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The Duty to Reduce Greenhouse Gas Emissions and the Limits of Permissible Procreation

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Abstract

Many environmental philosophers have argued that there is an obligation for individuals to reduce their individual carbon footprints. However, few of them have addressed whether this obligation would entail a corresponding duty to limit one's family size. In this paper, I examine several reasons that one might view procreative acts as an exception to a more general duty to reduce one's individual greenhouse gas emissions. I conclude that none of these reasons are convincing. Thus, if there is an obligation to reduce one's unnecessary greenhouse gas emissions, then people should also limit the size of their families when they have the means to do so.

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Global climate change, if it continues its current rate of progression, will have tremendous effects on present people, future people, and the nonhuman community. Some of these effects include more severe weather events (e.g., heat waves, droughts, hurricanes), sea-level rise, regional food and fresh-water shortages, increased vulnerability to disease, ocean acidification, and biodiversity loss.¹ In simple terms, climate change will cause a lot of people—both present and future—to suffer or die, and will cause many nonhuman species to go extinct. Given the moral gravity of these impacts, it is clear that something must be done to curb greenhouse gas (GHG) emissions in the near future, and the global scale of the problem entails that international political action will be required to accomplish that task.

Nevertheless, climate change also presents challenging moral questions for individuals. Many individual emissions are not required for personal survival, and these emissions add to the concentration of GHGs in the atmosphere. Since such emissions contribute to a severe and ongoing environmental harm, they appear morally unjustifiable. Some philosophers reach this conclusion on consequentialist grounds by arguing that an individual's emissions, despite constituting only a tiny percentage of global emissions, are still great enough to cause significant harms.² An alternative consequentialist argument is that individual emissions increase the likelihood of crossing a negative climate threshold that leads to severe weather events (or other impacts) that otherwise could have been avoided.³ If that reasoning is correct, then we should reduce our GHG emissions even if the probability of an individual emission making a difference is low because the impacts

¹ The most comprehensive list of impacts and their effects comes from the reports of the Intergovernmental Panel on Climate Change (IPCC). For their most recent report, see IPCC, *Climate Change 2014: Impacts, Adaptation, and Vulnerability*, ed. C. B. Field et al. (Cambridge: Cambridge University Press, 2014). The World Health Organization (WHO) has also conducted a series of studies to measure the annual casualties caused by the impacts of climate change on human health. See WHO, "Climate and Health: Fact Sheet, July 2005," WHO, July 2005, <http://www.who.int/globalchange/news/fsclimandhealth/en/index.html>; *Global Health Risks: Mortality and Burden of Disease Attributable to Selected Major Risks* (Geneva: WHO Press, 2009), http://www.who.int/healthinfo/global_burden_disease/GlobalHealthRisks_report_full.pdf; and *Quantitative Risk Assessment of the Effects of Climate Change on Selected Causes of Death, 2030s and 2050s* (Geneva: WHO Press, 2014), http://apps.who.int/iris/bitstream/10665/134014/1/9789241507691_eng.pdf.

² See John Nolt, "How Harmful Are the Average American's Greenhouse Gas Emissions?" *Ethics, Policy, and Environment* 14, no. 1 (2011): 3–10; John Nolt, "The Individual's Obligations to Relinquish Unnecessary Greenhouse-Gas-Emitting Devices," *Philosophy and Public Issues (New Series)* 3, no. 1 (2013): 139–65; and John Broome, *Climate Matters: Ethics in a Warming World* (New York: Norton, 2012), chapter 5.

³ See Ben Almassi, "Climate Change and the Ethics of Individual Emissions: A Response to Sinnott-Armstrong," *Perspectives* 4, no. 1 (2012): 4–21.

of those actions—when they do make a difference—will be enormous.

Non-consequentialists have also defended a duty to reduce individual GHG emissions. Christian Baatz argues that individuals should not exceed their fair share of emission rights and are obligated to reduce their emissions (insofar as they can) if they are above that threshold.⁴ Travis Rieder contends that the duty to reduce individual emissions stems from a more general duty not to contribute to massive, systematic harms.⁵ Other philosophers have appealed to virtue ethics and argued that reducing individual emissions is required to maintain one's moral integrity.⁶

This quick survey is not meant to be exhaustive or to establish the consensus among environmental philosophers. Not everyone is convinced that there is a strict obligation for individuals to reduce their GHG emissions.⁷ But it is clearly true that many environmental philosophers believe such a duty exists and that many arguments can be offered to support this conclusion. Rather than retread familiar territory, I want to consider a relatively unexplored question in this literature: assuming that there is a general duty to reduce one's individual carbon footprint, what implications does this duty have for the ethics of procreation?

⁴ See Christian Baatz, "Climate Change and Individual Duties to Reduce GHG Emissions," *Ethics, Policy, and Environment* 17, no. 1 (2014): 1–19; and "Reply to My Critics: Justifying the Fair Share Argument," *Ethics, Policy, and Environment* 19, no. 2 (2016): 160–69

⁵ See Travis Rieder, *Toward a Small Family Ethic: How Overpopulation and Climate Change Are Affecting the Morality of Procreation* (Cham, CH: Springer, 2016), 26–29

⁶ See Marion Hourdequin, "Climate Change, Collective Action, and Individual Obligations," *Environmental Values* 19, no. 4 (2010): 443–63; and Trevor Hedberg, "Climate Change, Moral Integrity, and Obligations to Reduce Individual Greenhouse Gas Emissions," *Ethics, Policy, and Environment* 21, no. 1 (2018): 64–80.

⁷ Some skeptics about a duty to reduce one's individual carbon footprint include Baylor Johnson ("Ethical Obligations in a Tragedy of the Commons," *Environmental Values* 12, no. 3 [2003]: 271–87); Walter Sinnott-Armstrong ("It's Not My Fault: Global Warming and Individual Moral Obligations," in *Perspectives on Climate Change: Science, Politics, Ethics*, ed. Walter Sinnott-Armstrong and Richard B. Howarth [Amsterdam: Elsevier, 2005], 285–307); Joakim Sandberg ("My Emissions Make No Difference," *Environmental Ethics* 33 no. 3 [2011]: 229–48); and Dan Shahar ("Treading Lightly on the Climate in a Problem-Ridden World," *Ethics, Policy, and Environment* 19, no. 2 [2016]: 183–95). Notably, Johnson retracted this claim in later work; see Johnson, "The Possibility of a Joint Communicate: My Response to Hourdequin," *Environmental Values* 20, no. 2 [2011]: 147–56). For replies to some of the common grounds for this skepticism, about duties to reduce individual GHG emissions, see Anne Schwenkenbecher, "Is There an Obligation to Reduce One's Individual Carbon Footprint?" *Critical Review of International Social and Political Philosophy* 17, no. 2 (2014): 168–88.

When we think of reducing our individual GHG emissions, the actions that typically come to mind involve driving less, taking fewer cross-country flights, conserving electricity, and perhaps eating less meat, but it is rare for the duty to reduce individual emissions to be explicitly connected to the ethics of procreation.⁸ As we will see, however, determining one's family size is likely the most significant decision that one will make with respect to their individual carbon footprint. As a result, if there is a duty to reduce one's unnecessary GHG emissions, then *prima facie* there is a moral obligation to limit one's family size when it is possible to do so, particularly for those who live in the developed world and have large individual carbon footprints.⁹ If limiting one's procreation is not required by this more general obligation, then we need an explanation for why it is such a special exception. However, I argue that the most common reasons offered to undercut this obligation—again, assuming that there is a general duty to reduce one's individual GHG emissions—are unsuccessful. As it stands, we are left to conclude that there is indeed a duty to limit one's family size when possible, at least until further, more persuasive arguments to the contrary are presented.

I begin with an overview of the carbon footprint tied to procreation and how it compares with other human activities. I then examine several common reasons that one might offer for thinking that procreation—despite its enormous carbon footprint—could still be an exception to the general duty to reduce GHG emissions. Ultimately, I argue that none of these reasons is compelling, so for now, we should conclude that procreation is not a special action that is exempt from the duty to reduce GHG emissions. If there is a general obligation to reduce unnecessary GHG emissions, then those to whom it applies should also limit our family size. In the concluding section, I also consider what fulfilling this obligation would mean in practice.

The Carbon Footprint of Procreating

The case that a duty to reduce one's GHG emissions entails a duty to limit one's procreation is rather straightforward. As a starting point, consider what courses of action are

⁸ Notable exceptions include Christine Overall, *Why Have Children?* (Cambridge, MA: MIT Press, 2012); Sarah Conly, *One Child: Do We Have a Right to Have More?* (Oxford: Oxford University Press, 2016), and Rieder, *Toward a Small Family Ethic*.

⁹ The duty to reduce one's individual carbon footprint is usually targeted at those in developed nations because those in developing nations often have emissions that are perilously low—these people cannot reduce their emissions without thereby lacking the means to provide for their basic needs. For the purposes of this paper, I am not going to deviate from the convention and will assume that the implications of my argument are reserved primarily for those living in developed nations where citizens have carbon-intensive lifestyles.

typically recommended as a result of a duty to reduce one's carbon footprint. Commonly mentioned duties usually include driving and flying less, buying more fuel-efficient vehicles, eating less meat, converting to more energy-efficient light bulbs, and setting the thermostat to lower temperatures in the winter and higher temperatures in the summer. Most would, I imagine, regard these activities as environmentally good things to do. What's remarkable, however, is that the emissions reductions tied to these behavioral changes pale drastically in comparison to the reductions that could be made by having fewer children.

Paul Murtaugh and Michael Schlax conducted an elaborate study to measure the GHGs tied to an act of procreation. They attempted to measure a person's carbon legacy—the carbon footprint tied to their genes. In making their calculations, they regarded a parent as being responsible for one half of their children's GHG emissions, one fourth of their grandchildren's emissions, and so on. Combining this formula with data regarding fertility rates, life expectancy, and the average individual emissions of citizens in various nations, they compiled data regarding the carbon footprint tied to acts of procreation.¹⁰

Murtaugh and Schlax's results reveal that procreation massively increases a individual's carbon footprint. Having an additional child in China increases a person's carbon footprint by 1384 metric tons, and a new child in Russia boosts each parent's carbon footprint by 2498 metric tons. The figures for the United States are particularly staggering. They estimate that the lifetime emissions tied to the carbon legacy of one child born in the United States is roughly 9,441 metric tons of CO₂, assuming that the emissions rates of one's descendants are roughly equivalent to the average emissions of a 2005 US citizen. Although the figures are lower for other countries, a general fact remains true across all countries: having one fewer child reduces one's carbon footprint far more than any other available actions.¹¹

In the United States, for instance, driving a vehicle that gets 30 mpg rather than 20 mpg for your entire life will save you 148 metric tons of CO₂. That's no small sum, but it's less than 1.6% of the 9,441 metric tons of CO₂ that you would save by having one fewer

¹⁰ Paul Murtaugh and Michael Schlax, "Reproduction and the Carbon Legacies of Individuals," *Global Environmental Change* 19, no. 1 (2009): 18.

¹¹ Murtaugh and Schlax assume that emissions will remain constant at 2005 levels. Obviously, it is possible that per capita emissions decline in the future, so this projection might prove too extreme in the long run. Nevertheless, the more general observation that procreative choices radically outweigh other lifestyle choices in terms of carbon footprint will remain true for the foreseeable future, especially since emissions worldwide have *increased* since 2005, which means the figures in their constant emission scenario would be *higher* if they were calculated today.

child. If you live in the developed world, the degree to which procreating less affects your lifetime carbon footprint should not be understated. In a further application of the data gathered by Murtaugh Schlax, Seth Wynes and Kimberly Nicholas concluded that for a person living in the developed world, not having an additional child would (on average) save 58.6 tonnes of CO₂ equivalent annually. The next highest impact action in their survey was living car free—which would save an average of 2.4 tonnes of CO₂ equivalent annually. In other words, on their assessment, choosing to have one fewer child is twenty-four times more effective at reducing one's carbon footprint than living without a car! In fact, having one fewer child makes a six times larger difference than the sum of all eleven of the other individual actions they examined.¹²

If there is any duty to reduce individual GHG emissions, it would seem that the strongest candidate for a derivative duty would be to limit one's procreation (assuming one has the means to do so). After all, procreation makes by far the largest contribution to one's individual GHG emissions, and it is also not necessary for a person's survival. In this respect, it is meaningfully different from, say, the need for people in Scandinavia to heat their homes or the need to drive into town to purchase groceries.

These observations are bound to make people apprehensive. While many environmentalists are quick to advocate driving less and lowering one's power consumption, the thought that people with carbon-intensive lifestyles should limit their procreation is seldom voiced. For many, the idea of criticizing a person's procreative choices just seems too intrusive—an invasion into one of life's most private and significant choices. In many cultures, procreative acts are met with congratulations and celebration, and questioning a couple's procreative choices is viewed as both callous and inappropriate.

Nevertheless, despite cultural norms, it is not reasonable to regard procreation as beyond the bounds of moral obligation. When one's choices affect the welfare of others, they are morally significant. Procreation obviously affects the welfare of others—both the child who is conceived and the people who are later affected by the child's presence. Procreative choices are special in the sense that they dramatically alter the course of a person's life and are often a significant aspect of a person's life plans, but these considerations do not exempt them from moral evaluation. There may, however, be stronger reasons to exempt people from an obligation to limit their procreation even if there is a more general duty to reduce one's GHG emissions, so we must now consider what those reasons might be.

¹² Seth Wynes and Kimberly Nicholas, "The Climate Mitigation Gap: Education and Government Recommendations Miss the Most Effective Individual Actions," *Environmental Research Letters*, July 12, 2017, iopscience.iop.org/article/10.1088/1748-9326/aa7541.

Do We Have a Right to Unlimited Procreation?

One of the most immediate thoughts that a person might have is that a restriction on procreation is a violation of the person's rights. Rights typically protect basic fundamental interests that people have, and procreating certainly qualifies: it is something that is deeply valued by most people and essential for the continuation of any human society. Thus, it is not surprising that the United Nations recognizes a right "to found a family" in their Universal Declaration of Human Rights (1948).¹³ While it may not be as essential to one's individual well-being as the right to physical security, it certainly seems like an important right and deserving of significant moral protection. Does it follow from this observation that individuals lack an obligation to limit their own procreation?

Procreative rights might play a role in what policies a government can permissibly enforce on its citizens with respect to procreation, but a broad right to procreate does not morally permit an individual to have as many children as they please. One route to this conclusion is by arguing that the right to procreate must be limited in scope. Sarah Conly, for instance, appeals to the fact that rights can be restricted when their exercise causes harm to others.¹⁴ Boosting one's GHG emissions by having more children may, the thought goes, cause great harm to others, and under such circumstances, we do not have a right to engage in that behavior. This line of reasoning may strike some readers as persuasive, but matters here are actually rather complicated. It is not obvious to everyone that a person's individual contribution to population growth really makes a meaningful difference to climate change given its size and scope.¹⁵ After all, it is only in the context of billions of other people emitting GHGs that this process causes any harm; in isolation, a single act of procreation—or even a dozen acts of procreation—does virtually nothing to change the global picture with respect to GHG emissions. Consequently, some philosophers would argue that it is inappropriate to claim that an individual's procreative acts *cause* harm in the morally relevant sense. Carrying Conly's argument further would require either defending an account of harm that is favorable to the argument or explain why the mere contribution to an ongoing harm is enough to override the right to procreate. These may be tasks worth pursuing, but they are beyond my means here. Fortunately, there is a more straightforward response to an appeal to procreative rights.

¹³ UN, *Universal Declaration of Human Rights*, UN, 1948, <http://www.un.org/en/universal-declaration-human-rights/>.

¹⁴ Conly, *One Child*, chapter 3.

¹⁵ Travis Reider, "Review: Sarah Conly, *One Child: Do We Have a Right to Have More?*" *Kennedy Institute of Ethics Journal* 26, no. 2 (2016): E-29–E-34.

Remember that we are currently discussing whether individuals have an obligation to limit their procreation. That question is importantly different from whether they have a moral right to procreate freely. Even if we have a right to determine the number and spacing of our children, that fact alone does not establish that it is morally permissible for us to have as many children as we please.¹⁶ Most agree that we have a right to freedom of speech and expression: people have a fundamental interest in being able to speak and express themselves without fear of reprisal by the government. Nevertheless, I can act wrongly by saying hurtful or malicious things, and I can be justifiably criticized for these actions. Even if I am within my rights to speak my mind, I can do so in ways that violate moral duties tied to avoiding unnecessary harm and treating people with respect. To provide another example, I may have a right to view sexually explicit material, but it may nevertheless be wrong for me to do so under certain circumstances—perhaps because of the ways some particular material objectifies women or the fact that viewing some of this material could cultivate vices in my character.

The main point lesson from these cases is this: the *right* to do X does not entail that one *ought* to do X. In various contexts, we can be morally criticized for behaving in certain ways even when we are within our moral and legal rights to behave in those ways. Therefore, even if we grant that one has a right to procreate freely, it may nevertheless be true that one ought to refrain from procreating in certain circumstances. Rights are not, after all, a license to ignore all other moral obligations that bear on our conduct. An appeal to procreative rights might make sense to object to certain policies imposed by the government, but it does not exonerate a person from a moral obligation to limit their unnecessary GHG emissions (assuming that such an obligation exists). Under these circumstances, if we want to justify the claim that there is no duty to limit one's family size, then we must look at a different argument.

What about the Environmental Benefits of Having Children?

Rather than appealing to procreative rights, one could question whether having children is really a bad thing for the environment on the whole. Given the figures cited earlier, this line of argument might seem puzzling, but the general idea, presented by Julian Simon, originates from the view that people are the ultimate source of ideas and innovation. A growing population tends to lead to conditions of scarcity, and scarcity creates economic incentives to search for solutions to whatever problems scarcity creates. This process, at least according to Simon,¹⁷ actually leaves us better off than we were before:

¹⁶ Overall, *Why Have Children?* and Rieder, *Toward a Small Family Ethic* press similar lines of thought.

¹⁷ Julian L. Simon, *The Ultimate Resource 2* (Princeton, NJ: Princeton University Press, 1996), 59.

More people, and increased income, cause resources to become more scarce in the short run. Heightened scarcity causes prices to rise. The higher prices present opportunity and prompt inventors and entrepreneurs to search for solutions. Many fail in the search, at a cost to themselves. But in a free society, solutions are eventually found. And in the longrun *the new developments leave us better off than if the problems had not arisen*. That is, prices eventually become lower than before the increased scarcity occurred.

Assuming Simon's reasoning is correct, we are left better off in a strictly economic sense: the relevant goods and services are less expensive than they were prior to the conditions of scarcity that arose.

A variation of Simon's argument can be deployed with respect to climate change. Solving climate change will require a lot of people working together and trying to develop solutions—social, political, and technological—to a vast array of relatively new problems. Having more people will increase the severity of the problem—by heightening the scarcity of the available carbon sinks—in the short term but also create a greater incentive to solve the problem and provide more people to generate ideas that might aid the discovery of a solution. In this manner, procreation could contribute to *solving* the problem rather than merely exacerbating it.

There are two core problems with this argument. First, there is no guarantee that the people born will have ideas that *help* us fight climate change. Part of the problem in the United States is that there are too many people with ideas that are *hindering* our ability to take serious action in response to climate change. People can have ideas that aid social and technological progress, but they can also have ideas that impede these types of progress or that encourage applications of new technologies that are unethical or otherwise objectionable. It is not a straightforward truth that the existence of more ideas is better than the existence of fewer ideas: the *content* of the ideas matters as well.

This point is particularly important with respect to climate change because it tempts us with various types of moral corruption.¹⁸ Climate change is an extremely difficult problem to address with our current institutions, and mitigating it effectively involves some short-term costs to us (since we will have to drastically reduce our use of fossil fuels). These features make it rather tempting to dismiss the problem as too complex or too burdensome to solve and encourage us to instead prioritize economic growth and

¹⁸ Stephen Gardiner, *A Perfect Moral Storm: The Ethical Tragedy of Climate Change* (Oxford: Oxford University Press, 2011), chapter 9.

short-term gains at the expense of future people's welfare. A greater number of people contemplating climate change is not going to help us if they are just as vulnerable to moral corruption and inaction as we have been up to this point.

Second, even if more people will eventually help us progress toward a solution, we cannot afford to make the problem worse in the short term. The window for adequately responding to climate change is rapidly closing, and we no longer have time to wait for new generations of people to arrive and aid the search for a solution. In order to meet the goals established in the Paris Climate Agreement, have to reduce carbon emissions at an extraordinary rate—halving them by 2030, halving them again by 2040, and then halving them yet again by 2050—while simultaneously ramping up our carbon capture technologies so that we are pulling about 5 gigatons of carbon dioxide from the atmosphere annually by 2050.¹⁹ This trajectory is staggering, which means that we do not afford to continue increasing the severity of the problem. We need to start implementing solutions *now*. Dithering at this stage just makes the more catastrophic outcomes of climate change more likely to materialize.

These considerations notwithstanding, some may still remain unconvinced. Perhaps the thought is that the environmentally conscientious are precisely the people who should have large families. People who do not care about climate change or related environmental concerns will not be persuaded to limit their procreation, and their children are unlikely to be raised to care about climate change or their individual carbon footprints. If environmentally conscientious people are the only ones who restrict their procreation, then one may worry that those who care about the environment will become a significant minority among future generations. This outcome would be worse overall than if the environmentally conscientious did not restrict their procreative behaviors.

This version of the objection does not fare better than the prior iteration. For this objection to be successful, one must assume that there is a very strong connection between the environmental views of one's parents and the resulting environmental views of their children. This connection is tenuous at best. Anyone who has taught an environmental ethics course in North America has likely encountered students with conservative political views who are frustrated by their family's lack of concern for the environment, and many who develop a deep appreciation for the environment do not do so because of their parents' influence. Parents do usually have a significant influence on their children, but as children become adults, most of them do not dogmatically endorse all of their

¹⁹ Johan Rockström et al., "A Roadmap for Rapid Decarbonization," *Science* 355, no. 6331 (2017): 1269–71.

parents' beliefs and values: they will endorse some and reject others. Unless coercion or indoctrination are employed, it is far from guaranteed that children will share the same values as their parents.

Perhaps the thought is that children are more likely to hold the beliefs and values of their parents than alternate worldviews, so the children of the environmentally conscientious are more likely to be environmentally conscientious themselves than the children of other parents. This more modest view is consistent with many people's experiences and fits with our basic understanding of how children are raised and exposed to various worldviews, political ideologies, and so on. Nevertheless, there are some empirical uncertainties here. Consider, for instance, the studies done by Christopher Ojeda and Peter K. Hatemi in which more than 50 percent of children either misperceived or rejected the political party affiliation of their parents.²⁰ If their research proves accurate, then there is no strong relationship between parents' political views and the views that their children will endorse. Surveying that literature would take us far afield, however, so I will grant this more modest claim for the sake of argument.

Even with this concession, the objection still fails to justify having large families because there are other ways to increase people's awareness of climate change and their general concern about humanity's environmental impact beyond just raising children to hold a certain set of beliefs and values. These options include (among other things) increasing environmental education, developing social and cultural norms focused on living in sustainable ways, and creating economic and other incentives that make it easier for people to live an environmentally friendly lifestyle. Prompting people to contemplate their legacies (and engage in the long-term thinking that this requires) has also proven effective in increasing people's engagement with environmental issues like climate change.²¹ There are many ways we can motivate people to care about environmental issues without requiring environmentally conscientious people to have large families.

What about Carbon Offsets?

At this point, one might offer a different strategy for reducing an individual's contribution to climate change. Instead of trying to have a smaller carbon footprint by refraining from procreation, one could instead try to offset the emissions generated by their pro-

²⁰ Christopher Ojeda and Peter K. Hatemi, "Accounting for the Child in the Transmission of Political Party Identification," *American Sociological Review* 80, no. 6 (2015): 1150–74.

²¹ See Lisa Zaval, Ezra M. Markowitz, and Eike U. Weber, "How Will I Be Remembered? Conserving the Environment for the Sake of One's Legacy," *Psychological Science* 26, no. 2 (2015): 231–36.

creation. Offsetting individual GHG emissions means that “for every unit of greenhouse gas you cause to be added to the atmosphere, you also cause a unit to be subtracted from it.”²² An individual can accomplish this by donating money to a company or organization that will use that money to fund a project that will prevent GHG emissions somewhere else in the world.²³ In this manner, your net effect—in terms of GHG emissions—can be zero: the atmosphere can contain the same amount of GHGs as a result of your actions as it would contain if you never existed.

Explicit assessments of the ethics of carbon offsetting are relatively rare compared other topics in the climate change literature, but the practice has been endorsed by John Broome and Kai Spiekermann.²⁴ There are, however, significant objections to offsetting.²⁵ One of these concerns is about how we can determine whether a particular act of offsetting actually influences the outcome. If, for instance, we are donating money to build a wind turbine but that turbine would be built regardless of how much we donated, then our attempt at offsetting our emissions failed: the emissions reductions attributed to this source of wind power would have occurred without our donation. This is known as the problem of *additionality*, and in practice it is often difficult to know with certainty that your attempt to offset your emissions actually makes a difference.

An additional practical problem is that many offsetting projects involve the creation or protection of short-term carbon sinks.²⁶ The most common examples involve the planting of trees or the protection of existing trees. Offsetting through these methods is un-

²² See John Broome, *Climate Matters: Ethics in a Warming World* (New York: Norton), 85.

²³ Such projects might include the creation of a hydroelectric power plant, working to prevent deforestation in the Amazon, or helping install efficient cooking stoves in developing countries (so that the residents do not have to cook with firewood).

²⁴ See Broome, *Climate Matters*, chapter 5. Kai Spiekermann’s endorsement of carbon offsetting is highly qualified because he bypasses a number of practical concerns about their implementation and also questions the motivations of those who purchase them. Specifically, he morally criticizes those who would purchase carbon offsets only when they are cheap. See Spiekermann, “Buying Low, Flying High: Carbon Offsets and Partial Compliance,” *Political Studies* 62, no. 4 (2014): 913–29.

²⁵ See Simon Bullock, Mike Childs, and Tom Picken, *A Dangerous Distraction: Why Offsetting Is Failing the Climate and People: The Evidence* (London: Friends of the Earth, 2009), https://www.foei.org/wp-content/uploads/2014/02/dangerous_distraction.pdf; Simon Caney and Cameron Hepburn, “Carbon Trading: Unethical, Unjust and Ineffective?” *Royal Institute of Philosophy Supplements* 69 (2011): 201–34; and Keith Hyams and Tina Fawcett, “The Ethics of Carbon Offsetting,” *WIREs Climate Change* 4, no. 2 (2013): 91–98.

²⁶ See Rieder, *Toward a Small Family Ethic*, 21.

reliable because trees die, rot, and eventually decompose. As a result, the CO₂ that these trees absorbed through photosynthesis is eventually released back into the atmosphere. The only way that these means of offsetting can be effective is if measures are taken to ensure that these short-term carbon sinks are maintained indefinitely—something that cannot be guaranteed.

These are perhaps the two biggest problems with reducing one's individual carbon footprint via offsetting, but a few other objections are also worth acknowledging. First, calculating both one's total GHG emissions and the emissions that are genuinely offset by a particular project is difficult to accomplish. Estimates on these figures can vary dramatically depending on which particular carbon calculator a person uses, and that makes it difficult for anyone to be confident that their offsets actually result in their carbon footprint being sufficiently reduced.

Second, offsets are an appealing option in large part because they are relatively cheap, but if a large portion of people started purchasing them, the price would quickly increase. Thus, as a large-scale solution for helping people meet their moral duties to reduce their GHG emissions, offsetting would not be a viable strategy. For most people, its financial viability is highly contingent.

Third, promoting offsets may undercut proper moral motivation: people may purchase offsets as a way of clearing their conscience but without making any broader lifestyle changes that would make a bigger difference.²⁷ As a result, there is a worry that promoting cheap carbon offsets “creates the mistaken impression that offsetting is all we need to solve the problem of GHG emissions” and “sends the misleading signal that the average Western lifestyle does not need to be reformed to mitigate climate change because buying a few cheap offsets is enough.”²⁸ A better strategy, one reasons, would be to lower our carbon footprints by just emitting less. That strategy sends the right message about pursuing a solution to climate change.

Even with all this in mind, I should stress that purchasing carbon offsets is still better than doing nothing. In cases where emissions reductions would be prohibitively difficult or impossible, purchasing carbon offsets is a worthwhile strategy for reducing one's carbon footprint. Nevertheless, in general, purchasing carbon offsets is not a reliable means

²⁷ This sentiment is reinforced by the fact that offsetting is often used in conjunction with marketing campaigns that aim to get people to continue engaging in carbon-intensive activities such as driving SUVs or booking long flights.

²⁸ Spiekermann, “Buying Low, Flying High,” 926.

of lowering one's GHG emissions. The best approach is not to emit and then offset but to *prevent* the emissions in the first place. In the case of procreation, the overwhelming majority of people in the developed world can control how many children they have. Thus, the preferred moral strategy for reducing the carbon footprint tied to their procreation is for them to limit their family size.

Would a Duty to Limit Family Size Be Too Demanding?

We now reach perhaps the strongest objection and the one that is likely to resonate with parents or aspiring parents the most: a duty to limit procreation may be seen as unreasonably demanding. Many believe that morality has limits and that a person cannot be required to abandon their most important projects and pursuits to comply with moral obligations.²⁹ This objection is most powerful when the purported obligation would demand that we sacrifice something that is central to our lives and perhaps a core component of our identity. Procreation fits this description for a lot of people: conceiving and raising a child is a life project that becomes central to their identity.

The strength of the demandingness objection will depend in part on how stringent the obligation to restrict one's procreation is. If we must all go childless, then the obligation may well be too demanding. For many people, gestating and raising a child is a central life project that they would not be willing to abandon. Only antinatalists such as David Benatar and Jimmy Licon advocate such an uncompromising standard.³⁰ This obligation is less demanding if couples are allowed to have one child and less demanding still if parents are allowed to have two biological children, which would mean adhering to replacement fertility levels (or lower).

While conceiving and raising a child constitutes a powerful transformational experience, the value of this experience surely diminishes with each child that one conceives. The difference between being a parent and not being a parent is enormous—a change not only in one's life circumstances but also in one's identity. Perhaps the difference between being a parent of siblings and the parent of an only child is also significant in this respect. But surely at some point, this is no longer true. It would be dubious for someone to say

²⁹ One classic representation of this view comes from Bernard Williams, "Integrity," in *Utilitarianism: For and Against*, ed. J. J. C. Smart and Bernard Williams (Cambridge: Cambridge University Press, 1973), 108–18.

³⁰ They also advocate these positions on the basis of reasons that are largely independent of climate change. See David Benatar, *Better Never to Have Been* (Oxford: Clarendon, 2006); and Jimmy Licon, "The Immortality of Procreation," *Think* 11, no. 32 (2012): 85–91.

that having ten children instead of nine radically alters their personal identity or that their life will be fundamentally incomplete if they can only have nine children.

Of course, the demandingness of restricting one's procreative behavior is not just limited to the ways in which it impacts one's identity. Many view children as a significant source of personal happiness and believe that restricting their family size will deprive their lives of much joy. For those who want children, an obligation to limit their family size risks depriving them of a central source of long-term happiness.

Or at least conventional wisdom holds that having children often makes people happier. The social scientific research on the subject paints a very different picture. The general trend appears to be that having children *decreases* happiness.³¹ Having children, on average, appears to have an adverse effect on one's marital satisfaction, life satisfaction, and general reported happiness.³² While there will surely be memorable positive experiences from a child's life, these tend to be outweighed by the day-to-day sacrifices parents must make to ensure that their children have a worthwhile upbringing.

Now one may be skeptical about this research. One complication is that the major benefits of child-rearing occur later in life. Once children become adults, they no longer

³¹ See Alberto Alesina, Rafael Di Tella, and Robert MacCulloch, "Inequality and Happiness: Are Europeans and Americans Different?" *Journal of Public Economics* 88, no. 9–10 (2004): 2009–42; Rafael Di Tella, Robert MacCulloch, and Andrew Oswald, "The Macroeconomics of Happiness," *Review of Economics and Statistics* 85, no. 4 (2003): 809–27; Jean Twenge, W. Keith Campbell, and Craig Foster, "Parenthood and Marital Satisfaction: A Meta-Analytic Review," *Journal of Marriage and Family* 65, no. 3 (2003): 574–83; Daniel Gilbert, *Stumbling on Happiness* (New York: Vintage Books, 2007), 242–44; Nattavudh Powdthavee, "Putting a Price Tag on Friends, Relatives, and Neighbours: Using Surveys of Life Satisfaction to Value Social Relationships," *Journal of Socio-Economics* 37, no. 4 (2008): 1459–80; Thomas Hansen, "Parenthood and Happiness: A Review of Folk Theories versus Empirical Evidence," *Social Indicators Research* 108, no. 1 (2012): 29–64; and Rachel Margolis and Mikko Myrskylä, "Parental Well-Being Surrounding First Birth as a Determinant of Further Parity Progression," *Demography* 52, no. 4 (2015): 1147–66. Angus Deaton and Arthur Stone observed the same effects but thought that they were negligible if one controlled for parental choice. Thus, they conclude that parents and nonparents will have on average the same levels of happiness provided that parents choose to be parents and nonparents choose not to be parents. See Deaton and Stone, "Evaluative and Hedonic Wellbeing among Those with and without Children at Home," *Proceedings of the National Academy of Sciences* 111, no. 4 (2014): 1328–33.

³² There is some variability depending on where one lives. In most industrialized countries, having children seems to have a pronounced negative effect on parents' well-being, but in others (e.g., Portugal, Hungary), the effect appears to be positive. See Jennifer Glass, Robin Simon, and Matthew Andersson, "Parenthood and Happiness: Effects of Work-Family Reconciliation Policies in 22 OECD Countries," *American Journal of Sociology* 122, no. 3 (2016): 886–929.

require a great amount of personal care, and they can be a source of many joys—pride in their achievements, pleasant interactions with them at family gatherings, and so on. Additionally, having a child often increases the perceived meaningfulness of one's life even if it diminishes one's well-being. How are these considerations to be weighed against the costs associated with gestating and raising a child to adulthood?³³

One immediate observation is that the long-term benefits sometimes fail to materialize. If either the parent or their child dies younger than expected, then the parent will not be able to reap the long-term benefits associated with parenting. That may also occur if the relationship between parent and child becomes strained over time. Admittedly, such occurrences are not the norm, and so most people will probably anticipate enjoying a relationship with their children when they are late in life. I am not sure there is any straightforward way to aggregate the long-term benefits with the short-term costs. How do the pleasant experiences of interacting with your children later in life compare to the sleepless nights, stressfully busy days, and substantial financial costs (i.e., usually the equivalent more than one hundred thousand dollars in the developed world) tied to child-rearing?

Here is a conservative conclusion that I believe can be reached from the research conducted and these other considerations: having children on the grounds that it will make you happier overall is, at best, a gamble. There is compelling evidence that it usually makes people's lives less enjoyable in the short term. It *might* make your life go better when you are older, and this combination of enjoyment and sense of meaningfulness *might* outweigh the unhappiness experienced earlier in life. But there is no guarantee that either of these outcomes will materialize. The safer route to promoting your happiness would be to stay childless.

Even if this view is accepted, there may still be some people who would prefer to take the gamble. Some simply cannot envision a fulfilling life without a child in the picture, and others will be confident that their parenting experience will go well. The good news for these people is that I am not advocating that everyone go childless. I have been advocating a duty to limit one's family size, and that is not the same as limiting one's number of children to zero. For those parents who are deeply invested in having biological children, I believe that having two children per couple (or one per person) is an acceptable compromise

³³ This observation is the foundation for part of Bryan Caplan's argument that people should, on self-interested grounds, have more children. He thinks the value of children later in life is not sufficiently captured by the relevant sociological and psychological research. See Caplan, *Selfish Reasons to Have More Kids: Why Being a Great Parent Is Less Work and More Fun than You Think* (New York: Basic Books, 2011). See also Roy Baumeister et al., "Some Key Differences between a Happy Life and a Meaningful One," *Journal of Positive Psychology* 8, no. 6 (2013): 505–16.

given the moral considerations in play. This standard does not force aspiring parents with a deep desire for biological children to forgo that experience, and one child per person, if universalized, is slightly below replacement-level fertility. Thus, parents with two biological children can be said to have done their part not to contribute to overpopulation. A two-child family is also sufficient for the creation of sibling relationships, which some parents consider important.

Now at this juncture, two concerns might be raised to my proposal. First, if the parents are reflective, they will recognize that many people who should have two or fewer children will have more anyway. Does it follow that the environmentally conscientious parents should have no children as a means of correcting for others' noncompliance? If their desire for biological children runs deep enough, then I believe the parents are under no obligation to further restrict their procreation even when noncompliance with the two-child standard is foreseeable. It would be good for these parents to restrict their procreation further, but doing so goes beyond what morality requires. Individuals are required to do their part to help solve our ongoing climate problem, but they are not required to be martyrs for the environment, especially since the solutions to these problems require large-scale collective action at the institutional level. It is simply not reasonable to ask individuals to bear enormous burdens with respect to these problems when their individual actions will make only a small difference toward solving the problem. They should still do their fair share, but requiring them to do more due to the noncompliance seems to punish them for their efforts to adhere to their moral duty. Such a proposal is not just profoundly unfair but also self-defeating, since it could serve to undercut people's motivations to do their moral duty in the first place.

A second concern about my proposal is that a universal two-child standard is not really a neutral policy. Because there are such a large number of young people relative to the population as a whole, even if all procreating couples were to limit themselves to only two biological children, the population would still increase significantly over the next several decades. Thus, it would appear that I should advocate a standard that is more stringent than two children per couple.

This objection conflates concerns about policy objectives with concerns about individual moral obligations. At the level of policy, we should definitely aim for a fertility rate of below two if we are to stabilize population quickly enough to aid our response to climate change. But what we aim for at the level of public policy does not always align perfectly with what individuals are morally obligated to do. At the policy level, we want to create conditions where parents will freely choose to have (on average) less than one child per person—conditions that have already been achieved in many

developed countries. Nevertheless, for some people, requiring them to have only a single child or to go childless is, in my view, too onerous a burden to place on them. It is enough that they are reproducing below the replacement level fertility rate. We may strive to create conditions that would incentivize them to choose only one child (or perhaps none), but in my view, they are not strictly obligated to have fewer than two children. There are, however, other people who are indeed obligated to have less than two children, and these groups of people may provide an avenue whereby the target fertility rate of less than two per woman falls more in line with what individual moral obligation requires.

Many people are not so deeply invested in having biological children so as to justify having two children. For them, adopting children would often be a better choice. Adoption is frequently an available but unexplored option for those who want to increase their family size. Many children who already exist are in dire need of permanent homes, and other things equal, meeting the needs of children who already exist would seem a more important moral objective than the creation of new people. On these grounds, Daniel Friedrich has argued that we generally have a moral duty to adopt rather than procreate.³⁴ This argument is only bolstered by the climate-related impacts associated with procreation, since these provide an additional reason for favoring adoption if it is available. If the relevant desire is simply the experience of *raising* children, then prospective parents are obligated to look into adoption and see if it is a viable option for them. Of course, we may well acknowledge exceptions for women with a strong desire to experience pregnancy,³⁵ and adopting children may in some cases prove very burdensome for the family in question. Under these conditions, having biological children is permissible.

Another group of people who should not have two children are those who are perfectly content with one child. When there is no deep desire for a second biological child, then the parents should not procreate further. The same reasoning applies to those who do not have any preference for children: these people should not procreate *at all*. This point might sound obvious, but we must remember that many people procreate for relatively frivolous reasons (given the gravity of the choice). Some procreate simply because they view it as a normal thing to do at their age or because they witness their friends having children. If parents' reasons for having children are not rooted in some deep desire for biological children, then they should not procreate.

³⁴ Daniel Friedrich, "A Duty to Adopt?" *Journal of Applied Philosophy* 30, no. 1 (2013): 25–39.

³⁵ See Tina Rulli, "Preferring a Genetically-Related Child," *Journal of Moral Philosophy* 13, no. 6 (2016): 669–98.

Of course, the social pressures to have children can be stronger or weaker depending on the context, and the social norms we observe in childhood can influence how we form our preferences. Most cultures are dominantly pronatalist, and so people often subconsciously form expectations that they will have children when they are older. Nonetheless, social pressures and expectations to engage in certain behaviors rarely justify doing something wrong. Most cultures in the developed world promote carbon-intensive lifestyles and meat eating, but there are ethical arguments that both these practices are wrong. If those arguments are correct, then doing the right thing will sometimes be inconvenient or socially awkward. The same may well be true for limiting one's family size, but moral obligations typically take precedence over moral and social norms. There may, of course, be rare circumstances where the costs of certain norm-defying behavior would be so devastating for a person that they cannot be reasonably expected to defy expectations. If a person were in danger of being disowned by their parents and other family members if they do not procreate, then their particular act of procreation might be justified. But among the audience of this paper—namely, those in the developed world with large carbon footprints—how many people are really in such radical circumstances? For the overwhelming majority of such people, the costs of having fewer children than others expect will be much less severe.

Overall, concerns about the demandingness of limiting one's family size are not sufficient to undermine the obligation to do so. At best, this objection provides some constraints on the scope of the obligation. Prospective parents with strong desires for biological children should not be forced to give up the experiences of gestation and child-rearing. But even for parents who fit this description, an obligation to restrict procreation to below the rate of replacement (i.e., two children per woman or lower) is not overly demanding. Two children would provide them the means to enjoy both the experiences of biological parenthood and provide sibling relationships for their children. Adoption is a suitable avenue for people to expand their families further.

Conclusion

We have seen that procreation has a disproportionately large carbon footprint compared to other GHG-emitting activities, so *prima facie*, if people have an obligation to limit their individual carbon footprints, then there is an obligation to limit their family size. I surveyed four reasons that could be offered to defend procreation as a special exception to this more general moral obligation, but I argued that none of these reasons is persuasive. A duty to limit one's family size is not undercut by appealing to procreative rights, the environmental benefits of procreation, the practice of offsetting one's emissions, or concerns about the demanding nature of the obligation. We did see, however, that concerns

about demandingness do affect the stringency of the obligation in some circumstances. Nonetheless, until further arguments are presented, we should accept the conclusion that if there is a duty to reduce one's individual carbon footprint, then there exists a duty to limit one's family size when possible. This duty will primarily apply to those in the developed world, given the large per capita GHG emissions of people living in these nations.³⁶ How can this duty be fulfilled? First, individuals should consider whether they want children. If a couple decide that they have no strong desire for children, then they should not procreate *at all*. Given the carbon footprint associated with procreation, if there is a general duty to limit one's carbon footprint, then people should not procreate unless they have a strong reason to do so.

Suppose a couple does want children, but what they mainly value is the experience of *raising* children. If the child's genetics and the experience of pregnancy are not significant concerns for the prospective parents, then they should attempt to adopt a child. Should this prove impossible or unduly burdensome, then they may permissibly procreate.

Once a couple has engaged in procreation, they can then consider whether they want another child. For some people, one child will be enough to fulfill their deep desires to be parents. These individuals should not have additional children. But if the parents view a second biological child as essential to their life plans, then they may permissibly have a second child. The second child represents the upper limit of the obligation however: having any more children will violate it. Once a couple goes beyond the replacement fertility rate, it is clear that they are actively contributing to population growth and the associated growth of our collective carbon footprint. No reasonable construal of a duty to limit one's carbon footprint can permit this behavior.

It may strike some as disconcerting that our procreative choices could be restricted by climate change, but procreation's contribution to our carbon footprints reveals an important way in which procreative choices are not private. They are personal and profoundly meaningful, but they also contribute to environmental impacts that will affect the welfare of future people. Thus, those of us with carbon-intensive lifestyles should carefully consider how many children we ought to have.

³⁶ Of course, population growth can contribute to a variety of other environmental problems (and some nonenvironmental ones), and these considerations might entail a duty for even those groups with miniscule per capita carbon footprints to limit their procreation to replacement-level fertility rates. These considerations, however, would have to be the topic of another paper entirely and take us beyond the bounds of what a duty to reduce one's GHG emissions would require.

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