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ARTICLE



'It's my responsibility': perspectives on environmental justice and education for sustainability among international school students in Singapore

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ABSTRACT

This article analyzes students' perspectives on sustainable development, environmental justice, and concomitant environmental education programs at two international schools in Singapore. Data include surveys of over 250 students and 19 focus-group interviews with 300 students. In addition to having a detailed and nuanced understanding of the complexity of climate change and its impacts, most students acknowledged both the likely consequences of continuing resource-intensive industrialization and the growing and unjust disparity in carbon emissions between developed and developing countries. Many students also recognized that contemporary lifestyles rooted in overconsumption are not sustainable and proposed a variety of measures – both mainstream (i.e., discourage meat consumption and single-use plastic) and radical (population-control measures) – to curb consumption. While identifying some areas for improvement in their schools' commitment to sustainability issues, students overall valued the ecological education that their schools provided them and to various extents recognized the privileges it has afforded them.

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Introduction

In the aftermath of a 2018 UN report stating that we have about a decade to drastically cut emissions before it will likely be impossible to stabilize global warming, young people around the world began to 'Strike for the Climate.' Inspired by climate activist Greta Thunberg's initial August 2018 protest to boycott school until world leaders addressed global warming, many students have mobilized to tackle our worsening climate crisis. Of course, these estimated 6 million protesting students will not be equally burdened by future warming; various-marginalized groups are, and will continue to be, disproportionately impacted by a host of climate change issues, from rising seas, heat waves, tropical diseases, and food shortages (Watts et al., 2019).

One youth movement, Fridays for Future, explicitly recognized this in a recent communique:

Over 300 climate activists, including many young climate strikers from around the world, were kicked out of COP25 in Madrid after protesting for women's and indigenous people's rights and calling for ambitious actions from rich countries. The voices of millions of people are silenced at the climate change conference (while) fossil fuel lobbyists remained inside ... We cannot accept this injustice and violation of human rights ...the climate strikers ... are calling out for an international strike and action day TOMORROW, Friday, December 13th. (Fridays For Future, 2019)

These youths' actions have received considerable exposure in Western news media. However, much less is known about the perspectives of teenagers not explicitly involved in such movements, especially those who are living in countries where protesting and striking is not only culturally discouraged but outright illegal, such as the Chinese teenage climate activist Howey Ou whose advocacy led her to be interrogated by government officials and barred entry to school. Our study seeks to shed light on such perspectives by surveying and interviewing focus groups of dozens of middle and high school students, aged 10 to 18, at two international schools in Singapore during the weeks leading up to these international 'school strikes,' most notably on December 6 and 13, 2019. Through our study, we sought to hear directly from this climate-striking generation regarding their perspectives on education for sustainability and environmental justice.

Previous studies have documented how curricular coverage of environmental issues has increased over time (Bromley et al., 2011; Jimenez et al., 2017). Of course, merely having a curriculum that includes sustainable development content does not guarantee that it adequately addresses eco-pedagogical issues such as global-local connectivity and the role of dominant cultures in marginalizing others (Misiaszek, 2015), nor that it adequately prepares students to deal with particularly bleak future climate scenarios (Moser, 2019; Verlie, 2019). In recent years, researchers have increasingly examined young students' environmental views and behaviors by surveying and interviewing them directly (Stanes & Klocker, 2016; Nairn, 2019). For instance, Tolppanen and Aksela (2018) studied what questions 200 international high school students asked about climate change and found that many students not only understood climate change as a complex issue but articulated multi-disciplinary perspectives through thoughtful inquiries. However, these and other studies (Fløttum et al., 2016; Kuthe et al., 2019) typically have focused on teenagers living in the Western countries of the Global North, where free speech is relatively unrestricted. Missing are voices from young people living in the Global South (especially in contexts with considerably less free public expression),

a phenomenon that has frustrated some young adults who have noted how few young environmental activists of color have received media attention, despite having similarly advocated about environmental issues (and their respective impacts on their local communities) for years (Warner & Jimenez, Forthcoming 2021).

Key terms

We identify developed countries as those with widespread industrialization, high average per capita income, and high relative consumption of world resources; these same countries generally are also considered to be part of the Global North, a term reflective of countries with both developed status and location in or adjacent to the temperate regions of the country. However, some developed countries are nonetheless considered part of the Global North despite being located near the equator (e.g., Taiwan) or in the more temperate regions south of the equator (e.g., New Zealand).

Conversely, developing countries more or less refer to the remaining world's countries, albeit with some countries being difficult to categorize (such as South Africa, where its disparate development generally aligns with its racist, apartheid legacy). While the aspirational label 'developing' emerged from the modernist vision of broadly diffusing the material gains of economic development throughout the world, we inquire the extent to which our student participants think the collective pursuit of carbon-fueled mass industrialization in the Global South can be commensurate with future, sustainable prosperity.

Sustainable development is a broad, encompassing term that can at times include contradictory perspectives. For instance, while some sustainability advocates argue that investments in renewable energy is key to humanity's long-term future (Egan, 2019), others insist that such an approach, heavily dependent on fossil fuels and toxic chemical processes inherent in mining rare earth minerals, is at best a bridge technology to help transition towards more local, agrarian living (Rees, 2019). As such, we are more interested in exploring what students enrolled in our participating students view as 'sustainable' rather than limiting our understanding of sustainability to any one particular conceptualization.

Environmental Justice (EJ), on the other hand, is considerably less ambiguous. EJ first originated from the concept of environmental racism, which drew attention to how many privileged people reap the benefits of industrialized living without enduring its environmental burdens, while people of color have been disproportionately encumbered with industrialization's adverse impacts, directly through toxic contamination or indirectly from anthropogenic climate change (Adeola, 2000). Environmental Justice, however, concerns a broader conception of marginalized groups that are

unfairly impacted by environmental degradation, with particular consideration of intersectional issues. For instance, rural, low-income women of color living in the Global South are considerably more likely to be the primary water collectors in their families; thus, as global warming reduces water accessibility, it is these women who will be increasingly burdened by longer daily walks to secure their family's water needs.

Although we note when students explicitly frame climate crises as environmental justice issues, we argue that it is important for educators and curriculum designers to understand the varied ways in which students conceptualize sustainable development, in order to better prioritize both individual lifestyle and collective policy recommendations as paths to mitigating and adapting to our climate crisis. For the purpose of this paper, we generally view *environmental justice* as 'the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies' (Environmental Protection Agency, 2018, n.p.), though we incorporate gender issues as well. And while not everyone experiencing climate-related natural disasters is a person of color (i.e., white Australians) nor living at or south of the equator (i.e., North Koreans), the vast majority of people experiencing negative climate change impacts *are* people of color living in the Global South (Brändlin, 2019).

Materials and methods

Participants and setting

Our study took place at two K–12 International Baccalaureate (IB) schools in Singapore. IB schools have typically served expatriate communities in Canada, Europe, the UK, and the US (Bunnell, 2009). These schools emerged to address the needs of mobile transnational elites (Fox, 1985) by providing 'the broad principles of a Western liberal art education,' eventually leading to 'a prototypical transnational school curriculum' that allows for some local adaption (Doherty et al., 2012, p. 312).

The participating schools offered both an academic and values-based education to students from a mix of nationalities, particularly from East and South Asian countries. The schools identified environmental issues as essential to their missions by including elements of sustainability in their curriculum (e.g., scientific content, service learning), hands-on, skills-based activities that promoted sustainability (e.g., composting, meatless lunches, and fundraisers for external nonprofits), and investments in alternative energy infrastructure (e.g., solar panels). Through a convenience sample, we selected these sites based on their efforts to incorporate sustainability

into students' experiences, both inside and outside their classes. While cognizant that survey terms such as gender justice might be unfamiliar to middle or high school students, our initial assumptions about the notably above-average environmental justice literacy of these students were generally confirmed in our in-person class conversations. That said, we cannot presume such understandings were universal; as such, our response findings may have been skewed by students unfamiliar with these terms.

Singapore presents a unique research opportunity. On one hand, Singapore has promoted itself as the 'world's greenest city' (Kolczak, 2017), even though some have also questioned the extent to which its long-term development projects are sustainable (Mayerson, 2017.) On the other hand, Singapore, with its equatorial location and vulnerability to rising sea levels will likely face environmental devastation and resource insecurity sooner than many other developed countries (Fogarty, 2012), a reality generally acknowledged publicly by Singapore's government and population (Kiedrowski, 2020).

A US-based Institutional Review Board (IRB) approved all research procedures and instruments (Protocol #192,023), with participants' names being omitted to protect confidentiality. In the interest of protecting student anonymity, we do not report specific ages or grades of students in conjunction with either survey results or focus groups.

Context

Teachers and staff from both schools expressed concerns over instruction about climate strikes in the context of Singapore's laws that, essentially, make public demonstrations illegal. Some noted the potentially precarious situation of international schools in Singapore: as foreign residents, many students, families, faculty, and staff of these schools have little legal protection. In turn, cooperating teachers and staff at both schools requested that we remove several survey questions (i.e., asking students about their views of school strikes) from our initial survey as a precaution. However, teachers and staff were more comfortable with questions about school strikes and protests in focus-group discussion.

For this study, we utilized a two-phase sequential explanatory mixed-methods design. We combined the qualitative method of a semi-structured, anonymous questionnaire with focus-group interviews. Our survey and focus-group questions were organized around our three overarching research inquiries: 1) to what extent do students view climate change in environmental justice terms? 2) what lifestyle and school policy changes do students prioritize to promote sustainable development? and 3) how do students acknowledge privilege in addressing climate change mitigation and adaptation?

This approach allowed us to address methodological concerns about interpreting apparent discrepancies in data across focus groups and questionnaire methods (Leech & Onwuegbuzie, 2007), and more generally to triangulate findings. Young people's questionnaire responses can differ from themes that emerged in focus-group talk. Considering these differences enables us to understand how students express themselves in different mediums, and how methods can affect whether dominant or subordinate discourse surface.

The approach also considers student differences, accommodating both those preferring written correspondence and those more comfortable verbally responding among their peers (Morgan, 1988). Researchers value focus groups as a way to make participants feel more relaxed and spontaneous (Morgan, 1988), while their interactive nature permits students to debate and work through their views with others (Bers, 1994). Still, focus groups are not without challenges, and we paired the approach with a questionnaire as a way to address these challenges (e.g., 'group-think,' dominance by overly vocal individuals, conflict-avoidance) (Fontana & Frey, 1998).

Our survey included the Likert scale (Strongly Agree to Strongly Disagree), open-response, and multiple-choice questions. The latter allowed students to either select answers from a fixed list of options (i.e., structured survey responses) or write open-ended responses. The research team piloted the questionnaire among undergraduate students studying K-12 education in the US and teachers from each participating school to ensure our questions' clarity as well as political and cultural acceptability in a Singaporean context. Students completed the survey just prior to our on-site visit. By their nature, pre-selected response options are limited by researchers' preconceptions and assumptions; therefore, we also asked open-ended questions in our survey, to uncover issues that students might raise when provided with the opportunity to answer more freely.

Data collection

Researchers gathered data in anticipation of and immediately after the 'international strike and action day' on 6 December 2019. We conducted 19 focus groups (approximately 300 students, in total), which ran for 20 hours over 6 days (Dec. 9–18, 2019). Students could participate in a focus group, even if they did not complete the survey (as per IRB protocol, students could opt-in or out of the research at any point and for any reason). Focus groups were based on class enrollment (typically up to 20 students) and generally composed of an equal number of boys and girls. While this made for larger-sized focus groups than typically recommended (i.e., 4–12 students) (Krueger, 1988) (Seal et al., 1998), the approach still allowed for theme saturation and accommodated cooperating teachers' preferences for full-class participation.

Two researchers (R1 and R2) conducted the first set of focus groups (eight in total), with one researcher conducting the subsequent set (11 in total). This researcher (R1), a former social studies teacher with more than 5 years of experience working in international schools, led a few focus groups by sharing a brief presentation about anthropogenic global warming; other groups consisted entirely of semi-structured interview questions as well as informal question-and-answer sessions. The presentation format was designed to encourage discussion about environmental sustainability issues. Students were encouraged to ask questions throughout, though especially during each session's last 20 minutes. R2 led students in discussions about where and how they accessed environmental news and information. A teacher from the participating school attended each session, as per school policy. Each focus group lasted between 60 and 90 min and was audio recorded, with supplemental observation notes by R1 and R2. The researchers, a research assistant (RA), and a third-party service transcribed all audio files.

We analyzed focus-group transcripts using a hierarchical open-coding approach (Strauss & Corbin, 1997). The researchers, as well as RA (who was fresh to the data, having not been part of data collection), read each transcript independently and developed general categories and themes with specific text examples. After two individual passes, the research team came together to discuss categories, reread, and identify additional subcategories. In comparing categories, we evaluated any coding differences, developed a codebook, and reviewed each subcategory's responses for exemplary quotes that reflected important themes. We resolved coding differences through discussion.

Results

Among the 278 students who participated in the questionnaire, 147 (53%) completed all questions, and 131 (47%) answered portions of the survey. In this section, we share how survey responses and focus-group respondents answer our three primary research questions.

To what extent do students view climate change in environmental justice terms?

While many participants understood climate change through an environmental justice lens and recognized how it impacts some people and communities more than others, many either did not articulate and/or understand these as racial or gender justice issues.

Environmental haves and have-nots

Is climate change a racial justice issue? Is climate change a gender justice issue?

While the most common response to the racial justice question indicated that most students were ‘neutral’ on the issue (39%), nearly as many disagreed (36%). Respondents were less likely to view climate change as a ‘gender justice’ issue, with a majority of respondents (56%) disagreeing and 15% agreeing (27% indicated neutrality). While these survey responses suggest a majority of students were not conceptualizing climate change in environmental justice terms, our analysis of additional responses complicated this assessment.

What people (i.e., social/ethnic/national groups) are more likely to be disproportionately and negatively impacted by climate change?

Of 278 total respondents to the questionnaire, 118 (42%) students answered this prompt, with many exceeding the recommended 20-word limit. Some of the most frequently identified marginalized groups were people with ‘low-income’ (19.4%), residents of small islands (11.8%), farmers and other subsistence communities (5.1%), and people living in regions disproportionately affected by devastating climate change impacts, such as people exposed to significant wildfire risk (9.3%), people in areas prone to natural disasters (5.9%), and coastal communities (4.2%). Even though most respondents did not affirm climate change as being either a racial or gender justice issue, dozens of respondents identified some combination of less developed countries (11.8%), indigenous people (9.3%), and racial/ethnic minorities (4.2%) as being particularly marginalized. Additionally, many respondents singled out geographic regions such as ‘sub-Saharan African countries’ or ‘developing countries in Asia’ as being especially vulnerable to adverse climate change impacts. However, respondents more frequently indicated specific countries (or semi-sovereign territories), particularly regional countries such as India (3.3%), Hong Kong (2.5%), Maldives (2.5%), and Singapore (2.5%). Occasionally, respondents would also indicate why they named specific countries, such as different students who wrote ‘the Maldives (sea level rise)’, ‘Japan (natural disasters)’, and ‘Indonesia (wildfires).’

The Global North and South divide

The impacts of climate change are likely to cause increased natural disasters, war, and conflict, particularly in countries that have the least greenhouse gas emissions. Should countries that are more stable take in refugees from the countries that have been negatively impacted by climate change?

With 143 participants responding, 98% reported that developed countries had some obligation to help developing countries, with 48% of the

respondents indicating that countries ‘able to should have the obligation to help those impacted.’ However, half of the respondents opted for the qualifier that ‘countries should limit refugees if it begins to significantly impact their resources.’ Only 2% of the respondents chose the option ‘countries do not have any obligation to take in refugees for climate change-related impacts.’

During focus-group interviews, many students shared their perspectives about the rights (or lack thereof) of ‘climate refugees.’ Several students pointed out that because the United Nations does not recognize fleeing climate change as a valid asylum justification, climate refugees are already marginalized. In line with survey results highly supportive of developed countries’ obligation to help refugees, no student in focus groups expressed that countries had no obligation to help; however, several students said that many countries are already in a situation of resource scarcity for migrants. As one student explained:

You could say that some countries, like Singapore, can’t take any more migrants (though) there may be the obligation for them to intervene in climate change, a lot more than other countries, and really take responsibility.

This student recognized that developed countries with resources are obligated to mitigate climate change while also acknowledging that physical space constraints might limit a developed country’s capacity to accept refugees. The notion that developed countries also owed a climate debt was further corroborated by questionnaire responses about a proposed hypothetical tax to remedy climate change impacts.

Because the developed countries of the Global North (primarily in North America, Europe, and East Asia) have been most responsible for contributing greenhouse gases to the atmosphere in the 20th century, the citizens of these countries should be required to pay a special tax to developing countries in the Global South (such as Bangladesh, Ethiopia, and Colombia), so they can better prepare for the various climate crises now unfolding there.

Among 147 responses, 52% (20% strongly agree, 32% agree) supported the tax, whereas only 9% (8% disagree, 1% strongly disagree) opposed it. Interestingly, in another question inquiring whether students supported paying ‘a much higher government tax on products that produce carbon dioxide emissions, such as gasoline,’ roughly the same percentage agreed or strongly agreed (22% and 34%, respectively); however, 10% disagreed and another 10% strongly disagreed. Again, despite most not identifying climate change as being a racial or gender justice issue, their support for such mitigating policies suggests that a majority of these students at least view climate change as an economic and even generational justice issue, readily willing to proffer indirect sacrifice (via increased personal costs in their country of origin) to help remedy it.

Some students acknowledged in group discussions that allowing developing countries to use fossil fuels for continued industrial development is unsustainable, while others also recognized that continued economic growth, and modern civilization more broadly, is not possible without fossil fuels. In several focus groups, students discussed the environmental justice issues inherent in economic development. As one student shared:

In terms of economic equity, countries should be able to use their [resources] in a manner that gets them to a place where they can sustain themselves. [...] But if you're looking at it in terms of equity, it is possible, yes, but whether it should be done or not is a question of moral values and ethical values.

While discussions about whether modern industrial civilization can ever be fundamentally sustainable in the future are beyond the scope of this paper, our focus groups suggest these are questions that some students are already contemplating. Our next question examines students' viewpoints regarding individual and school actions that could help mitigate climate impacts.

What lifestyle and school policy changes do students prioritize to promote sustainable development?

Name one or more things you think your school should start doing and/or that you'd like to start doing at home to promote a more sustainable lifestyle.

The most common survey responses (mentioned by 84% of the students) involved proposing multiple ways to limit consumption. Reducing plastic consumption (e.g., plastic straws, bags, and packaging) was by far the most common specific response (29% of 136 respondents). The next most prevalent recommendation involved eating 'ethically' or 'sustainably'; 24% of the responses involved some advocacy for more plant-based diets, such as a vegetarian diet (11%), a vegan diet (7%), and reducing meat consumption broadly (6%).

Such sentiment aligns with the findings of Sandström et al. (2018) that highlight how reducing personal meat consumption is one of the most impactful ways that individuals can reduce their ecological footprint, as their study found that a country's share of animal products in its residents' diets was the most important factor determining its individuals' carbon footprint. Livestock consumption has many negative ecological impacts, including drawing upon scarce water resources (that could be more efficiently used to grow crops directly for human consumption) as well as cutting down rainforests to grow crops for livestock. Ruminants such as cows are particularly harmful in that their digestion emits methane (with many students relishing the opportunity to say 'cow farts'), a greenhouse gas which contributes significantly more to global warming per unit of mass,

especially before it gradually oxidizes in the atmosphere to form carbon dioxide; in fact, reducing beef consumption was specifically mentioned in 3% of the survey responses.

Many students also wanted to see their schools play a bigger role in encouraging a plant-based diet; representative comments include:

Our school should offer more vegan options in the canteen, not just on Veggie Day [one day of the week when the school canteen serves only vegetarian food].

I think the school should stop serving high carbon-emitting meats such as beef or only serve it once a week. Possibly they can make Veggie Day a weekly event rather than once a fortnight.

One student shared a particularly thoughtful response to their struggle in getting parental buy-in, as well as how to motivate change in others, arguing we should:

Make people aware that a pretty easy way to live a more ethically sound lifestyle is to go vegetarian ... I am a part of a Japanese family, and in Japan, eating ... seafood every day is normal. My parents are adamantly against vegetarianism, so greater internal reflection ... on the animal welfare [and climate] arguments are needed. Increasing understanding of how fish species interact in the global marine ecosystem, as well as commonly eaten species that are threatened (e.g., some tuna species) by Japanese consumer habits could lead [to] ... Japanese families like my own choosing to change their habits to reduce negative impact. Hopefully a reduction of fish-eating overall, but realistically shifting their diet to less threatened species.

This student's complex moral reasoning incorporated both environmental and animal rights perspectives (3% of the students acknowledged animal rights in their open responses) along with the importance of cultural considerations in promoting effective advocacy.

Another critique that students frequently raised was how their school over-consumed resources such as paper (6%), air conditioning (4%), and electricity (2%). Outside of school, respondents highlighted the importance of reducing overall consumption and its associated waste in general (9%) and specifically with food (6%) and water (2%).

Along with *reducing* consumption, students mentioned the two other components of the sustainability trinity: *reusing* and *recycling*. Participants noted the importance of reusing (11%), which included multiple mentions of reusable bags. They also discussed recycling (8%), referring to either personal recycling or a desire for more recycling infrastructure (e.g., 'colored bins to differentiate waste,' 'awareness of how to properly recycle,' and 'taking advantage of the decently developed recycling systems here in Singapore'). The fact that students primarily emphasized reducing, moderately emphasized reusing and discussed recycling least of all, however,

suggests that these students are quite well informed about the relative importance of each (Somerville, 2016).

Perhaps fittingly, students identified education and advocacy as crucial ways to address climate crises, being noted in 20% of their responses. As one student wrote:

My school does quite a good job, but there is sometimes some backlash with the policies they implement. Maybe, through more education rather than enforcing policies, students might choose to make more sustainable choices.

Some students asserted that their school should arrange more environmentally themed campaigns, workshops, events, and/or assemblies (5%), local environmental cleanups (3%), and implement broad curricular changes (4%), such as showing environmentally themed documentaries. Once again, open responses notably enrich our data. For example, consider the two responses below; although we coded each response as recommending curricular change, the latter response is considerably more detailed:

I think our school should try to teach more about climate change so that we are educated on how to save the earth.

Teaching philosophy and/or ethics as its own subject or by integrating it more into other subjects — by making students think deeply about their own responsibilities and moral code, they are more likely to consider why or why not they partake in climate action. Although it is difficult, I think honesty with oneself often leads to people being more active in helping others (e.g., addressing climate crises). We should also promote better understanding of where our various resources come from, and our local environment (e.g., through nature walks in Biology class, material sourcing in Design and Technology classes), so that we as students and teachers feel our complete connection to the natural world around us.

Many focus groups also expressed similar themes to those raised in survey responses, such as reducing single-use plastic and meat consumption. They frequently discussed how their formal schooling influenced their lifestyle changes, and conversations with faculty corroborated that the schools' curriculum emphasized both plastic pollution and livestock agriculture as major environmental problems. Some students also said that more substantial investment in sustainable development advocacy in schools would be necessary to encourage more people to pursue lifestyles that best support the long-term sustainability of our varied ecosystems.

Overpopulation, gender, and race

Overpopulation was completely absent from student questionnaire responses; nonetheless, it surfaced frequently in focus-group discussions. During discussions of possible ways to address our climate crises, multiple students in nearly all focus-group sessions expressed some version of the

Table 1. Common focus-group responses that highlighted population reduction for sustainability.

<p>'Make families pay [for] the second child'</p> <p>'More countries should have China's one-child policy'</p> <p>'Too many young people in other countries can cause instability'</p> <p>'Show families the benefit of smaller families'</p> <p>'Money discounts for having less kids'</p> <p>'Rations on how much a family can use, to reduce family size'</p>
--

idea that reducing population was imperative to limiting humans' detrimental environmental impacts. Table 1 below shares representative direct quotations.

Of course, some students challenged these suggestions. For instance, when a student praised China's former one-child policy, another student countered that the 'plan failed at the end because there were not enough kids to take care of their elders, and they now have more old people than young people.' In general, though, many students seemed open to a variety of population-limiting policies.

Interestingly, only one survey respondent indicated that women were disproportionately impacted by climate change. Still, several focus groups raised the importance of women's education as a mitigation and adaptation effort for climate change. Several focus groups raised the importance of women's education the challenges women face in countries that do not have systems in place for family planning:

People on the street have like eight kids and they can barely support one kid and they have eight kids because they just don't know how to[get access to birth control].

One student said that educating women (both formal schooling in general and specifically through birth control) could mitigate overpopulation's strain on available resources: 'Women are able to go to school; they're able to gain independence and not become housewives and bear 10 children.' Several other students mentioned how it is important for family-planning services to advise people not to have 'five' or '10' children that 'put more strain on their economy.'

While one can debate whether many of the students' behavioral and policy recommendations can serve environmental justice goals when students do not articulate their recommendations with environmental justice in mind, merely recognizing who will be disproportionately impacted is only one side of the equation; our last question examines the extent to which these students acknowledged their own privileges and lifestyle impacts.

How do students acknowledge privilege in addressing climate change mitigation and adaptation?

Privilege comes in many forms and layers, some of which many students acknowledged.

On the most macro level, students recognized that wealthy-developed countries have more resources to adapt to climate change impacts. For instance, one student reasoned while developed countries ‘have the resources to be able to dodge things like rising sea levels,’ developing countries ‘would not be able to develop in time to build such fortifications’; this student was likely referring to wealthier developed cities (such as New York City or even Singapore itself) having ample resources to notably minimize such sea-level impacts. Of course, while developed countries may have the privilege of postponing negative climate impacts such as sea level rise, no countries will be spared in the long run, in terms of reduced trade opportunities, greater stress on the world food supply, and an ever-expanding growth of climate refugees seeking safer shores.

Several students extended their recognition of privilege to their immediate environment, most notably their schools, which better equipped them to adapt to future climate change. As one student explained,

It’s my responsibility not only as someone who comes from such a great school [that] [...] instills these values in us, but also as a member of this planet that this is my responsibility to look after it by telling people, ‘Okay, look, this is wrong,’ because they might not get that education or that sense of awareness that we do in this school.

In developing our questionnaire and focus-group interviews, we were keen to hear students’ thoughts about one of their generation’s most well-known young climate spokespersons, Greta Thunberg. While roughly one in 10 survey respondents (9.5%) indicated they did not know who Thunberg was and another one in 10 (12%) either disagreed with her message and/or her methods (i.e., striking), the overwhelming majority either considered her an inspiration (33%) or included her among many other important voices addressing climate change (49%).

Thunberg often came up in focus-group interviews without prompting. Some students saw her as an inspiration for her directness with ‘tell[ing] the government what we need to do’; others said she lessened the importance of her political messages by ‘missing out on her education.’ When asked about Thunberg’s school strike, several students thought her striking strengthened her advocacy and brought more media attention to the cause. However, many were concerned about the ramifications of missing school:

I do agree with her protesting and her trying to really make it powerful. But the whole thing about not going to school — I don’t really agree with that. Because I was just

thinking that a lot of people don't have education, and I think that maybe finish your education first, because it's really important.

This student recognized that schooling itself is a privilege that many do not have; several other students pointed out that many young people living in developing countries would risk their future livelihood by skipping school. Some students also complained about perceived hypocrisy. As one student explained, 'She is a little bit of a hypocrite because ... she comes from a wealthier family, and sometimes they fly to go to her talks.' In contrast, some students agreed with Thunberg's climate change advocacy but criticized what they saw as her extreme tactics.

And while Thunberg herself typically focuses on the injustice of future generations paying the price for adults' lifestyle today, some students pointed out how her gender may influence how others perceive her message. For instance, one student noted the gender discrepancy between those who are more inspired by Thunberg and those who are not, pointing out 'most of the boys do not believe in Greta Thunberg, and the girls are more likely to believe.' Her comment is a useful reminder that environmental justice is not just a matter of acknowledging how marginalized groups such as women are more likely to be disproportionately burdened by climate change impacts. Combating sexist attitudes towards environmental advocates is also an essential component in advancing environmental justice.

Discussion

In general, the students who participated in the questionnaire and focus groups had impressive climate change knowledge and identified key strategies to mitigate future impacts.

Refugees and race

There was a disconnect between respondents agreeing that developed countries are obligated to help developing countries and their people yet not seeing climate change as a racial justice issue. Whether it is Central American or African migrants fleeing north to the United States or Europe (respectively), some of the greatest cross-border refugee flows involve people of color to white-dominant countries. However, the issue could be in its framing. That is to say, perhaps respondents can more easily view 'climate refugees' as affected people while the terms racial and gender justice don't as readily invoke images of people marginalized from climate impacts.

Individual lifestyle changes

Students' recommendations about lifestyle changes and school policy interventions seldom explicitly raised issues of environmental justice. However, both their knowledge of necessary changes and their efforts to implement such changes in their lives suggests that, indirectly, they understand that the larger collective benefit to humanity also includes marginalized groups, typically people of color, who are most negatively impacted by a warming planet.

Notably, only two focus-group respondents identified 'women' as being such a marginalized group. To some extent, this matches our survey data, in that respondents were notably more likely to disagree that climate change is a 'gender justice' issue as compared to a 'racial justice' issue. While further research is needed to gauge the extent to which our findings can be generalized, these results suggest that environmental education programs and curricula (and mass media in general) may be insufficiently addressing the pivotal role gender plays in climate change discussion, whether it is gender biases in respecting women as climate change advocates or the disproportionate climate impacts that women experience.

We were also initially surprised by the degree to which students suggested population control as an important path towards sustainability, especially notable as this theme is seldom found in mainstream sustainability literature, school curriculums, or in communications by youth climate strikers. Some local contextual factors might account for why these students were less reticent to discuss population growth. For one thing, Singapore has already had population-control measures as part of its public policy (Gill et al., 1996). It is also embedded in a region (South and East Asia) where many countries have also had similar policies, such as China, India, and South Korea (countries from which many of the student hail). Of course, one reason environmental advocates seldom raise population-control policies nowadays is because of the racist and sexist history associated with these policies as well as some disastrous consequences (e.g., female infanticide, forced abortions) of such policies (Al Jazeera, 2018).

While many students advocated for limiting population growth as a key environmental priority, few framed it as an environmental justice issue. When students critiqued population-control policies, it was more often from the perspective that these policies have not worked or had negative consequences for society at large ('not enough young people'), rather than negative consequences particularly for women, people of color, or people living in poverty. Occasionally, though, a student would describe future generations as being marginalized by the excessive consumption of scarce resources by the growing human presence today.

Students appeared to be influenced by population-control narratives increasingly prevalent in TV series such as *Utopia* (2013–2014) or popular films such as *Snowpiercer* (2013), *Death Race 2050* (2017), *What Happened to Monday* (2017), and *Avengers: Infinity War* (2018). In fact, in later focus groups, our research team opted to inquire about students' views of Thanos, a main Marvel film character that sought to randomly kill half of the world's population as an environmental sustainability measure, namely, to prevent the over-exploitation of natural resources jeopardizing all of the humanity's long-term survival. We asked students if they thought he was a hero, villain, or something in between. In some classes, a majority of students raised their hands indicating he was a hero, while in the other classes, a sizable minority of students also expressed support for his draconian violence as a measure to prevent omnicide. Interestingly, nearly every student knew who Thanos was, without us needing to mention the *Avengers* film.

It is also possible that students, steeped in popular media and not yet exposed to academic norms discouraging overpopulation discourse, were less inhibited in raising overpopulation as an issue. The 'global media' (de Beer, 2010, p. 596) likely also shaped students' narratives about the Global North/South divide. In focus groups, students regularly cited international publications (most typically the BBC) over local publications, suggesting a more Western-influenced view. Some showed a tendency to apply 'national prisms' to local or regional settings, particularly when considering global issues such as environmental and ecological challenges (Cottle, 2009, p. 168).

More broadly, though, the fact that overpopulation may once again be entering environmental discourse could also be a reflection of students' contemporary-lived reality. That is, recent bleak climate and other environmental assessment reports, coupled with a political climate imbued with the proliferation of environmentally destructive leaders, may be pushing students to consider more unorthodox strategies and policies to address the gravity of contemporary environmental problems.

Of course, an implicit subtext of these conversations was that some students in focus groups often blamed marginalized groups more for resource overexploitation, namely, the women in developing countries having too many children; however, no students addressed the patriarchal systems of oppression that limit women's life choices or concerted campaigns in recent decades by representatives and organizations from Western hegemonic countries to undermine women's access to contraception (Sedgh et al., 2016). Furthermore, birth rates have been declining worldwide and such large family sizes are now exceedingly rare, even in developing countries. Their commentary, thus, implicitly points the finger at families struggling with subsistence living in the Global South, thus deflecting (perhaps inadvertently) attention from high-energy, resource-intensive consumption

patterns of families living in developed countries, whose per capita carbon footprint has considerably more devastating environmental impacts than those of large subsistence families (Union of Concerned Scientists, 2019). Nevertheless, these students drew attention, albeit at times in controversial ways, to curbing human population growth as a key-neglected component to helping ensure a planet with sufficient resources for future generations.

Privilege

One mitigation solution notably missing was reducing air travel. As a survey open response, only one student recommended ‘conscious travel choices,’ of which flying might be considered. In focus groups, students seldom raised air-travel impacts, even after we described our own contribution to carbon emissions by traveling to Singapore. Some climate scientists such as Kevin Anderson and Peter Kalmus have often shamed the disproportionately high carbon footprint from the privileged flying class. In fact, an emerging ‘no-fly’ movement in academia has grown in recent years (Timperley, 2019). When some mentioned that Thunberg similarly committed to not flying, some students were unimpressed, with several seeing it as a ploy just to attract media attention. Another student dismissively pointed out that her sailing journey to New York still involved two cross-Atlantic flights, because her boat operators flew back home afterward. It is also notable how some students referred to their own flying behavior as ‘normal’ (contrasted with rich people who fly in private jets), not recognizing that this behavior itself puts them in an exclusive group, as less than 10% of the world’s population have flown even once in any given year (Sullivan, 2020).

Several possible explanations may account for these recommendation omissions. For one, as relatively privileged international students, many of these students not only regularly fly during school breaks but also frequently fly throughout the region for various academic and/or athletic meetings. Second, Singapore is a major travel hub that is most easily connected to its neighbors by frequent and affordable flights and with Malaysia as its only direct land connection, so it might be a greater sacrifice to give up flying here compared to other developed countries with more extensive rail or road connections. Finally, it could also be that while these teenagers may have notable discretion over what they buy (in terms of plastic and dietary choices), they have considerably less agency to resist parents who expect their children to accompany them back for visits to their native countries or on holiday excursions.

Concluding remarks

In the context of a global student climate strike, these students generally acknowledged that a warming planet will affect some communities more than others and that developed countries have a particular obligation to both mitigate runaway global warming and help those disproportionately impacted. Additionally, while students' recommendations about lifestyle changes and policy interventions seldom explicitly raised issues of environmental justice, their extensive knowledge of necessary lifestyle changes and incipient efforts to begin implementing such changes in their own lives suggests an indirect benefit to marginalized groups most adversely impacted by our warming planet. Students also recognized the need for a larger educational movement to encourage more people to pursue lifestyles that correlate with long-term ecosystem health.

Moving forward, research is needed to develop curricula that help students better recognize the concerns of, and impacts on marginalized groups, particularly those in the Global South. Most of our participating students were conscious of the privileges afforded them and others, notably Thunberg, and offered insight into their concerns for the rights of people lacking these privileges. Still, students had some blind spots in regard to their privilege (i.e., flying) and to how their own lifestyle disproportionately impacts marginalized groups; however, they nonetheless revealed an emerging recognition of the rights of future generations, often with reference to people living in developing countries in the Global South.

Thus, our research offers educators, policymakers, and curriculum developers a window into understanding how students – currently immersed in school programs that emphasize sustainability – think about climate change as well as the extent to which they acknowledge their privilege (and the concomitant responsibility that comes with it) to help mitigate future global warming impacts. These insights can be used to promote environmental justice emphases in schools, such as expanding the curriculum to include sustainable lifestyle experiences and focusing more explicitly on helping students understand the relationship between their high consumption lifestyles and its subsequent impact on various-marginalized groups across the world. Many of these students impressed us with not only their recognition of the resource disparity between their privileged selves and others but also the disparity between those privileged to learn about the devastating impacts of climate change impacts from the comfort of their air-conditioned classrooms and those who are increasingly enduring such impacts as their lived realities.

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