Limiting climate change: what's most worth doing?

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PERSPECTIVE

Limiting climate change: what's most worth doing?

Paul C Stern[1,2,4] and Kimberly S Wolske[3]

[1] Social and Environmental Research Institute, Northampton, MA 01060, United States of America
[2] Norwegian University of Science and Technology, Trondheim, Norway
[3] Harris School of Public Policy, University of Chicago, Chicago, IL 60637, United States of America
[4] Author to whom any correspondence should be addressed.

E-mail: pstern@seri-us.org

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Abstract

Wynes and Nicholas (2017 *Environ. Res. Lett.* **12** 074024) claim that some of the most important actions individuals can take to mitigate climate change have been overlooked, particularly in educational messages for adolescents, and estimate the potential impact of some of these, including having fewer children and living car free. These estimates raise questions that deserve serious analysis, but they are based only on the technical potential of the actions and do not consider the plasticity of the behaviors and the feasibility of policies to support them. The actions identified as having the greatest potential are lifestyle changes that accrue benefits over a lifetime or longer, so are not realistic alternatives to actions that can be enacted immediately. But presenting lifestyle choices and the relative impacts of different actions as discussion starters for adolescents could be promising, especially if the discussions highlight issues of behavioral plasticity, policy plasticity, and time scale. Research has identified design principles for interventions to achieve the strongest emissions reductions at time scales up to the decadal. Design principles for achieving longer-lasting changes deserve careful analytic attention, as well as a stronger focus in adolescent textbooks and messages to the general population. Both adolescents and researchers would do well to think carefully about what could promote the generational changes needed to reach a climate change target such as 'well below 2 °C'.

Limiting the potential for catastrophic climate change will require dramatically reducing carbon dioxide emissions within the next several decades. Wynes and Nicholas (2017) make two important claims that deserve greater attention in achieving this objective. One is that some of the highest impact actions individuals can undertake to reduce greenhouse gas (GHG) emissions have been overlooked, especially in government recommendations to consumers. In particular, they point to choices to have one fewer child, to live car free, to avoid airplane travel, and to eat less meat. They find that the first two of these in particular have much greater impact than more frequently recommended actions. Secondly, they point out that adolescents, who they see as an ideal demographic to consider such choices, are not presented with information about the impact of significant lifestyle changes in climate change educational materials.

Wynes and Nicholas raise questions that deserve serious analytic attention and further research. However, their quantitative estimates of the effects of several lifestyle-changing emissions-reducing behaviors are only a rough first step. Analysis must go farther to consider how much of this potential is reasonably achievable, on what time scale, and through what interventions. The paper's claims derive from analysis of what has been called the technical potential of these actions: the effect if the actions are fully and universally adopted. For example, the estimated annual emissions reduction from living car free assumes that a person lives completely car free. Estimating reasonably achievable emissions reductions (RAER) must also consider the behavioral plasticity of actions (see Dietz *et al* 2009): the degree to which they are universally and fully adopted. In this example, it must consider the proportion of people who would actually live car free and the completeness of that commitment (e.g. avoiding car rentals and hired rides). RAER must also account for policy plasticity (Vandenbergh and Gilligan in press), or the feasibility of implementing a fully effective intervention. This is not easy to estimate on an empirical basis, especially for behaviors that are rare

or new, or for such choices as childbearing, which are complex, multiply determined, and typically not considered as responses to the risks of climate change. Still, analysis of such behaviors is worth undertaking.

Analyses also need to consider time scales. Actions like recycling, hanging clothes to dry, and so forth, can reduce emissions immediately, but tend to have much lower RAER on a decadal time scale than one-time actions that upgrade household energy-using equipment (cars, heating systems, etc.; Dietz *et al* 2009). The actions showing the greatest potential in the Wynes and Nicholas analysis—having one fewer child and living car free—accrue their full benefits over the course of a lifetime or beyond. Presenting long-term lifestyle choices as realistic alternatives to behaviors that can be immediately enacted is likely to meet resistance from audiences, and for good reason: high-impact lifestyle choices require ongoing commitment to forego benefits that society generally sees as desirable. If these high-impact approaches to mitigating climate change are seen as non-starters, adolescents may erroneously conclude there is little they can do to effect change. But presenting these lifestyle choices as discussion starters for adolescents could be promising, especially if the discussions also highlighted the issues of behavioral plasticity, policy plasticity, and time scale, and encouraged consideration of how to facilitate the higher-impact changes.

Research has identified several design principles for creating effective interventions to achieve RAER from the highest-impact household behaviors that occur on a decadal time scale (e.g. upgrading heating equipment, choosing a fuel-efficient vehicle, installing solar panels). Not surprisingly, these principles go beyond simply informing people of which choices have greatest effect on that time scale. Among the most important are providing information from credible sources at points of decision, presenting information so as to minimize the cognitive effort needed to make an informed choice, and providing credible quality assurance that adopters will actually get the promised benefits (Vandenbergh *et al* 2010, Wolske and Stern in press). The design principles for maximizing behavioral change toward lowering birth rates and reducing car ownership deserve careful analytic attention. They are surely different from the ones for changing daily behavior or for promoting adoption of energy-efficient replacements of household equipment.

A key contribution of Wynes and Nicholas' analysis is its emphasis on the potential role of today's adolescents. Adolescents' future actions can have large and long-term effects on GHG emissions, so shaping their understanding can be very important. Prior work has shown that students are more likely to engage in climate action if they not only understand the causes of climate change, but also have knowledge of specific action strategies (McNeill and Vaughn 2012). Wynes and Nicholas' paper does a service by showing that many educational texts support the false impression that behavior changes that in fact have very limited potential for constraining climate change can contribute meaningfully. The texts' authors may intend to promote a sense of efficacy in readers, but they miss the opportunity to provide a more accurate understanding and to stimulate deeper thinking during a formative period in young lives. Getting adolescents to reflect on which of their actions can have great overall impact on the future climate, and on the small impact of many of the most readily imaginable actions, could have considerable value by stimulating serious and better-informed discussion of how they might make a difference in limiting climate change.

Adolescents and researchers would both do well to think carefully about what could promote the generational changes that are needed to reach a target like 'well below 2 °C'. Such changes might depend on a social movement for climate stabilization that supports long-term changes in social norms (e.g. about family size), greater availability of mass transit, climate-friendly urban design, or other actions that are impractical on the short term but on a longer time scale increase the plasticity of potentially high-impact behaviors. A stronger focus on high-impact actions in adolescent textbooks and in messages to the general population may be critical, not only to affect behavior in the near term, but to stimulate discussion about the larger and longer-term changes needed and how to achieve them.

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