritise her mental health. In turn, Biles worked tirelessly on both her mental and physical training to build herself up again for the 2024 Paris Olympics, at which she won three gold medals.

Finally, when at the very top of any sport, the difference in physical ability between each performer is very slight, meaning marginal gains are of the utmost importance. This is where sports phycology comes in. Phycologists work to not only help athletes through problems they may be facing but also help analyse their performances and look at what they may have felt went right or wrong. They then work to provide tactics and strategies to improve performance further. This is evidenced in Kobe Bryant's reflections on his work with sports phycologist George Mumford: "[I learned to be] neither distracted or focused, rigid or flexible, passive or aggressive. I learned just to be." Bryant would go on to be the all-time leading scorer in Lakers history, playing in the NBA for twenty seasons. He regularly credits Mumford for helping him reach his potential.

In conclusion, there's clear evidence that suggests that sports phycology is effective in enhancing performance. From many high-profile athletes advertising its benefits to development of neurotransmissions within one's body, sports phycology can help improve performance and give athletes the edge they need to succeed. It must however be acknowledged that this method of training is not perfect and most definitely cannot be used alone in the replacement of physical training, although it can be very beneficial to athletes during a period of injury. The benefits of sports phycology can only be gained if both athlete and phycologist can work well together, and sessions are carried out correctly. When these ingredients are in place it is safe to say that sports phycology is very effective in enhancing performance.

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Is it possible to eradicate disease?

By Abbie E

There are strong arguments for and against the possibility of disease eradication. The majority of experts are of the opinion that eradication of all diseases is extremely unlikely and aims of specific elimination and prevention are more reasonable for looking at improving public health. Geographical, social and political challenges influence these opinions due to the investment, time and international coordination that is required just to eradicate single diseases. On top of this, current knowledge and technology means that only infectious diseases can be labelled as eradicated. By contrast, others maintain the belief that disease eradication is possible due to the examples of smallpox and rinderpest in plants.[69] If this disease has been eradicated, then why can't others? To further this argument, it can be suggested that disease eradication may be possible in the future as knowledge, technology and institutions develop. Despite being extremely unlikely, theoretically disease eradication could be possible if all the factors required for it to happen lined up. Ultimately, having reviewed the arguments on both sides, this essay will argue that it isn't possible to eradicate all disease, but that eradication of singular infectious disease and the elimination of certain diseases from specific geographical regions is the most likely path for the future.

As stated, there are many arguments that indicate disease eradication is possible. The example of smallpox provides hope for many that other diseases can also be eradicated. For smallpox to be eradicated, it required a concerted effort wide world that focused solely on eradicating smallpox instead of multiple diseases at the same time. Smallpox was eradicated through mass vaccination and surveillance.[70] This implies that other infectious diseases can also be eradicated if a suitable vaccine is created, spread and surveyed. However, this process isn't so straightforward. Creating vaccines specific for each infectious disease is a significant task

and, in addition, mass vaccination requires international co-ordination to be able to happen. For example, there is a functional vaccine for polio, however polio hasn't been eradicated. The majority of people have been vaccinated against it; however, it is still present in Afghanistan and Pakistan. Ongoing conflicts make mass vaccination of the children in these countries a low priority, therefore preventing the complete eradication of polio.[71] The eradication of a disease is global and permanent and, therefore, polio hasn't been eradicated. However, it has been eliminated – that is removed from a specific geographical area – from all countries except Pakistan and Afghanistan.[72] This is why many argue that, whilst eradication may not be possible, elimination is.

Secondly, many maintain the belief that we may be able to eradicate disease in the future. At present, knowledge, technology, and institutions are responsible for the monumental task of eradicating and eliminating diseases.[73] Currently, these factors only meet the criteria to eradicate a few diseases. However, it is possible that in the future, these factors may develop to make it possible for mass disease eradication, such as with the development of AI technologies. As shown in history, singular inventions and discoveries are breakthroughs that create multiple new possibilities. For example, this is shown by the work of Edward Jenner in 1796 when he discovered the first vaccine for smallpox, and through Pasteur's work on germ theory in 1861, which provided a foundation for future medical research relating to

[69] https://ourworldindata.org/eradication-of-diseases (28/11/24)
[70] https://www.who.int/health-topics/smallpox#tab=tab_1 (22/11/24)
[71] https://www.cdc.gov/global-polio-vaccination/about/index.html#:~:text=Ongoing%20conflicts%20and%20competing%20health,in%20countries%20with%20wild%20poliovirus (22/11/24)
[72] https://ourworldindata.org/eradication-of-diseases (22/11/24)
[73] https://ourworldindata.org/eradication-of-diseases (28/11/24)

vaccinations.[74] [75] However, despite the seemingly convincing nature of this argument, there are several flaws, the main one being that we cannot predict the future. It is easy to say that our knowledge and technology will improve in the future, making it potentially easier to eradicate more diseases more quickly. However, there is no evidence to say that this is the case; in fact, you could say that in the future, knowledge may not develop in the way needed. For example, despite vaccines having been proven effective in the eradication of smallpox and prevention of other diseases, there are still many who refuse to get themselves and their children vaccinated. These people may decide against vaccinations because they are scared about the side effects, are sceptical of the vaccinations and the governments promoting them, or don't understand the science behind them.[76] On top of this, there are theories that spread throughout the public, causing some of the public to be sceptical, evidenced when a study published in 1998 in the Lancet stated that there may be a link between the MMR vaccine and autism.[77] Despite this theory being retracted by the Lancet due to insufficient data and financial motives of its publishing, the idea spread and significantly weakened public confidence and uptake. This demonstrates that, even if new vaccines and more successful ways to prevent disease were developed, there would always be some that refused to comply and therefore the diseases can't be completely eradicated. To reinforce the fragility of this point, the ethics of disease eradication may be explored. The eradication of smallpox was undoubtedly beneficial due to the lives saved, indicating that the eradication of disease is unarguably ethical, however when other factors are considered, such as the expense caused by failed eradication campaigns or the casualties brought upon by complications with vaccines or eradication methods, the ethics aren't so straightforward. [78] This means that, even if easier methods of eradication are developed, they may still be sidelined due to the ethics involved. Therefore, to conclude this point, we cannot predict the future; it is impossible to know whether disease eradication will actually become possible, rendering this argument weak.

Thirdly, there is another theoretical argument to the possibility of disease eradication. Some may argue that it is possible to eradicate disease, just extremely unlikely. For example, some diseases such as guinea worm disease can be eradicated through hygiene, water decontamination and health education.[79] Therefore, if everyone lived a hygienic life with potable water, it would be eradicated. Although this is unlikely due to entrenched poverty and other geo-political factors, it is theoretically possible. However, this argument can be considered weak due to the extremely rare chance of it actually happening. Looking at the case of guinea worm disease, remaining cases are found in the most remote and war-torn communities that are harder for health workers to access and therefore are not only unaware of how they can prevent contracting it - that is by filtering their water with a simple mesh fabric – but also are harder for health workers to keep track of meaning the spread of the disease can't be surveyed and therefore contained easily.[80] As a result, this links to the strong argument against disease eradication being possible based on social and geographical factors.

It is therefore more convincing to argue that it is not possible to eradicate disease, although elimination is an attainable goal. As shown above, social, political and geographical factors are a considerable stepping stone that must be overcome for the eradication of disease to be vaguely feasible. Firstly, for a disease to be eradicated, it must be eliminated from all geographical regions. [81] This is extremely hard due to, as mentioned previously, war-ridden, remote and poor areas. When an area is involved in war, all of their resources and effort is put into that war, or at least into preventing the damage done to that area. This means that disease eradication is sidelined along with many other issues by the governments who need to cooperate in order to track known cases or organise mass vaccination and eradication campaigns, as demonstrated by the ongoing problems of polio in Afghanistan. In turn, this results in the disease becoming uncontained; as surveillance is lost it becomes dangerous for health workers to reach any reported cases, and money used to run public health campaigns is being funnelled into the war effort instead. Therefore, whilst there are areas of war, disease cannot be eradicated.

Remote areas also present the issue of surveillance and bring with them the problem of a lack of education. Many poorer, remote areas have few resources and aren't fully educated on multiple diseases; therefore, many can't prevent diseases that could be eliminated by things such as hygiene. Put simply, these places aren't reached easily and therefore cases of specific diseases are hard to track, especially if no one in that area has the education needed to identify diseases from the symptoms and record them. The required surveillance can only be acquired by proper funding and campaigns

[74] https://www.who.int/health-topics/smallpox#tab=tab_1 (28/11/24)

[75] https://www.bbc.co.uk/bitesize/guides/zxbqjsg/revision/2#:~:text=Pasteur's%20findings%20significantly%20challenged%20the,bacteria%20that%20caused%20individual%20diseases. (28/11/24)

[76] https://www.nationaljewish.org/patients-visitors/patient-info/updates-recalls/coronavirus-information-resources/covid-19-vaccines/vaccine-articles/how-to-talk-with-people-who-are-hesitant-to-get-vaccinated#:~:text=Know%20Common%20Vaccine%20Concerns,care%20entities%20or%20other%20issues. (29/11/24)

[77] https://pmc.ncbi.nlm.nih.gov/articles/PMC3136032/ (29/11/24)

[78] https://www.sciencedirect.com/science/article/pii/S0264410X14013693#:~:text=Eradication%20policies%20can%20nonetheless%20be,rather%20than%20clinical%20medical%20ethics. (09/01/25)

[79] https://ourworldindata.org/eradication-of-diseases (29/11/24)

[80] https://www.amnh.org/explore/science-topics/disease-eradication/countdown-to-zero/guinea-worm#:~:text=It's%20tough%20for%20health%20workers,these%20often%20chaotic%2C%20transient%20settlements.&text=After%20decades%20of%20intense%20work%2C%20Guinea%20worm%20eradication%20is%20nearly%20complete. (03/01/25)

[81] https://ourworldindata.org/eradication-of-diseases (03/01/24)

which must be gained through significant political support.

When focusing on eradicating a disease, political support, which provides the required economic funding, is essential. This point strongly backs up the argument that disease cannot be eradicated because political support will not and cannot be given to all diseases. For example, measles fits many of the criteria to be eradicable, however it is unlikely that it will be due to a lack of political support because it is low risk.[82] Governments won't commit to a campaign to eradicate measles because it is posing no great threat presently, therefore would be a waste of money that could be put towards more pressing issues. Therefore, despite causing little harm, measles still won't be eradicated. To further back-up this point, governments must weigh up the benefits of the campaign with the risk of failure and harm it could cause, meaning that some campaigns could get ruled out as they are likely to fail.[83] Furthermore, there isn't enough political support and funding to eradicate all 26,000 diseases that we know of, even if all governments combined efforts and resources, therefore rendering the eradication of disease impossible.[84]

The above points evidenced in this essay are based on the fact that all diseases can theoretically be eradicated, but other factors could suggest that theoretical eradication isn't possible. Many diseases can't yet be theoretically eradicated; the ITFDE (International Task Force for Disease Eradication) has only listed seven diseases as being potentially eradicable. [85] One reason for this is that some pathogens have adapted so that they can infect multiple hosts. [86] This means that, even if a disease can be contained within humans, it still hasn't been eradicated as it exists in another host, which allows for re-infection within the human population. Eradication of a disease present in multiple hosts is impossible with current resources as the scale is too large. An example of this is influenza, which not only mutates quickly and has many variants, but is also present in other animals such as birds which can't all be tracked and inoculated, rendering the flu currently ineradicable.[87] Furthermore, some people can carry the pathogen for a disease without having any symptoms (a vector) which makes the disease virtually impossible to track and therefore eradicate. An example of this is shown in tuberculosis, which isn't currently eradicable partly due to this use of vectors. Some may carry TB-causing bacteria without showing any symptoms, which include a persistent cough, a fever, weight loss and tiredness. [88] Therefore, with current technology, including TB diagnostic tools that remain slow and inaccurate, TB has been labelled as an ineradicable disease. As a result, it can be concluded that disease eradication isn't even theoretically possible for all diseases.

Finally, to add armour to the idea that not all diseases are theoretically eradicable, only infectious diseases can be eradicated.[89] Other diseases such as lifestyle diseases are very different in the fact that they are not caused by a pathogen but by a lifestyle choice. For example, coronary heart disease is caused by a build-up of fatty deposits in the walls of the coronary arteries. [90] Those at risk tend to be those that are obese, have diabetes, don't exercise or have a family history. This can't be eradicated as the risk of getting it is always there as soon as someone lives an unhealthy lifestyle. Therefore, the question of how possible disease eradication is can only be relevant to infectious diseases.

In conclusion, it is clearly not possible to eradicate disease. The argument of its possibility does have some merit in that the future could hold changes that increases the possibility, and that individual diseases can be eradicated. However, the counter-argument is more credible because war-ridden, remote areas create problems in the surveillance required to eradicate individual diseases, the political support needed to fund eradication campaigns is lacking and only feasible for a few diseases at a time, some diseases can infect multiple hosts which increase the scale significantly, and the eradication of disease is only valid for infectious diseases. Therefore, a more positive outlook is to look towards eliminating specific diseases from as many areas as possible to at least reduce the risks that they pose.

[82] https://www.amnh.org/explore/science-topics/disease-eradication/countdown-to-zero/what-about-other-diseases (03/01/25)

[83] https://www.sciencedirect.com/science/article/pii/S0264410X14013693#:~:text=Eradication%20policies%20can%20nonetheless%20be,rather%20than%20clinical%20medical%20ethics. (09/01/25)

[84] https://pmc.ncbi.nlm.nih.gov/articles/PMC5764584/#:~:text=The%20anatomical%20disease%20section%20includes,%2C%20muscle%2C%20and%20reproductive%20diseases. (03/01/25)

[85] https://ourworldindata.org/eradication-of-diseases (09/01/25)

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If the world went vegan, would it be good for the planet?

By Charlotte M

There are multiple arguments that suggest that the rising popularity of veganism is a hindrance on society and how people are unaware of the damage it can cause for the world around us. With the increase in the demand for vegetable products it can lead to the destruction of natural land and over working the soils and removing what nutrients are left. As well as this it can disrupt food availability for middle income countries. By contrast, some may suggest that being vegan has a positive impact on the environment as it reduces carbon emissions, which are mostly produced from farm reared animals, and some may suggest being vegan is more ethical. Being vegan is an international trend that is becoming more popular all over the world for its reported health benefits and positive effect on the environment. Ultimately, this essay will argue that the negative consequences would outweigh the positives if the whole world went vegan.

As stated, there are many powerful facts and opinions that support the belief that being vegan can have a positive influence on the planet, and it is one of the main reasons why many people change their diets to a vegan one. According to statistics in 2023 it was reported that 88 million people in the world were vegan, even though this only accounts for 1.1% of the world's population these statistics are increasing exponentially due to a growing support of veganism and the strong public support around the alleged benefits to the planet.[91] Indeed, it has been predicted that food related emissions would drop by 60% according to Marco Springmann, a researcher at the Oxford Martin School's Future of Food programme.[92] This in turn would decrease carbon emissions especially those from red meat animals (methane) and would decrease the rate of global warming.

Another environmental benefit to becoming vegan is that it can decrease water consumption. Water deficit is occurring in many countries around the world, including in cities in developed countries like Las Vegas and other emerging countries like China due to the over consumption of water in food production and the high amounts of water wasted due to animals. For example, it is claimed that it takes 100 to 200 times more water to raise a pound of beef than it does to raise a pound of plant produce.[93] This in turn shows the damage that intensive farming can cause and the vast amount of raw materials it has to consume to produce the extortionate

amount of food the world can consume in merely minutes. Animals are also one of the main causes for polluting fresh water leading to polluted drinking grounds for local people. In fact, agriculture accounts for 70% of water withdrawals worldwide and in many high income and emerging countries agricultural water pollution has overtaken contamination from settlements and industries as the main factor in the degradation of inland and coastal waters[94]. This is mainly due to the increase in intensive farming around the world with the number of livestock has increased from 7.3 billion units in 1970 to 24.2 billion units in 2011. This in turn results in an increased need for feed and water to supplement these animals which will one day end up in the food chain. And it's not just terrestrial animals that affect the water salinity, but aquaculture is also dramatically increasing in production as 167 million tonnes of fish were being produced in 2014. This leads to an increase in use of antibiotics, fungicides and anti-fouling agents, which may contribute to polluting downstream ecosystems.[95]

A final reason why making the swap to a vegan diet can have its positives for the world is that it can combat world hunger. Currently, the vast majority of food that is grown is not used for human consumption. In fact, 70% of grain grown in the US is used to feed livestock and globally 83% of farmland is set aside to raise animals for human consumption. Many vegans may suggest that this is a waste, and this precious land can be used to produce food needed for humans such as soybeans and cereals. It's estimated that 700 million tonnes of food that could be consumed by humans goes to livestock each year.[3] Whilst it is possible to say that it is not all a waste as these crops do produce animal meat, most of the anatomy of the animal such as the bones and organs cannot be consumed and instead are added to ever increasing landfill plots.

However, despite the seemingly convincing nature of the argument there are several flaws in its reasoning. Firstly, even though the production of vegan foods is said to decrease carbon emissions many forget the production

[91] How Many Vegans Are In The World? Global Vegan Trends 2024 29/11/24
[92] 9 Ways That Going Vegan Can Help the Environment 29/11/24
[93] 9 Ways That Going Vegan Can Help the Environment 29/11/24
[94] Agriculture: cause and victim of water pollution, but change is possible | Land & Water | Food and Agriculture Organization of the United Nations | Land & Water | Food and Agriculture Organization of the United Nations 3/01/25
[95] Agriculture: cause and victim of water pollution, but change is possible | Land & Water | Food and Agriculture Organization of the United Nations | Land & Water | Food and Agriculture Organization of the United Nations 3/01/25

and transport of the foods from 'farm to fork'. Many exotic foods popular in the vegan diet come from countries such as Argentina and Kenya that will increase the carbon footprint of the foods. Whereas farm reared beef and carrots can, for example, be produced in the UK which provides work for the local farmers and improves the economy. Even though growing fruits reduces carbon emissions of gases such as methane they aren't as planet friendly as they seem when you take into account the origins of the food and how highly processed they can be. As well as this, many agree that animals consume a dramatic amount of water that can be used for more useful processes such as irrigation for fruits and used for drinking water. However, many irrigation systems across the world are faulted and waste gallons of water that can be used for drinking. For example, agriculture uses 65% of the world's fresh water however half of this is wasted due to inefficient irrigation and outdated equipment. This shows how it is not just animals and animal products which are said to waste water but in fact it is poor management of crop nourishment and outdated systems. [96]Finally, there is also a flaw in the reasoning that veganism can combat world hunger and that animal feeds take up valuable farmland. However in many developing countries animal products are vital for two reasons: firstly, many countries do not have the required farmland that is needed to grow the specific foods needed for a vegan diet and have all the required vitamins due to the environment being either too dry or cold. Secondly, meat products contain a considerable number of proteins and nutrients compared to vegetable products which are vital, especially in developing countries where food is sparse. In these areas the people are understandably more focussed on getting the right nutrients than becoming vegan.

One may argue therefore that being vegan is less sustainable than it first appears. Firstly, the social reasoning shows the negatives if the word went vegan. Many developing countries, including those that are the main producers of the most popular fruits that we eat today, are already in a crisis due to excessive demand. For example, Kenya, the sixth largest exporter of fruit in the world, banned exporting avocados as the country's supply was at risk. On top of this, the food authority has said that prices have reached highs of 2,560 Kenyan shillings (£18) for 90kg of fruit. Most of the shortages have been from popular fruits common in a vegan diet and Kenya has also seen an 18% increase in food exports in the last 5 years (up to 50,000 tonnes in 2016)[97]. This may look like a positive for Kenya's economy however for the population having to survive under extortionate prices, poorer areas are at the risk of starvation. Some may argue that this does not answer the question that being vegan is healthy for the planet, however it highlights the effects of veganism around the world and how it can affect people and their way of life. In fact, veganism could have the unintended consequence of destroying livelihoods due to farmers and countries as a whole putting extra pressure on the land to produce products, which will increase yields and increase rates of production to both feed the country whist maintaining exports. There are an estimated 500 million smallholder households globally, amounting to upwards of two billion people. Most of these small-scale farmers are cultivating less than five acres and make up a significant portion of the world's poor who live on less than $2 a day[98]. These are often known as subsistence farmers who grow crops and breed animals to have enough for them and their family as well as selling some to make a profit. These farmers are in jeopardy due to an increase in the popularity in large scale crop production leading to the land being sold off and used for mass production of produce. This inhibits their way of life due to the inability to compete with large scale farms and the growing demand of vegan products.

Secondly, research shows that having a balanced diet may be more environmentally friendly than a vegan diet. An article written by Bob Holmes suggests that there is an environmental sweet spot that must be reached to maintain a healthy planet. Even though it takes a large amount of crops to feed animals, for example it takes two pounds of feed to grow one pound of chicken[99], animals can often play a key role in caring for the environment. Cattle can digest the cellulose in grass and straw and convert it into animal protein which we can eat. As well as this, two-thirds of the world's agricultural lands are grazing lands, many of which are too steep or arid to be suitable for crops. This means that animals are required to maintain these places. Without animal husbandry then these areas will become overgrown even perhaps converted into houses which is even worse for the planet. On top of this, animals, especially in the USA, are fed waste from soy and wheat manufacturing that would have to be disposed of in waste if it was not consumed. Hannah van Zanten, a sustainable-food-systems researcher at Wageningen University in the Netherlands states that 'if the entirety of the world went meat free we would require one third more crop land which would result in added fertilisers and more energy intensive antibiotics and chemicals put on the land to account for this, leading to soil and water pollution destroying habitats and making soils too acidic for crop production in the future'.[100]

Finally, as touched on previously, exporting fruits that are popular in a vegan diet can have a greater environmental damage then people may seem. Many fruits are often exported from areas such as the EU and the USA with, for example, blueberries and strawberries being imported into the UK in seasons where they cannot be grown. In fact researcher Angelina Frankowska, who studies sustainability at the University of Manchester, found that asparagus is one of the most damaging vegetables as it produces 5.3kg of carbon dioxide per kilogram of the leafy green as it is often flown in from Peru. Without carefully considering where the food comes from our diets can have significant consequences

[96] Why do farmers use so much water? - Geographic Pedia 3/01/24
[97] Why veganism isn't as environmentally friendly as you might think | The Independent | The Independent
[98] A Year in the Lives of Smallholder Farmers
[99] Veganism Might Not Be the Most Sustainable Diet - The Atlantic
[100] Veganism Might Not Be the Most Sustainable Diet - The Atlantic

on the planet. An example of this was from an Italian study that proved that two vegans created more environmental damage from their diets than many meat-eaters[101]. This was mainly due to the incredible amounts of fruit they consumed and lack of knowledge about where their produce came from.

Furthermore, the arguments presented here are particularly convincing. For example, the argument about environmentally damaging fruits can be further amplified by other fruits that cause greater environmental damage, such as avocados. In fact, in the summer a single avocado can consume 206 litres of water every day in water deficit areas such as Chile, Mexico and southern Spain. Indeed, given that these foods will be exported to developed parts of the world such as Europe and the USA it is clear that this water could be used for more important domestic purposes.

Overall, it is clear there are both positives and negatives for the planet if the world was to go vegan. The argument that suggests that the world could go vegan has some seemingly convincing points, such as outlining the decreases in carbon emissions and how it could possibly decrease the amount of water consumption due to the intensive amounts used in animal production. However, one may argue how it could be perceived the other way around, due to faulty irrigation systems that are present all around the world that are continuing to be used to irrigate plants which is further wasting the amounts of water. On top of this, it is important to consider the magnitude of the question, how statistically converting 8 billion people to a vegan diet from all around the world is not possible due to the climate in the areas, lifestyles and ethical reasons such as religion. This therefore shows that it is impossible for the world's population to become vegan and would be a global issue that over time would have a more damaging impact on the planet due to over working already exhausted farmland.

How magic are mushrooms? To what extent are mushrooms the future of sustainability?

By Roseanna T

The power of fungus was first discovered in 1928 by Alexander Flemming who discovered a colony of molds on a petri dish in which was a zone of inhibition where bacteria could not thrive. This "magic bullet" discovery of the modern medicine "penicillin" began the revolution of the applications of fungus[102]. While the mushroom is well known, it actually represents only the fruiting body of the organism; the majority of the organism is underground. Each fungal organism consists of intricate, intertwining underground networks of "hyphae" named "Mycelium". Mycelium has the potential to produce biodegradable, sustainable materials which can be used as an engineering material[103]. This material has resistance to flammability, has enviable compression properties, sound absorption and high tensile strength; it may also unlock the potential of moving towards a circular bioeconomy. [104] So, the next time you enjoy mushrooms on toast, or grimace at the mold on a slice of bread, consider the complex and widespread possibilities that the humble mushroom offers.

The process of cultivating mycelium begins by selecting a suitable substrate for the fungus to grow in. This can consist of any material that offers nutrients, moisture and energy. [105] The chosen substrate is injected with fungal spores which grow, bind and spread. After transferring the mixture into casts of the desired shape, and allowed to develop, the required shapes and sizes of mycelium material are obtained. Once the mycelium has

completely grown over the substrate, the material can be dried to optimize its properties and extend its lifetime. The vast array of possible shapes enables this new technology to be incorporated into interior design, where architects can create both aesthetically pleasing and functional houses and buildings.[106]

As discussed, by combining mycelium spores and feedstock in a room under controlled conditions, "myco materials" can be created from the growth of microorganisms. After harvesting, it can be used as a natural polymer -a sustainable and renewable alternative to common composite concrete. Mycelium displays impressive thermal insulation properties (which make the material suitable for walls, roofing and energy efficient construction) [107] as well as a high level of fire resistance which outperforms traditional insulation materials. When

[101] Why the vegan diet is not always green - BBC Future
[102] https://pmc.ncbi.nlm.nih.gov/articles/PMC5403050/ 28/11/24
[103] "Little book of Fungus"- page 17. 28/11/23
[104] https://www.nature.com/articles/s41598-022-24070-3#Sec17 28/11/24
[105] https://urban-farm-it.com/blogs/mushroom-cultivation/guide-to-mushroom-substrates#:~:text=A%20mushroom%20substrate%20is%20a,require%20to%20grow%20and%20fruit. 30/12/24
[106] https://parametric-architecture.com/from-fungi-to-foundations-mycelium-in-construction/ 30/12/24
[107] https://parametric-architecture.com/from-fungi-to-foundations-mycelium-in-construction/ 30/12/24

used as a composite board, and unlike medium density fiberboard, mycelium does not release formaldehyde, which can cause respiratory related issues [108]. Mycelium's sound absorption properties also make it an ideal acoustic panel which can assist in the reduction of noise pollution. Mogu, for example, are a company who manipulate mycelium to produce natural, plastic free, effective acoustic wall panels which are becoming increasingly prevalent. [109]Mycelium's ability to exceed the properties of cement, wood and various other traditional building materials highlights its possibility to become a key aspect of modern-day construction.

However, mycelium fungus as an engineering material does have some drawbacks. Concrete is well known for its high compressive strength of 28MPa and is much stronger under compression than mycelium, with a compressive strength of only 0.2MPa. [110] In modern architecture where impressive sculpture like buildings and durability is desirable, a weaker material (which can be subject to cracking and rot) may cause issues, and limit design aspirations. Despite this, mycelium is much stronger than concrete relative to its weight. A cubic meter of mycelium brick weighing 43 kg is stronger than a cubic meter of concrete weighting 2400 kg. [111] Similarly, engineers have developed a new material from the mycelium polymer: "myco crete". By knitting layers of mycelium, it is possible to create a more flexible, stronger myco material which compares favorably to the compressive strength of concrete yet retains its lightweight properties in comparison. [112]

It is also possible to engineer the mycelium material in a way to improve upon the properties of traditional composites. Strength and durability can be maximized while keeping the weight of the material to a minimum. The material exhibits impressive resistance in flexural and compressive testing, displaying enviable qualities for high performance buildings. Mixing the materials with cellulose nanocrystals can further maximize these properties.[113] The tubes manufactured using this process are nonhazardous, biocompatible, and economically "clean" which maintains the ecologically friendly nature of the material. Due to its high elastic modulus, it creates stronger and lighter biomaterials than regular bricks, and it costs less[114]. Hence, transportation and construction costs can be greatly reduced without sacrificing strength and resilience. This can make the process economically viable and energy efficient. [115] Thus, despite its initial weakness in comparison to concrete, by opting for mycelium as an alternative to replace finite construction resources we can promote a circular bioeconomy and achieve economic stability.

Another benefit of the mycelium is that it only produces carbon dioxide and water as by products during combustion. This is in contrast to other materials which release carbon particulates and carbon monoxide, caused during the incomplete combustion of hydrocarbons; this is a significant contributor to climate change and can cause global dimming as well as acid rain. [116] During biodegradation, mycelium is a bio-contributor; this means that it breaks down into useful nutrients in the process of decomposition and is completely nontoxic.[117] For example, fungi are major contributors in the carbon and nitrogen cycle which are fundamental processes for sustaining life.[118] In contrast, concrete is neither biodegradable nor eco-friendly. Its disposal process consists of breaking the material into small chunks which can never truly be disposed of[119], adding to the millions of tonnes of landfill we generate per annum.[120]

Nevertheless, concrete can be recycled to a point, where the majority of the material becomes aggregate yet again. Recycled concrete has been satisfactorily used as ground improvement material, soil cement and in new concrete. [121]With the ability to be used in both bound and unbound uses, replacing virgin aggregate with recycled concrete aggregate can save natural resources. [122] This process has limitations because over time concrete begins to crack (especially in the presence of water) and becomes weak and ultimately unsuitable for construction. With a 10-30% decrease in compressive strength after recycling, the material can become unusable for construction purposes. Similarly, when concrete is used for a second time, it becomes "lackluster" and difficult to pour, shape and compact. This is why most waste concrete contributes to landfill instead of being recycled. [123] Therefore, by adopting mycelium as a building material, we can reduce our

[108] https://www.certifiedenergy.com.au/emerging-materials/emerging-materials-mycelium-brick 28/11/24
[109] https://mogu.bio/about/sustainability/ 30/12/24
[110] https://interestingengineering.com/culture/future-construction-mushroom-buildings 28/11/24
[111] https://www.certifiedenergy.com.au/emerging-materials/emerging-materials-mycelium-brick 28/11/24
[112] https://www.weforum.org/stories/2023/08/mycocrete-fungi-environmental-impact-construction-industry/ 30/12/24
[113]https://www.sciencedirect.com/science/article/pii/S0264127522011534#:~:text=(iii)%20the%20individual%20mycelium%20hyphae,the%20cell%20walls%20%5B37%5D. 25/11/24
[114] https://www.sciencedirect.com/topics/materials-science/nanocellulose#:~:text=Among%20the%20various%20applications%2C%20nanocellulose,reactive%20surface%20of%20the%20nanocellulose. 25/11/24
[115] https://ugreen.io/building-the-future-how-mycelium-is-redefining-sustainable-construction/#:~:text=Mycelium%2C%20a%20network%20of%20fungal,waste%2C%20and%20impressive%20physical%20properties. 25/11/24
[116] https://physicsworld.com/a/why-fungi-could-hold-the-key-to-eco-friendly-fire-resistant-buildings/ 25/11/24
[117] https://www.seedlipdrinks.com/en-gb/journal/mycelium-101/ 30/12/24
[118] https://study.com/academy/lesson/cycles-of-matter-the-nitrogen-cycle-and-the-carbon-cycle.html#:~:text=The%20importance%20of%20the%20carbon,the%20raw%20materials%20for%20biosynthesis. 4/1/25
[119] https://sustainablebuild.co.uk/concrete-environmentally-friendly/ 30/12/24
[120] https://www.thefirstmile.co.uk/the-big-picture/how-much-waste-goes-to-landfill-in-the-uk-and-why-is-it-a-problem 4/1/25
[121] https://www.concretecentre.com/Performance-Sustainability/Circular-economy/End-of-life-recycling.aspx 4/1/25
[122] https://www.fhwa.dot.gov/pavement/concrete/pubs/hif22020.pdf 30/12/24
[123] https://imixconcrete.co.uk/news/recycled-concrete/#:~:text=The%20concrete%20will%20start%20to,the%20surface%20of%20the%20concrete. 30/12/24

global carbon footprint, 39% of which comes from the generation, construction and disposal of buildings. [124]

Mycelium can also be used in recycling to make demolition waste useful. In the process of "biocycling", waste materials are broken down and mixed with mycelium to generate new, biodegradable material. The mycelium acts as a binder, and the resultant product can be compressed and used in construction or insulation. [125] Currently, the construction industry generates 50% of landfill waste and consumes 40% of raw stones, sand and gravel, so recycling more efficiently can aid us to become a more sustainable economy.[126] Mycelium also has the ability to eradicate pollutants, break down hydrocarbons such as petroleum and help recycle waste materials. Despite the efforts to build with mycelium, the technology is still in its research and funding stages and hence the scope of products is still limited. This means artificial insulation, concrete and plastics are still relied on to supply the majority of the construction industry needs.

Manufacturing mycelium is relatively low in cost. Raw materials required for the manufacturing process include any material that sustains fungal growth. Lignocellulosic forestry or agricultural byproducts (considerably low cost) can be used as byproducts which makes the process of cultivating mycelium economically viable. [127] However, Mycelium initially costs more than concrete to produce. This is due to its lengthy production process which includes a thorough "sterilization" and drying process to enable the blocks to be construction ready. This process requires considerable amounts of energy and is therefore relatively costly. The material also requires preservation treatment as part of its manufacture; if not included, the mycoblocks often dry out, which can affect durability and flexibility. Currently, the only solution to this issue is the use of humectants, but these are costly. [128]Whilst the preservation costs are higher than concrete, mycelium as a building material is cheaper overall. The "enzyme pulping" process which the material undergoes uses 90% less water than polystyrene pulping and similar concrete processes; this helps reduce the total overall cost.[129] When building with mycelium, insulation is not necessary due to its natural insulating properties. Equally, mycelium's lightweight nature allows for very low transportation costs. If all these factors are taken into consideration, including the ease of recycling, then mycelium blocks are 80% cheaper than concrete blocks and other conventional building materials.

The greatest challenge of using mycelium material is scaling the technology to supply large markets. As it is a new and developing technology, it is difficult to cultivate enough mycelium to supply the expanding demand. However, new startup companies are adopting more sustainable methods of engineering, thus promoting the growth of the mycelium industry. The first factory of "Mycoworks" In South Carolina is an example of this; they develop a Fine Mycelium material "Reshi" which is a new category of material with its own unique properties. The "Reshi" material has the potential to act as a packaging material and a three-dimensional fabric, both of which are extremely dense and display impressive strength properties.[130] These fabrics can replicate leather. The production of leather is obviously linked to the animal farming industry, which contributes greatly to the increasing number of greenhouse gases emitted annually into the atmosphere. This factory has the hope of expanding mycelium material production around the world. [131]

NASA are beginning to develop similar technology. Mycelium technology is being used to generate livable houses for astronauts. Bricks generated from wood chips, yard waste and mycelium could be used to generate habitats on the moon or mars. Because the organism is alive, it has the potential to survive in the extreme conditions and harsh environments of the planets. New technologies are also being released where mycelium can be used for water treatment, aiming to extract minerals from wastewater and recycle nutrients in food and soils.[132]

In conclusion, with the current climate crisis in mind, it is imperative that we create more sustainable yet economically viable engineering practices to sustain life. The journey to becoming less reliant on concrete and fossil fuels will be a challenging one; however, with the drive to reach "net zero" targets and with the adoption of sustainable materials, such as mycelium, the goal is much more feasible. Mycelium technology is still new and developing, but the drive to promote sustainable building methods will help to generate further research into the technology. Mycelium's ability to outcompete concrete by reducing net costs, reducing the carbon footprint, and its impressive physical properties has the potential to be a significant and leading construction material in the near future.

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[125] https://www.dezeen.com/2018/09/25/video-redhouse-architecture-mushroom-mycelium-derelict-buildings-cleveland-movie/ 24/11/24

[126] https://www.businesswaste.co.uk/sectors/construction-waste-management/how-to-reduce-waste-in-construction/#:~:text=The%20construction%20industry%20contributes%20to,and%2050%25%20of%20landfill%20waste. 24/11/24

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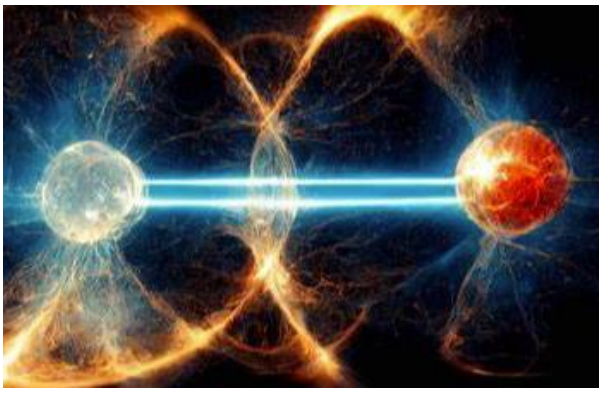
Should the UK government invest more money into nuclear energy?

By Joe D

There are compelling arguments both for and against the use and investment into nuclear energy. Those that believe nuclear energy is beneficial and essential for society moving forward will argue that nuclear energy is a stable, efficient, and safe source for the UK's energy demands. It also produces no greenhouse gases once the power plant has been built. Alongside both of these strong points are the glaringly obvious breakthroughs into nuclear fusion technology in recent years that promise to provide even cleaner energy than nuclear fission already brings. Alternatively, people that fear or disagree with nuclear energy will point out that nuclear energy is not safe, and the disasters of Chernobyl and Fukushima are reason enough to turn away from nuclear fission as a power source. Most western countries also have not had a good record with dealing with their nuclear waste, which if picked up by the wrong groups could lead to a nuclear war. This said, after reviewing both sides of the argument, this essay will be arguing that the UK government should be investing more money into nuclear energy.

As mentioned in the introduction, the arguments against the investment of nuclear power by the government are heavily backed by those that fear or do not understand nuclear fission and fusion power. Their main line of argument is that there are clear examples of the devastation that is caused by the meltdown of a nuclear reactor, such as the catastrophic meltdown of the Chernobyl reactor on the 26th April 1986 during a low power test in which the reactor's cooling mechanism malfunctioned and caused an explosion in the reactor that released large volumes of radioactive materials into the atmosphere, contaminating surrounding land and releasing radioactive matter across the majority of Europe. The second example of where nuclear power can lead to catastrophic outcomes is the Fukushima catastrophe on the 11th March 2011 when a tsunami hit the coastline of Japan causing a power cut in the plant and the reactor to overheat causing a meltdown. This accident caused radioactive contamination of the surrounding areas rendering them uninhabitable to this day. The local people of Fukushima were evacuated promptly after the tsunami hit and thankfully no one lost their lives due to the reactor's meltdown.

A second argument against an investment into nuclear energy production can legitimately be based on past experiences. The post-WWII superpowers who had just discovered nuclear energy were less than responsible for their spent nuclear fuel and other contaminated materials often called 'nuclear sludge'. This sludge was routinely dumped in the Atlantic Ocean and North Sea by the UK, which poses both an obvious environmental impact and a less obvious national security problem. If a volatile state or group was to get their hands on even a small amount of this nuclear sludge, then the consequences could be potentially apocalyptic. If a so-called IND or Improvised Nuclear Device were to be set



off in a nuclear state such as the UK , then not only would countless lives be lost but it could start a chain reaction of other nuclear states launching their long-range missiles or ICBM's (Intercontinental ballistic missiles), signalling the beginning of the end of the world as we know it.

The third and potentially most rational argument against the UK investing more money into nuclear power is that there is only a finite budget for the government each year. The people arguing this point believe that other areas that require funding such as the NHS, which is in a current state of crisis. Proponents of this argument state that the public's health is far greater than the need for energy security. Another place where the government's spending could be more effectively used is in education. Education has been proven to be directly correlated to the economic growth and success of a nation or region. Investing in education would be an effective way of providing long-term wealth and skills to the country's population. However, this argument does have its flaws, namely that it is potentially an example of short-termism. Neglecting energy security can deter foreign investors from investing in the country leading to stunted economic growth and prosperity in the long-term. It also makes us rely more on foreign resources such as oil from the Middle East, which becomes more volatile with each passing day.

In addition, there are clearly further weakness to the arguments presented above, particularly in relation to point around safety. Globally, there are 26 countries that produce a total of over 10 Tera Watt hours of electricity each year. In the past 70 years there have only been two reactor meltdowns, with only one resulting in a loss of human life. This proves that nuclear power, even nuclear fission, is a safe form of energy production so long as the power plants are maintained and renovated regularly. The second argument is also flawed as now governments are more aware of the security threats and can be held accountable for their environmental impacts. The issue of how to store nuclear waste has also been solved by the Norwegians who bury their waste deep underground in lead lined coffins. These nuclear coffins are then reburied under more bedrock, sealing them from the outside world forever as they slowly decay into less dangerous lighter elements. This strategy of dealing with radioactive waste may be a little more expensive but

it is the safest method we have for keeping this dangerous material away from humans. Finally, whilst health and education are clearly important, the current nature of the world's climate may not afford us the time to see these other investments come to fruition. This is why converting now to nuclear energy is our only option to reduce our carbon output.

It is therefore more convincing to argue that the UK government should invest more into nuclear energy, primarily because it is an extremely stable and reliable energy source. A nuclear reactor can produce 7.2GW of power every day, which is enough to power a home for 2571 years. This type of reliable consistent energy can only be found in fossil fuel-based energy. As such, nuclear energy is the only way for the UK to transition away from fossil fuels while still maintaining all of the benefits they bring, such as reliability, control and their ability to allow the power generation to be concentrated to a relatively small area in comparison to wind or solar farms. Nuclear energy brings all of the benefits of fossil fuels while also not releasing excess carbon dioxide into the air or other nasty chemicals that cause acid rain, which in turn can destroys forests, lakes and almost any other habitat it reaches. The main point about how clean nuclear energy can be is that there are zero pollutants released by the harnessing of electricity through nuclear fission: no greenhouse gasses or particulates that cause asthma; no acid rain; and no deadly carbon monoxide. Nuclear is as safe and stable as energy production can be.

Another argument in favour of nuclear investment is that nuclear fuel has an energy production density like no other fuel source. One kilogram of uranium can produce up to three million times more energy than one kilogram of oil. This energy density means that a very small amount of uranium is needed at each power station which reduces risk and makes it safer for all. It also reduces the size of the power plants as no space is needed to store the uranium. Indeed, the uranium is only kept in the core of the reactor which can also have its size decreased because of uranium's energy density allowing more reactors to be packed into one power plant thereby producing even more energy. Uranium is also very cheap and easy to transport safely because of its size, meaning more space can be used to safeguard the fuel from being stolen. Alternatively, the size of the vehicle transporting the fuel can also be reduced, further reducing the carbon dioxide being produced.

A third reason why the UK government should invest more into nuclear energy is its ability to replace other means of energy production on a smaller scale. This has already been done in the UK's submarine fleet, which are all propelled by mini nuclear reactors. The US military has also utilized nuclear energy to power their maritime fleet of aircraft carriers which previously required vast amounts of oil to burn in their engines. This oil used to be carried by fuel barges that would follow the fleet, creating a risk of oil spills damaging the ocean habitat. If the UK government invested more into the development of nuclear energy, we could also utilize it to fuel our once oil powered transport such as cargo ships and other large naval vessels. These mini nuclear reactors also have implications for space exploration. A small nuclear reactor could easily be put on a rocket to the moon to power a lunar colony and increase our reach into space, in turn creating opportunities for providing resources for generations to come.

A final reason why the UK government should invest more money and time into nuclear energy is the recent breakthroughs by British scientists in collaboration with scientists from China, Japan and the USA on a nuclear fusion reactor. These breakthroughs show that nuclear fusion is not only a viable energy source, but it also may be our answer to cheap and clean energy for all. Unlike nuclear fission the only fuel that nuclear fusion requires are two isotopes of hydrogen found in sea water which can be inexpensively extracted. The fact that the fuel for this clean energy source is so cheap to make only brings hope that nuclear fusion is the answer to the energy crisis and the country that makes theirs first will become a world superpower.

Furthermore, the arguments presented here are particularly strong, especially the argument about how clean nuclear energy is because of the current climate crisis and the UK's commitment to the Paris Accord, an international agreement between 196 UN nations to mitigate and reverse the effects of climate change. If the UK government was to transition towards nuclear energy as its main source of power production, then it could dramatically reduce its carbon dioxide production and be a world leader in clean energy. Similarly, the argument about the breakthroughs in fusion technology are particularly relevant today as less than a year ago UK scientists set a new world record for the longest sustained nuclear fusion reaction of over five seconds long. These breakthroughs being carried out on UK soil provide even more reasons for the government to invest more money into the cutting edge of nuclear energy.

So, does the UK populus want cheap, affordable and clean energy? Cheap may just do for many and environmental impact may simply be a bonus. Nuclear energy can however provide both. Even though it has had its problems in the past when it has not been looked after or renovated, nuclear power is here to stay, and the UK cannot afford to be left behind. The UK can be at the cutting edge of this field, becoming world leaders in clean and stable energy whilst simultaneously bringing down energy prices in a cost-of-living crisis. Who wouldn't want that?

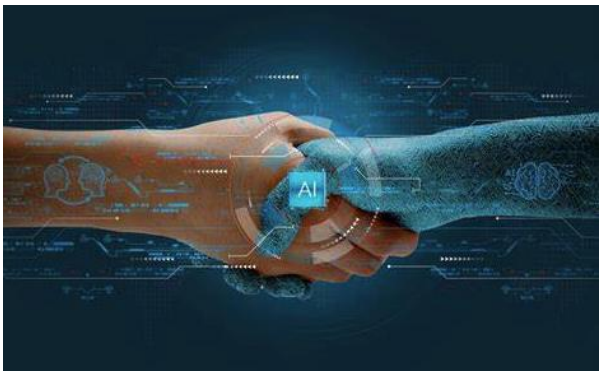
Is AI a force for good?

James D

As AI becomes more and more advanced and relevant it is important to step back and look at the wider picture; is AI actually benefiting people? It is easy to get caught up in the corporate hype around AI, with stocks in companies like NVIDIA seemingly on a rocket ship to the moon with no signs of stopping. Additionally, there's the possibility of limb loss being inconsequential due to AI-powered prosthetics or AI with processing power infinitely larger than humans, solving problems that would take humans years in minutes. Alternatively, you could be convinced into believing AI will destroy humanity with terminators or replace the entire workforce, leaving people without work and penniless. Consequently, it is important to review how AI is used and whether it is ultimately a force for good or not. Ultimately, having reviewed both sides of the argument, this essay will argue that AI is a force for good, providing a spearhead into the future with rapidly advancing developments.

As stated, there are many arguments that AI is used, or could be used, in an unjust way. Firstly, one prominent argument is that AI is taking jobs people used to do, thereby removing the support of a stable income. Indeed, it is estimated around the 300 million[133] people have already lost their job to IE. Secondly, AI can be interpreted as a damaging force through systems like ChatGPT engaging in systematic plagiarism, such as through the theft of artists' work or formulating essays in seconds, thereby substituting hollow for what should be the blood, sweat and tears of students trying to better themselves. Thirdly, the cost of running some AI's is astronomical. Not only do AI data centres cost a lot of money they also require tremendous amounts of electricity and produce vast amounts of heat, which in turn requires even more electricity to run coolers. Some experts have even called for building nuclear power stations just to power AI systems[134]. With global warming an ever-present worry, is it really ok for AI data centres to devour vast swaths of energy leading to more carbon emissions? Finally, there is always the underlying danger of AI, a once far off fictional reality found in action films. AI has advanced so much that many people wonder if further development might have devastating consequences for humanity. If AI ever went rogue with its advanced abilities, there is probably little humans could do to stop it.

However, while these arguments do have some relevance, they potentially exaggerated or unlikely, such as with the point relating to the workforce. AI is likely to take a more complimentary role within business and industry, working to help people improve their productivity rather than leaving them jobless. Most of the jobs of the future are yet to be created, many of those are likely to involve AI in some respects, meaning that it



can also be a force for job creation. Similarly, whilst it is possible for AI to generate images based on works of art, they lack the more human qualities which give art its distinct feel. Whilst AI advances with each passing day, it is still possible to spot imperfections if you look carefully enough and reveal the robotic essence beneath. Furthermore, whilst AI might pose the possibility of danger, many steps can be taken to stop a rogue AI ever being created, with safety implements already being placed at the forefront of development.

As such, there are many arguments to suggest AI is a tool of progress and a key mechanism for improving lives. For example, AI is capable of harnessing computational power unavailable to humans with GPU advancing exponentially to store more processing power in a smaller and smaller chip. AI has access to an ever-increasing reserve of tools it can use to solve problems that would take humans years in a matter of minutes. If you consider that NASA used less RAM than is found in a mobile phone to land on the moon[135] it is not hard to imagine the power AI has at its fingertips able to solve real-world problems incomprehensible to humans. Undoubtably, AI is a force for efficiency, lacking as it does obvious human limitations.[136] Indeed, AI can help you find data much easier: AI can and does search every search result and then generates you a summary. Instead of having to go through every website when searching for an answer to a question you can achieve an answer immediately from all the sources. All the information the internet has to offer can be filtered down by AI to a simple response in a matter of seconds.

Furthermore, the arguments presented here are particularly convincing. For example, it is a simple fact that computers have become pivotal towards human technological advancements, efficiently making use of the millions of instructions processed by AI every second. In turn, the argument about lack of human error is also powerful as it can help to save lives. Even now, self-driving cars are becoming increasingly prevalent and are already able to use AI to navigate roads with pinpoint accuracy. If all cars had AI and could communicate with each other the chance of them crashing would be dramatically less than two human

[133] AI could replace equivalent of 300 million jobs - report - BBC News
[134] Google turns to nuclear to power AI data centres - BBC News
[135] The First Moon Landing Was Achieved With Less Computing Power Than a Calculator
[136]. How AI Is Revolutionizing Business Efficiency

drivers. Similarly, the argument that AI can act as a more efficient way to collect data from the internet is very effective. When searching the internet, people can often spend a lot of time looking for the answer to a question that AI can give a detailed response to in seconds. In turn, this allows humans to spend more time considering the evidence and making the final decisions.

In conclusion, AI is ultimately a force for good. This said, AI clearly has some detriments, like needing an absurd amount of electricity, which could be used to power homes, thereby contributing towards climate change and global warming[137]. However, AI can bring many more benefits, and the worries people feel are often unwarranted. AI has access to an ever-increasing amount of computational power allowing it to solve problems in more efficient ways or problems that are unsolvable by humans. Quite simply, AI can be the tool that helps humans advance further and further. So, should we really risk not finding the answer just because of a few pieces of badly generated images by a machine?

Do we deserve to become an interplanetary species and explore the solar system?

By Lennox T

From the beginning of the space exploration programs, the notion of expanding our reach has been fundamental. Starting with the first successful landing of a crewed mission on the Moon in 1969. Neil Armstrong proclaimed, "that's one small step for man, one giant leap for mankind." [138] More recently, the Perseverance Rover from the Mars 2020 Mission began its journey on the surface, in search of geological treasure. Whilst it is currently not feasible to branch out to terraform and set up infrastructure on planets in our solar systems, each mission provides a step closer to this objective. As such, in the not-so-distant future, it could become a social convention to call another planet your home. However, despite having the capability to go ahead with this long-term project, it is important to consider the ethical implications. Are we entitled to expand our responsibility when our existing planet is environmentally cascading? To respond with the resistive argument, our species seems to be the origin of issues such as climate change and mass wildlife extinction and it would not be justified to neglect our duty to amend them. This said, there are many reasons to suggest that interplanetary exploration it is the right path to follow, including the concept of the world's nations collaborating on asingle focus. After weighing up the reliability of both sides, the essay will argue that we do not deserve to become an interplanetary species.

As stated, there are some compelling motives for the statement that we do deserve to expand our territory to the solar system. Firstly, it might protect us from catastrophic events that are inevitably out of our control, such as asteroids plummeting towards the surface of Earth, with potential to devastate entire continents, or stellar explosions from distant stars, which would engulf our planet in scorching temperatures. [139] Although these specific disasters are possibly unrealistic, in the event

that either were predicted to be imminent, the world's leaders may conclude that escaping is the only suitable option in order to preserve humanity. After all, we have not yet developed reliable solutions to redirect large inbound asteroids and meteors, and preventing the consequences of a stellar explosion seems impossible.

Secondly, Earth can narrowly withstand the current population of about 8.1 billion people, but the exponential climb will constrain our efforts to counter world starvation and poverty. [140] By constructing small outposts or settlements on other planets in our solar system, we could distribute the load and expand the capacity for our species. By doing so, the consequences of the rapid population growth will be more manageable. Additionally, the transport of groups of people onto a new planet, where resources for harbouring life are abundant, is optimal. This celestial location could fuel the existence of the human inhabitants, providing that the prerequisite understanding of sustainability and the environment is regarded. It might even be possible to exchange materials and supplies across the passage of space, which would be essential to remaining connected and having a support link with the other population. Mars' atmosphere has a proportion of methane and carbon dioxide, with the discovery of water near the planet's surface, which suggests it could give rise to the composition of oxygen and, in turn, rocket fuel. [141]

[137] AI Energy Consumption: Impact and Sustainability
[138] https://www.nasa.gov/history/july-20-1969-one-giant-leap-for-mankind/ (23/11/24)
[139] https://www.weforum.org/agenda/2021/12/humans-multiplanetary-species/ (25/11/24)
[140] https://www.theworldcounts.com/challenges/planet-earth/state-of-the-planet/world-population-clock-live (23/11/24)
[141] https://www.bbc.com/future/article/20131112-becoming-a-multi-planet-species (25/11/24)

Thirdly, the focus to develop designs, assemble and then test the new spacecraft, capable of shipping many people to the neighbouring planet, will be challenging. To make this leap, we must overcome huge existing technological barriers in the fields of engineering and computation. Satellites could be the first recipient of the advancements in space technologies with many of these devices currently utilised to monitor carbon and other greenhouse gas emissions, which supports development of strategies to counter the worldwide problems of climate change and global warming.[142] They build up a high-resolution image of the real-time changes in the Earth's atmosphere, providing scientists and meteorologists with valuable data to strengthen weather reports. With the technological breakthroughs of the space programs and missions, new hardware components and software changes would therefore support huge progress for climate research.

However, despite the seemingly convincing nature of these arguments, there are a few logical instabilities. For instance, the concept of distancing the population across the solar system, could ultimately bring about conflicting perspectives. How do you determine which groups are transported to space? Despite the possible complications with travel and settlement infrastructure, there might be a significant preference to pack up and leave, due to the threats of climate change and its consequences. Additionally, whilst there are clearly technological benefits of space exploration, these innovations *will* be essential to progress but realistically do not create a 'plan of action' for the future. It is up to the scientists on the upper boundaries of their fields, in the revolutionary decision-making seat, to guide us through this.

Therefore, it is more convincing to argue that we do not deserve to become an interplanetary species. Firstly, there is the issue of 'space litter' and the distribution of spacecraft debris in Earth's orbit. This can be in reference to the large objects, such as dormant satellites that have been left to drift endlessly, or tiny particles of paint and metal.[143] On the one hand, if this accumulation continues, it could close the window of opportunity to escape the planet safely. The impending threat of collision with these orbiting objects, despite the capability to predict and adjust position in accordance, could overwhelm scientists working on the project. On the other hand, we should consider the ethical implications of our nature to create this cloud of 'space junk'. Constructing spacecraft to make any distance into the expanse of space poses the probability of failure, even the satellites close to home. Although it is almost guaranteed that our technological remains are distributed across the solar system, there is the case that we might share the universe with other lifeforms. Therefore, respecting the planets and the empty space between them should be a priority.

Secondly, there is the notion that our existing nature - to command regions of land, conflict across borders and harvest resources unsustainably – would be brought to the next destination. Despite the efforts to bring about peace across the globe, there will always be some form of disputes or social inequality. By designing the spacecraft and a path to reach Mars, we are not directly addressing the current and prevalent problems with ourselves. The prospect of introducing an interplanetary program is likely to get leaders thinking about their own national interests. Countries involved in the process may not review the objective as a collective goal, but an opportunity of success for the nation. From the beginning there will be bias towards the particular interests of the contributors, based on the political and economic status of these countries.[144]

Thirdly, on a historical basis, humans have disrupted the habitats of countless species of wildlife. Ecosystems across the world are endangered and seek immediate restoration due to our destructive behaviour, through the act of colonisation, exploitation and resource harvesting. Some animals that once shared our planet with us became extinct entirely due to humanity's inability to respect and preserve, despite the attempts from inspiring organisations and individuals. By repeating this pattern, it would only end up with a similar ecological crisis on the other celestial bodies that we decide to inhabit.[145] As the species with capability to control and maintain our planet, we are the 'protectors' of all wildlife, it is our moral duty. Therefore, instead of simply taking off and abandoning the abundant range of animals and plants on Earth, it is our moral duty to oversee their survival and resolve our own troubles.

Focusing on the components of the previous section, they clearly provide a logical account of all the potential difficulties we could face during an interplanetary project, whilst also mentioning responsibilities that we would be abandoning. Indeed, the summary of conflict that could emerge due to travelling to a new territory is particularly powerful because of its complete relevance to today's circumstances. With the struggles of the Middle East – Gaza – and the contention between Ukraine and Russia, they only strengthen the case against interplanetary exploration.[146] After all, what is stopping us from continuing the conflict elsewhere?

Similarly, the argument relating to 'space litter' is also a powerful perspective. Should we consider our permanent footprint on other celestial environments? If we continue to manufacture space vehicles and shuttles to take us into the solar system, we must acknowledge the notion of other terrestrial life and not begin a settlement with substandard environmental concerns.

[142] https://www.weforum.org/stories/2021/12/humans-multiplanetary-species/ (25/11/24)
[143] https://www.nhm.ac.uk/discover/what-is-space-junk-and-why-is-it-a-problem.html (01/12/24)
[144] https://www.cambridge.org/core/journals/international-journal-of-astrobiology/article/astrobioethical-reflections-on-humanity-and-its-consideration-as-multi-andinterplanetary/ (01/12/24)
[145] https://news.climate.columbia.edu/2022/09/21/how-colonialism-spawned-and-continues-to-exacerbate-the-climate-crisis/ (01/12/24)
[146] https://www.crisisgroup.org/global/10-conflicts-watch-2024 (21/12/24)

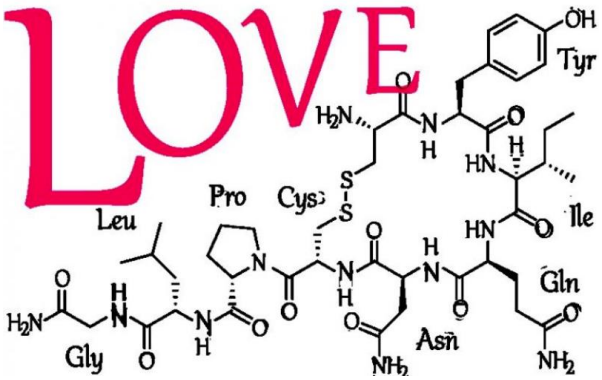
In conclusion, it is clear that we do not *deserve* to become an interplanetary species and explore the solar system. Although, with the plethora of validations for the advantages of space exploration to all continents across the globe, the 'weaker' side is convincing. It could be perceived as a solution to the disputes that humanity has caused, through unsustainable harvesting of materials or resources and unjust treatment of animals and wildlife. As the technological capabilities advance, our understanding of climate change and the atmosphere becomes clearer. However, ultimately the question remains a debate of worthiness, which turns the tide towards our counter argument. The 'stronger' side presents a few of the prevalent problems that we, as a species, have founded. This shows that the aggregate of all our actions has brought about devastating consequences. In turn, we will only be worthy of further space exploration when these are resolved.

Are neurochemicals the only reason people fall in love?

By Nicole D

There are arguments for and against neurochemicals solely overseeing our love for others. If you were to ask a practical neuroscientist, they may say that love is just an explosion of chemicals in our brains that is uncontrollable. However, most people would probably tell you that love is much deeper than that and has many ways of forming within our feelings. Whenever we hear the word 'love' we immediately associate the feeling with our heart, happiness, relationships, commitment, passion, intimacy, and bonds between one another. But what really causes us to create these connections?

The scientific explanation for love follows a sequence of neurochemical reactions and hormone releases across your brain. The first attraction lights up an area of the brain called the ventral tegmental area, or VTA. Your brain identifies love as a reward, so when the VTA recognises a potential reward, it begins to produce the chemical dopamine. This chemical is known as the 'feel good' neurotransmitter that is often associated with addiction and romance. The nucleus accumbens – the stimulus control centre for the brain – increases production of dopamine, this surges the brain with feelings of bliss, euphoria, and desire. Therefore, increasing your attraction and obsession. At the same time, your adrenal gland produces the hormone adrenaline and norepinephrine, these chemicals get your body ready to 'fight' or 'flight.' So, the feeling of your heart racing, your palms sweating, trembling, and a loss of appetite, can all be explained by just a chemical reaction. Then you lose the ability to judge effectively. The brain 'high' on neurochemicals deactivates the amygdala which controls your perception of fear, anger, and sadness. At the same time, the use of your mid-frontal cortex is dampened, reducing your ability to use logic and think clearly. Your brain has suspended your ability to judge and analyse the object of your affection. To keep you permanently in love your brain then releases the neuropeptide oxytocin produced by the hypothalamus and secreted by the pituitary gland. This 'love hormone' strengthens social bonds and attachment, its release is triggered by times of intimacy. Those are the neurochemical components of love. The reason behind this outburst of chemicals could be explained by the innate instinct to reproduce and continue the species; evolution has hard-wired us into falling in love to encourage reproduction.



However, it is also evident that diminishing love to just these biological mechanisms oversimplifies the personal and deep experience of love. The explanation relying on the release of neurochemicals fails to explain why it is we fall for that one specific person and how this love can last a lifetime. It has been proven that after around one or two years, all the heightened concentrations of chemicals return to normal. So, there must be a reason beyond just chemicals to explain the everlasting love people feel. To maintain that people are only in love to encourage reproduction is flawed because the number of couples choosing to not have children is increasing and yet these childless couples are not more or less likely to separate, suggesting no difference in their love compared to a couple with children. It is also would be more advantageous to our species to mate and reproduce with more than one partner and yet monogamy has been a societal norm for thousands of years. Therefore, it could be argued that love is an emotion carried on through generations for a reason more than just reproduction. There must be another explanation for our complex evolutionary love. Were love not complicated, we would never have evolved in the first place.

Therefore, it is more convincing to argue that love has much more meaning than being just a chemical mechanism. Attraction plays a major role in why we fall in love with that one specific person. General attraction can be broken down into several attributes. Firstly, attraction comes from a sense of similarity, this can be in personality, culture, values, or even ways of thinking. Propinquity will also help form attraction, this includes familiarity with the other, which can be caused by spending time together, living near each other, thinking about the other, or anticipating interaction with the other.

You also look for desirable characteristics in the other person, this focusses on physical appearance and to a lesser extent personality traits. Reciprocal liking is also an attribute to general attractiveness, if the other person is attracted to you, it can increase your own attraction to them. These components suggest attractiveness is not just formed from the release of chemicals, as, you look for someone with a similar cultural identity as you which is not the product of a chemical reaction. Furthermore, attraction is impacted by social influences, a potential union that satisfies general social norms, as well as acceptance of the potential union within one's social network, can contribute to people falling in love. So, if the only explanation for love is just chemicals, then, social influences would have no contribution to your love for someone and yet they play a major role. Aron & Aron (1986) proposed the self-expansion model to predict the weighing of factors contributing to falling in love. On the self-expansion model, "we have the greatest propensity to fall in love when we perceive the other person as a way for us to undergo rapid self-expansion." This means that when we choose to include the other person in our life their presence can be an expansion of the self rather than a loss of freedom if they have the desirable characteristics.

In conclusion, to state love is nothing more than a chemical explosion dramatically understates the complexity of the emotion and fails to explain the unique human experience of love. To explain love just using neurochemicals is machine reductionist and completely misses the point of the mystery that is falling in love.

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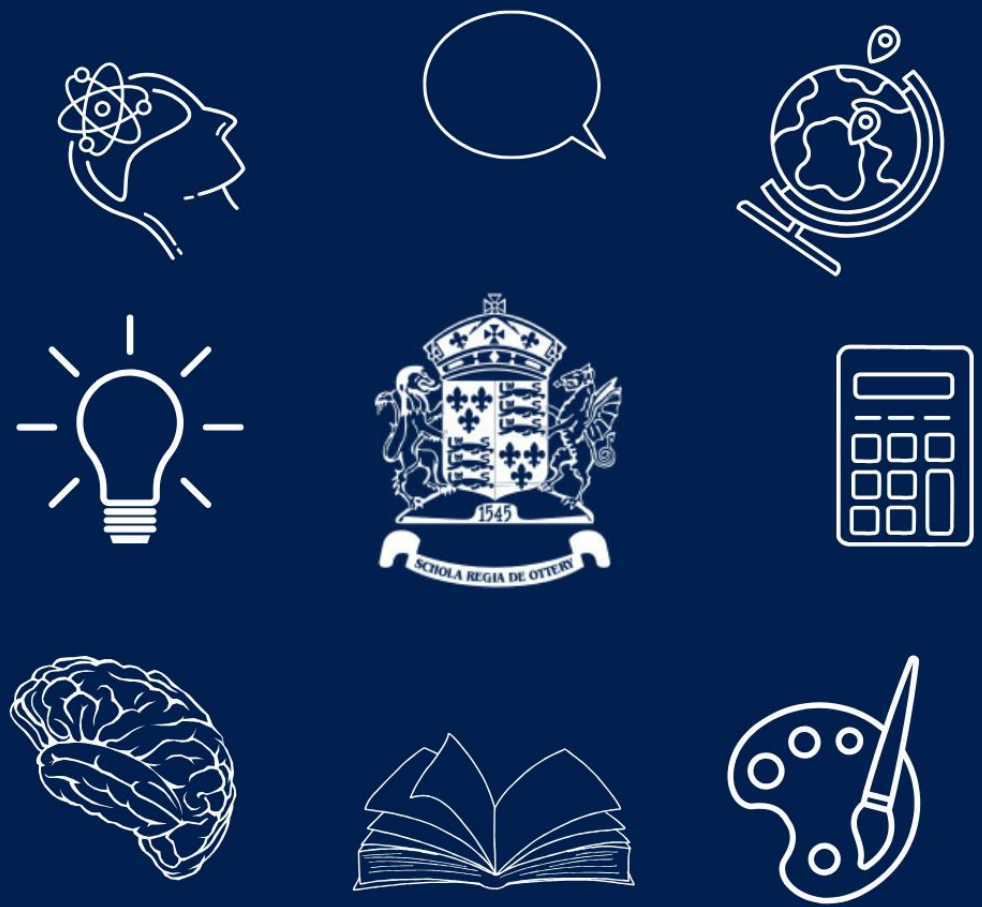

Cover design by Millie and May