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COMMENTARY



Health psychology at the age of Anthropocene

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ABSTRACT

This commentary argues that health psychology, as a scientific discipline, needs to address the negative consequences of Anthropocene by helping individuals, communities and health systems to produce proactive efforts and prepare effective responses strategies for climate change consequences. The commentary addresses the following questions: How to demarcate health psychology at Anthropocene age? What are the best mitigation and adaptation behaviors for health and environment? How to help the environmental migrants and future climate refugees? How to develop a more resilient and adapted health care systems? Should we be in and out of health psychology? In conclusion, health psychologists and academics have to move forward helping individuals, communities and health systems to radically develop lower-carbon lifestyles in a sustainable society.

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Climate change; global warming; planetary health; sustainable behaviors

The Anthropocene is a concept proposed by Crutzen and Stoemer to describe the current geological period recognizing the effects of humanity on geology and ecology (Crutzen, 2002; Crutzen & Stoermer, 2000). The Anthropocene epoch is characterized by major bio-physical changes due to human energetic footprint (e.g. ocean acidification and tropical forest loss) surpassing ecosystem thresholds. Although Crutzen suggested that the start date of the Anthropocene is placed near the end of the eighteenth century, there is a ‘great acceleration’ of fundamental shifts of Earth system due to human activities since about 1950 (Steffen, Broadgate, Deutsch, Gaffney, & Ludwig, 2015). In 2018 October, authors of the United Nations’ Intergovernmental Panel on Climate Change (IPCC) warned of global environmental catastrophe by 2030 (Intergovernmental Panel on Climate Change, 2018). Other authors added that these natural catastrophes associated with scarcity of fossil energy (Neff, Parker, Kirschenmann, Tinch, & Lawrence, 2011), rare earths and some metals may increase the risk of socio-economic and biodiversity collapse (MacDougall, McCann, Gellner, & Turkington, 2013; Motesharrei, Rivas, & Kalnay, 2014; Turchin & Denkenberger, 2018). The development of strategies anticipating the Anthropocene consequences is the most important current challenge for humanity.

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Over the past 25 years, researchers highlighted the unique contribution that psychology can provide for addressing gradual and abrupt environmental events due to climate change (Brügger, Dessai, Devine-Wright, Morton, & Pidgeon, 2015; Clayton et al., 2015; Gifford, 2014; Stern, 1992; Swim et al., 2011).

This commentary argues that health psychology, as a scientific discipline, needs to address the negative consequences of Anthropocene by helping individuals, communities and health systems to produce proactive efforts and prepare effective responses strategies for climate change consequences.

The environmental changes and ecosystem impairments negatively affect human health at worldwide scale (Ebi, Frumkin, & Hess, 2017; McMichael, 2013; Whitmee et al., 2015). Currently, little attention has been given in scientific literature to the relationships between severe health risks and climate change consequences (Butler, 2018). The ongoing human pressure on global environment has direct (e.g. injury and death), indirect effect (e.g. under-nutrition and water availability) and ecosystem-mediated effects (e.g. vector-borne diseases) on health. The Anthropocene period fundamentally forces stakeholders, healthcare providers and academic communities to rethink the health (Zywert, 2017). Already in 2003, the World Health Organization presented a research agenda for health risks related to climate change (McMichael, 2003). The Rockefeller-Lancet Commission updated this agenda, developing the *planetary health* concept, highlighting that '*human health and human civilization depend on flourishing natural systems and the wise stewardship of those natural systems*' (Whitmee et al., 2015, p.1974). It implies that highest attainable health, well-being and equity require recognition of the benefits arising from protected and conserved natural systems. This Commission identified five research priorities that could be followed by health psychology research community. They are summarized by Ebi et al. (2017):

- 'Better understanding of the mechanisms through which environmental change affects human health'.
- 'Assessment of strategies to reduce environmental damage and harmful emissions including assessment of co-benefits (and co-harms)'.
- 'Assessment of the effectiveness of strategies and technologies to promote resilience and support adaptation to environmental change'.
- 'Research to develop and implement more robust indicators of human welfare and the integrity of underpinning natural systems than exist at present and explore how these measures should be weighted across time (discount rates)'.
- 'Translational research and implementation science to address the on-the-ground realities of what is feasible and relevant in the settings facing the greatest threats'.

The adhesion to *planetary health* definition in the health psychology field could transform the discipline by systematically integrating the question of climate change consequences in the research questions.

How to demarcate health psychology at Anthropocene age?

Health psychology definition balances broadly between individual and social perspectives (Friedman, 2014; Murray, 2014). Friedman and Adler (2011, p. 12) defined this discipline

as: ‘the scientific study of psychological processes related to health and health care’. However, Murray (2010) suggested that the traditional form of health psychology is the development of ‘instrumental knowledge’, accumulating facts and testing clearly defined hypotheses with a particular focus on the individual. He also presented a second form of knowledge developed in critical health psychology perspective: ‘reflexive knowledge’ (Murray, 2010). This knowledge is more based on participatory action research involving communities to reflect upon their circumstances and to identify strategies of change. To address adaptation and mitigation challenges at Anthropocene epoch, we should develop both instrumental and reflexive knowledge. In other words, as academics in health psychology, we should improve the understanding of psychological processes (Friedman & Adler, 2011) from Anthropocene (in)direct consequences on health, but also develop an understanding about how to produce social changes for better health and environment (Campbell & Murray, 2004). Among teaching health psychologists, health and social consequences of climate change should be included in the course syllabus to prepare future generations to understand major issues related to Anthropocene. It is essential to overtake the ‘reformist position’ which is mostly developed to address the climate change consequences (Adams, 2017). The reformist approach focuses exclusively on individual behaviors without taking in consideration the fundamental social transition that is needed to cope with climate urgency in the future next decades (Geels, McMeekin, Mylan, & Southerton, 2015). Geels et al. (2015) conceptualized a ‘reconfiguration position’ emphasizing a deep modification of social, economic and technological practices in order to eliminate the status quo in governments and corporations. Briefly, this position highlights the need for changes in cultural values, the focus on de-growth approach and the promotion of local initiatives. This approach is in line with anticipated modifications of health ontology due to Anthropocene consequences (e.g. resources constraints) described by Zywert (2017).

What are the best mitigation and adaptation behaviors for health and environment?

According to IPCC, there is a highly probable increase in extreme weather and more frequent and intense natural disasters that will expose humans (Intergovernmental Panel on Climate Change, 2018). Individuals and communities will have to deal with progressive (e.g. coastal erosion) and/or intense climate-related threats (e.g. wildfire and flooding) (Gifford, 2014). The top 10 of countries contribution to global warming is in order: the USA, China, Russia, Brazil, India, Germany, the UK, France, Indonesia and Canada (Matthews et al., 2014). However, quantification of global warming (e.g. greenhouse gas emission and land use) sources is complex (Kander, Jiborn, Moran, & Wiedmann, 2015). Although the major responsibility of industrial carbon producer was emphasized in previous investigations (Ekurzel et al., 2017; Frumhoff, Heede, & Oreskes, 2015), individuals behaviors also play an active role in global warming (Wynes & Nicholas, 2017).

In the psychology field, responses to climate change have been classified as proactive efforts (i.e. mitigation) and reactive responses (i.e. adaptation) (Gifford, 2014; Stern, 1992; Swim et al., 2011). Consequently, health psychology should help individuals, communities and health systems to be more resilient and less vulnerable, and improve their capacity to psychologically respond in an emergency and manage the consequences of natural disasters.

It is important to note that mitigation behaviors have low or high environmental impact (e.g. recycling versus driving) and low-impact behaviors have been more studied in environmental psychology (Gifford, 2014). Consequently, a set of high-impact behaviors has been identified for average household in developed countries: eating fewer animal products, live car free, have one fewer child and decrease fly frequency (Lacroix, 2018; Wynes & Nicholas, 2017). Among them, birth control strategies and air travel reduction are specific and well-examined in health and environmental psychology, respectively. These disciplines investigate the positive impact of active transport promotion and meat consumption reduction with complementary approaches (see e.g. Bird et al., 2013). Future interdisciplinary collaborations could be considered for these behaviors. For instance, to provide information about health or environmental consequences of eating meat interventions was related with reduced intention to consume meat (Bianchi, Dorsel, Garnett, Aveyard, & Jebb, 2018). Thus, behavior change interventions might be tailored according to pro-environmental self-identity or health risk perceptions of participants.

Previous reviews examined the climate – health association in function to climate change categories: temperature variations (e.g. heat waves), air pollution, water and food supply, infection diseases (e.g. dengue) and extreme events (e.g. floods) (Ebi et al., 2017; Whitmee et al., 2015). All these ongoing environmental modifications threat health and well-being in numerous ways. An important number of health outcomes are studied in health psychology. Ebi et al. (2017) suggested that Anthropocene consequences are associated with increased risk of malnutrition, lower food quality, exacerbation of chronic illness symptoms and allergies, higher frequency of sleep disorders and mental disorders. Furthermore, the extreme environmental events are particularly associated with higher post-traumatic stress disorder, depression and substance use disorders incidences (Hayes, Blashki, Wiseman, Burke, & Reifels, 2018). For instance, Burke et al. (2018) found that suicide rates rose in the USA and Mexico municipalities where an average temperature monthly increase of 1°C was observed. These findings were corroborated by depressive language analysis of tweets during 14-month. The probability of ‘depressive’ language increased with contemporaneous local monthly temperature (Burke et al., 2018).

How to help environmental migrants and future climate refugees?

The last IPCC report highlighted that higher temperature, precipitation and sea rising, coupled with natural resource’s scarcity will strongly associate with an increase in migration by the mild- to late twenty-first century (Intergovernmental Panel on Climate Change, 2018). Moreover, tropical populations are particularly at risk. In this perspective legislative status and definition of environmental migrants and climate refugees is an ongoing challenge in (sub)tropic countries (Ridde et al., 2019).

Projections of World Bank suggest that climate change will push more than 140 million people to migrate within their country in 2050 (Rigaud et al., 2018). At worldwide scale, one billion humans may become climate change migrants (Watts et al., 2018). Facing adverse global environmental changes, there is a disproportionate risk in unequal societies but also in vulnerable peoples (e.g. older people), regions (e.g. delta and island populations) and countries (e.g. Malawi) (Butler, 2016; Whitmee et al., 2015). For instance, there was a massive increase in asylum applications in the European Union when temperatures deviated from moderate optimum (Missirian & Schlenker, 2017). A small rate of

ongoing internal migration is yet associated with negative climate change consequences in more vulnerable areas in Asia (e.g. Mekong Delta or Bangladesh) (Kim & Minh, 2017; Rahaman, Rahman, Bahauddin, Khan, & Hassan, 2018), North America (i.e. Alaska, Louisiana) and Oceania (i.e. Papua New Guinea) (Watts et al., 2018). Progressive or sudden changes in environment will force climate migrants to temporarily or permanently leave their home. Relocation of these people will lead a sum of challenges for health psychology such as higher risk of under-nutrition and infection diseases, water or basic healthcare access difficulties (Rahaman et al., 2018) and increasing mental health disorders (Shultz, Rechkemmer, Rai, & McManus, 2018). Effective communication strategies (e.g. content, mode of delivery and cultural adaptation) about health behaviors and healthcare access should probably be designed. Theories and methods from community health psychology will be very helpful to manage health and well-being in people from different communities of place (e.g. rural to urban migration) and/or identity (e.g. Muslim community) (Campbell & Murray, 2004). Migrations are inherent to human history, but the intra- and inter-country human movements are particularly alarming for human health at Anthropocene epoch. Indeed, these movements could be massive in at least three continents, and could happen in a time of resources and energy scarcity (e.g. cropland, water and food limited access) (Watts et al., 2018) and higher risk of collective violence (Levy, Sidel, & Patz, 2017). In this context, local and national healthcare systems might be overwhelmed (Ridde et al., 2019).

How to develop a more resilient and adapted healthcare systems?

Health systems are gradually under pressure with elevated occurrence of climate-related events and extreme weather (Ebi et al., 2017; Zywert, 2017). The expected higher risks in the next decade are heat- and air pollution-related morbidity and mortality, vector-borne diseases and water-borne infections. It has been recommended that healthcare systems increase their resilience by increasing access to vaccination and basic healthcare (Ebi et al., 2017). Moreover, government and local authorities should also help healthcare systems to limit their carbon footprint by emphasizing re-localization of care and pharmaceuticals manufacturing (McMichael, 2013; Zywert, 2017). Ridde et al. (2019) proposed that resilient health systems should anticipate technical strategies but also social and psychological strategies.

In this vein, health psychology could also play an important role by training healthcare providers, anticipating cultural barriers and facilitating social acceptance of climate refugees. Health psychology models (e.g. Theoretical Domains Framework) are effective to help clinicians to implement evidence-based strategies in health institutions (Cane, O'Connor, & Michie, 2012). Based on the previous research action (Doulougeri, Panagopoulou, & Montgomery, 2015), the community engagement could also improve concerted decisions in restructuring of health institutions adapted to climate change consequences.

Should we be in and out of health psychology?

Recently, the scientific community alarmed policymakers and population about the urgency of limiting warming to 1.5°C from now (Intergovernmental Panel on Climate Change, 2018). However, the time scale of knowledge development and scientific collaborations are relatively low. Moreover, research findings fail to be quickly translated in

meaningful changes for individuals, communities and health systems (Ioannidis, 2006; Morris, Wooding, & Grant, 2011). It requires an acceleration of mitigation and adaptation strategies implementation coupled with a granular understanding of social and cultural contexts (Adams, 2017). Health psychology alone can not resolve all *planetary health* difficulties. It is also necessary to collaborate with other scientific communities from anthropology, sociology, implementation sciences, behavioral medicine, neurosciences and ecology (e.g. see Bunch, 2016). Complex, non-linear and systemic approaches should be also developed in order to integrate the possible trajectories produced by ecological degradation and their respective impacts on human health, communities and healthcare systems (Rickles, Hawe, & Shiell, 2007).

Consequently, health psychology academics and professionals should:

- (i) include the climate-related change behaviors as a priority in their studies,
- (ii) systematically present Anthropocene consequences for health in courses,
- (iii) include global warming consequences in their models,
- (iv) develop collaboration with ecological psychology researchers in multi- and interdisciplinary perspective,
- (v) prepare the implementation of evidence-based interventions to cope with natural disasters,
- (vi) anticipate the social transformations in communities and
- (vii) participate in transdisciplinary initiatives.

In the vein of ‘World Scientists’ Warning to Humanity’ (Ripple et al., 2017), a manifesto for the creation of an Interdisciplinary and Intergovernmental Panel of Behavior Change has been recently released (gieco-ipbc.org). The authors would bridge scientists from miscellaneous behavioral sciences for providing evidence-based information and strategic recommendations to the information of institutions, policymakers and general population.

To conclude, humanity’s health is already affected by climate change: health psychologists and academics have to move forward helping individuals, communities and health systems to radically develop lower carbon lifestyles in a sustainable society (Uzzell & Räthzel, 2009). Using a cornucopian approach, defined as human ingenuity and market modification for solutions to cope with climate change, is indefensible for the health psychology community. In two or more decades, there is high probability that human health, places, lifestyles and social organizations will be threatened (Bonneuil & Fressoz, 2016; Mitchell, 2013). We have to face that global anthropogenic changes in the environment are interacting with psychological, social and political factors related to human health. In this perspective, health psychology can play an important role.

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References

- Adams, M. (2017). Environment: Critical social psychology in the Anthropocene. In B. Gough (Ed.), *The Palgrave handbook of critical social psychology* (pp. 621–641). London: Palgrave Macmillan. doi:10.1057/978-1-137-51018-1_30
- Bianchi, F., Dorsel, C., Garnett, E., Aveyard, P., & Jebb, S. A. (2018). Interventions targeting conscious determinants of human behaviour to reduce the demand for meat: A systematic review with qualitative comparative analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 15(1), 102. doi:10.1186/s12966-018-0729-6
- Bird, E. L., Baker, G., Mutrie, N., Ogilvie, D., Sahlqvist, S., Powell, J., & iConnect Consortium. (2013). Behavior change techniques used to promote walking and cycling: A systematic review. *Health Psychology*, 32(8), 829–838. doi:10.1037/a0032078
- Bonneuil, C., & Fressoz, J.-B. (2016). *The shock of the Anthropocene: The earth, history and us*. (D. Fernbach, Trans.) (Translated ed.). London: Verso.
- Brügger, A., Dessai, S., Devine-Wright, P., Morton, T. A., & Pidgeon, N. F. (2015). Psychological responses to the proximity of climate change. *Nature Climate Change*, 5(12), 1031–1037. doi:10.1038/nclimate2760
- Bunch, M. J. (2016). Ecosystem approaches to health and well-being: Navigating complexity, promoting health in social-ecological systems: ecosystem approaches to health and well-being. *Systems Research and Behavioral Science*, 33(5), 614–632. doi:10.1002/sres.2429
- Burke, M., González, F., Baylis, P., Heft-Neal, S., Baysan, C., Basu, S., & Hsiang, S. (2018). Higher temperatures increase suicide rates in the United States and Mexico. *Nature Climate Change*, 8(8), 723. doi:10.1038/s41558-018-0222-x
- Butler, C. (2018). Climate change, health and existential risks to civilization: A comprehensive review (1989–2013). *International Journal of Environmental Research and Public Health*, 15(10), 2266. doi:10.3390/ijerph15102266
- Butler, C. D. (2016). Sounding the alarm: Health in the Anthropocene. *International Journal of Environmental Research and Public Health*, 13(7), 665. doi:10.3390/ijerph13070665
- Campbell, C., & Murray, M. (2004). Community health psychology: promoting analysis and action for social change. *Journal of Health Psychology*, 9(2), 187–195. doi:10.1177/1359105304040886
- Cane, J., O'Connor, D., & Michie, S. (2012). Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implementation Science*, 7(1), 37. doi:10.1186/1748-5908-7-37
- Clayton, S., Devine-Wright, P., Stern, P. C., Whitmarsh, L., Carrico, A., Steg, L., ... Bonnes, M. (2015). Psychological research and global climate change. *Nature Climate Change*, 5(7), 640–646. doi:10.1038/nclimate2622
- Crutzen, (2002). Geology of mankind. *Nature*, 415(23). doi:10.1038/415023a
- Crutzen, P. J., & Stoermer, E. (2000). The Anthropocene. *Global Change Newsletter*, 41, 17–18.
- Doulougeri, K., Panagopoulou, E., & Montgomery, A. (2015). Implementing action research in hospital settings: A systematic review. *Journal of Health Organization and Management*, 29(6), 729–749. doi:10.1108/JHOM-09-2013-0203
- Ebi, K. L., Frumkin, H., & Hess, J. J. (2017). Protecting and promoting population health in the context of climate and other global environmental changes. *Anthropocene*, 19, 1–12. doi:10.1016/j.ancene.2017.07.001

- Ekwurzel, B., Boneham, J., Dalton, M. W., Heede, R., Mera, R. J., Allen, M. R., & Frumhoff, P. C. (2017). The rise in global atmospheric CO₂, surface temperature, and sea level from emissions traced to major carbon producers. *Climatic Change*, 144(4), 579–590. doi:10.1007/s10584-017-1978-0
- Friedman, H. S. (2014). Revolutionary health psychology versus scientific health psychology – commentary on Murray (2012). *Health Psychology Review*, 8(2), 238–241. doi:10.1080/17437199.2013.770048
- Friedman, H. S., & Adler, N. E. (2011). The intellectual roots of health psychology. In H.S. Friedman (Ed.), *The Oxford handbook of health psychology*. Oxford: Oxford University Press.
- Frumhoff, P. C., Heede, R., & Oreskes, N. (2015). The climate responsibilities of industrial carbon producers. *Climatic Change*, 132(2), 157–171. doi:10.1007/s10584-015-1472-5
- Geels, F. W., McMeekin, A., Mylan, J., & Southerton, D. (2015). A critical appraisal of sustainable consumption and production research: The reformist, revolutionary and reconfiguration positions. *Global Environmental Change*, 34, 1–12. doi:10.1016/j.gloenvcha.2015.04.013
- Gifford, R. (2014). Environmental psychology matters. *Annual Review of Psychology*, 65(1), 541–579. doi:10.1146/annurev-psych-010213-115048
- Hayes, K., Blashki, G., Wiseman, J., Burke, S., & Reifels, L. (2018). Climate change and mental health: Risks, impacts and priority actions. *International Journal of Mental Health Systems*, 12. doi:10.1186/s13033-018-0210-6
- Intergovernmental Panel on Climate Change. (2018). *Global warming of 1.5°C*. Retrieved from <http://www.ipcc.ch/report/sr15/>
- Ioannidis, J. P. A. (2006). Evolution and translation of research findings: From bench to where? *PLoS Clinical Trials*, 1(7), e36. doi:10.1371/journal.pctr.0010036
- Kander, A., Jiborn, M., Moran, D. D., & Wiedmann, T. O. (2015). National greenhouse-gas accounting for effective climate policy on international trade. *Nature Climate Change*, 5(5), 431–435. doi:10.1038/nclimate2555
- Kim, O. L. T., & Minh, T. (2017). Correlation between climate change impacts and migration decisions in Vietnamese Mekong Delta. *International Journal of Innovative Science, Engineering & Technology*, 4(8), 111–118.
- Lacroix, K. (2018). Comparing the relative mitigation potential of individual pro-environmental behaviors. *Journal of Cleaner Production*, 195, 1398–1407. doi:10.1016/j.jclepro.2018.05.068
- Levy, B. S., Sidel, V. W., & Patz, J. A. (2017). Climate change and collective violence. *Annual Review of Public Health*, 38(1), 241–257. doi:10.1146/annurev-publhealth-031816-044232
- MacDougall, A. S., McCann, K. S., Gellner, G., & Turkington, R. (2013). Diversity loss with persistent human disturbance increases vulnerability to ecosystem collapse. *Nature*, 494(7435), 86–89. doi:10.1038/nature11869
- Matthews, H. D., Graham, T. L., Keverian, S., Lamontagne, C., Seto, D., & Smith, T. J. (2014). National contributions to observed global warming. *Environmental Research Letters*, 9(1), 014010. doi:10.1088/1748-9326/9/1/014010
- McMichael, A. J. (2003). *Climate change and human health: Risks and responses*. Geneva: World Health Organization.
- McMichael, A. J. (2013). Globalization, climate change, and human health. *New England Journal of Medicine*, 368(14), 1335–1343. doi:10.1056/NEJMr1109341
- Missirian, A., & Schlenker, W. (2017). Asylum applications respond to temperature fluctuations. *Science*, 358(6370), 1610–1614. doi:10.1126/science.aao0432
- Mitchell, T. (2013). *Carbon democracy: Political power in the age of oil* (2nd Revised ed.). London: Verso.
- Morris, Z. S., Wooding, S., & Grant, J. (2011). The answer is 17 years, what is the question: Understanding time lags in translational research. *Journal of the Royal Society of Medicine*, 104(12), 510–520. doi:10.1258/jrsm.2011.110180
- Motesharrei, S., Rivas, J., & Kalnay, E. (2014). Human and nature dynamics (HANDY): Modeling inequality and use of resources in the collapse or sustainability of societies. *Ecological Economics*, 101, 90–102. doi:10.1016/j.ecolecon.2014.02.014
- Murray, M. (2010). Health psychology in context. *The European Health Psychologist*, 12, 39–42.

- Murray, M. (2014). Social history of health psychology: Context and textbooks. *Health Psychology Review*, 8(2), 215–237. doi:10.1080/17437199.2012.701058
- Neff, R. A., Parker, C. L., Kirschenmann, F. L., Tinch, J., & Lawrence, R. S. (2011). Peak oil, food systems, and public health. *American Journal of Public Health*, 101(9), 1587–1597. doi:10.2105/AJPH.2011.300123
- Rahaman, M. A., Rahman, M. M., Bahauddin, K. M., Khan, S., & Hassan, S. (2018). Health disorder of climate migrants in Khulna City: An urban slum perspective. *International Migration*, 56(5), 42–55. doi:10.1111/imig.12460
- Rickles, D., Hawe, P., & Shiell, A. (2007). A simple guide to chaos and complexity. *Journal of Epidemiology and Community Health*, 61(11), 933–937. doi:10.1136/jech.2006.054254
- Ridde, V., Benmarhnia, T., Bonnet, E., Bottger, C., Cloos, P., Dagenais, C., ... Sarker, M. (2019). Climate change, migration and health systems resilience: Need for interdisciplinary research. *F1000Research*, 8, 22. doi:10.12688/f1000research.17559.1
- Rigaud, K. K., de Sherbinin, A., Jones, B., Bergmann, J., Clement, V., Ober, K., ... Midgley, A. (2018). *Groundswell: Preparing for internal climate migration*. World of Banking. doi:10.1596/29461
- Ripple, W. J., Wolf, C., Newsome, T. M., Galetti, M., Alamgir, M., Crist, E., ... Laurance, W. F. (2017). World scientists' warning to humanity: A second notice. *BioScience*, 67(12), 1026–1028. doi:10.1093/biosci/bix125
- Shultz, J. M., Reckemmer, A., Rai, A., & McManus, K. T. (2018). Public health and mental health Implications of environmentally induced forced migration. *Disaster Medicine and Public Health Preparedness*, 1–7. doi:10.1017/dmp.2018.27
- Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., & Ludwig, C. (2015). The trajectory of the Anthropocene: The great acceleration. *The Anthropocene Review*, 2(1), 81–98. doi:10.1177/2053019614564785
- Stern, P. C. (1992). Psychological dimensions of global environmental change. *Annual Review of Psychology*, 43(1), 269–302. doi:10.1146/annurev.ps.43.020192.001413
- Swim, J. K., Stern, P. C., Doherty, T. J., Clayton, S., Reser, J. P., Weber, E. U., ... Howard, G. S. (2011). Psychology's contributions to understanding and addressing global climate change. *The American Psychologist*, 66(4), 241–250. doi:10.1037/a0023220
- Turchin, A., & Denkenberger, D. (2018). Global catastrophic and existential risks communication scale. *Futures*, 102, 27–38. doi:10.1016/j.futures.2018.01.003
- Uzzell, D., & Räthzel, N. (2009). Transforming environmental psychology. *Journal of Environmental Psychology*, 29(3), 340–350. doi:10.1016/j.jenvp.2008.11.005
- Watts, N., Amann, M., Ayeb-Karlsson, S., Belesova, K., Bouley, T., Boykoff, M., ... Costello, A. (2018). The Lancet countdown on health and climate change: From 25 years of inaction to a global transformation for public health. *The Lancet*, 391(10120), 581–630. doi:10.1016/S0140-6736(17)32464-9
- Whitmee, S., Haines, A., Beyrer, C., Boltz, F., Capon, A. G., de S. Dias, B. F., ... Yach, D. (2015). Safeguarding human health in the Anthropocene epoch: Report of the Rockefeller Foundation–Lancet Commission on Planetary Health. *The Lancet*, 386(10007), 1973–2028. doi:10.1016/S0140-6736(15)60901-1
- Wynes, S., & Nicholas, K. A. (2017). The climate mitigation gap: Education and government recommendations miss the most effective individual actions. *Environmental Research Letters*, 12(7), 074024. doi:10.1088/1748-9326/aa7541
- Zywert, K. (2017). Human health and social-ecological systems change: Rethinking health in the Anthropocene. *The Anthropocene Review*, 4(3), 216–238. doi:10.1177/2053019617739640