



The where, how, and who of mitigating climate change: A targeted research agenda for psychology

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ABSTRACT

Psychology has been making targeted contributions to climate change research for at least a decade. However, its efforts to date have not produced the knowledge needed to bring about the transformational societal change required to mitigate climate change. In this article, we invert the current logic of applying psychological theories to mitigate climate change. Instead, we begin by identifying the social change strategies capable of mitigating climate change, such as social tipping dynamics, and then highlight the corresponding knowledge that psychology must create to support and accelerate these dynamics. We suggest that psychology can help to answer the question of “Where to?” – i.e. the direction we should head for sustainability – by identifying the feasibility of consumption corridors. Next, psychology can help to answer the question of “How do we get there?” by producing more knowledge about human capacity for change. Finally, psychology can help to answer the question of “Who will get us there?” by exploring the motivations of three key social groups: activists, experienced individuals, and the affluent. Individually, each area of research can accelerate societal change. Taken together, the different areas can reinforce each other and amplify their respective impacts. The goal of the research agenda is to accelerate positive societal tipping dynamics that could limit global warming to 1.5 °C.

1. Psychology and the climate crisis

Greenhouse gas emissions continue to rise (IPCC, 2022), despite numerous countries committing to a net zero target under the Paris Climate Agreement. To achieve this target, more ambitious and comprehensive systemic changes are necessary. Psychology can make important contributions to combating climate change (Clayton et al., 2015; Kazdin, 2009; Kühn & Bobeth, 2022; Nielsen, Cologna, Lange, Brick, & Stern, 2021). In the past, environmental psychology has produced findings about the positive effects of intact nature on people’s (mental) health (Kuo, 2015) and well-being (Martin et al. (2020); Pritchard, Richardson, Sheffield, & McEwan, 2020), for example. In addition, there is research on “green” consumption decisions (Wyss, Berger, Baumgartner, & Knoch, 2021) and behavior interventions on behalf of sustainable consumption (Byerly et al., 2018; Khanna et al., 2021; Mertens, Herberz, Hahnel, & Brosch, 2022; Nisa, Bélanger, Schumpe, & Faller, 2019; Stern, 2020). As the climate crisis worsens, psychology is also beginning to investigate climate anxiety (Clayton & Karazsia, 2020; Hickman, 2020; Ogunbode et al., 2022; Whitmarsh et al., 2022). The field has been enriched by dedicated journals on the

topic as well as propositions about how psychology can aid mitigation of and adaptation to climate change (Clayton et al., 2015, 2016; De Young, 2014; Gifford, Lacroix, & Chen, 2018; Steg, Perlaviciute, & van der Werff, 2015). Finally, areas in psychology that are not directly related to climate change – e.g. the neurosciences – have begun highlighting their potential to contribute (Aron, 2019; Aron et al., 2020).

All of these efforts are vital and important. Notably, common to most of them is that they seek to apply existing knowledge of psychology to the problem of climate change. For example, motivated reasoning, developed in other contexts, has been applied to help explain climate-(un)friendly behavior (Bayes & Druckman, 2021; Druckman & McGrath, 2019). In addition, knowledge about social norms has been applied to help explain pro-environmental behavior (Cialdini & Jacobson, 2021). Indeed, these and similar contributions have improved our understanding of the challenges we face. However, we agree with Nielsen et al. (2021) that the current theory-to-practice approach is unlikely to bring about the transformational societal change we need as fast as we need it.

In the present article, we turn around the dominant approach of applying existing psychological theory to climate change problems.

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Instead, we take as our starting point current concepts from sustainability transformation research – in particular *target* knowledge and *transformation* knowledge, not just problem knowledge (Schneider et al., 2019; Wiek & Lang, 2016). Using these knowledge concepts, we explore what contributions psychology could make to accelerate social change and support transformational processes. To this end, we ask three questions: (1) “Where should we be heading?” (2) “How can we get there?” And, (3) “Who can get us there?” In terms of knowledge forms, our first question addresses target knowledge, while questions two and three address transformation knowledge. We aim to show that there are strategies for finding answers to these three questions, in addition to describing the knowledge psychology must produce in order to help provide answers (Fig. 1).

Before going further, we wish to discuss two important subjects of debate:

Firstly, prominent observers disagree as to whether social change is best promoted by changing contextual behavioral conditions (i.e. system change, Brand-Correa, Mattioli, Lamb, & Steinberger, 2020; Mattioli, Roberts, Steinberger, & Brown, 2020) or by changing individual behavior (Baltruszewicz et al., 2022; Wyss, Knoch, & Berger, 2022). As a discipline, psychology has traditionally focused on human beings as individuals, thus emphasizing the role of individual consumption behavior vis-à-vis climate impacts (Byerly et al., 2018; Otto, Wiedermann, et al., 2020; Wyss et al., 2022). While consumption is arguably an important driver of the climate crisis (Baltruszewicz et al., 2022; Brand-Correa et al., 2020; Mattioli et al., 2020), consumption always takes place within a larger system of prevailing (dis)enabling socio-cultural structures, institutions, incentives, infrastructure, etc. (Brand-Correa et al., 2020; Mattioli et al., 2020). Seen this way, both contextual behavioral conditions and individual consumption decisions must change in a co-evolutionary way in order to mitigate climate change – focusing solely on one or the other in falls short (Brownstein, Kelly, & Madva, 2022) and might even hinder advances in the other area (Hagmann, Lao, Charter, & Loewenstein, 2023). Indeed, individuals act both on a consumption-choice level and on a contextual-design level. For example, at least in democratic countries, governments do not autonomously create and implement the laws that shape our societies. Rather, government legislation is introduced and enforced by individuals in their roles as citizens and professionals. As the science of the individual, we argue that psychology can bridge these domains by studying individuals in their diverse roles – as consumers *and* as citizens, professionals, and members of communities that make up our

institutions of government, education, economy, social networks, etc. (Nielsen et al., 2021). In line with this thinking, some observers have called for more research not only on private-sphere behavior, but also on public sphere behavior – including activism and voting (Heidbreder, Tröger, & Schmitt, 2022; Stern, 2000). Since individuals act on both levels, understanding their actions on both levels could ultimately help to bring about the multilayered social change needed to mitigate climate change.

Secondly, there is debate about the role of values and social norms in fostering social change. On the one hand, some observers argue that people’s sense of “purpose”, morality, and values are crucial leverage points for systems change (Beddoe et al., 2009; Meadows, 1999, 2018; Perry et al., 2021; Tschersich, Sievers-Glotzbach, Gmeiner, & Kliem, 2023) and that, by extension, social change is best promoted by transforming social norms. On the other hand, it has been shown that values and norms are poor predictors of individual choice. Indeed, rather than individual motivational factors, the best predictors of actual consumption behavior and related emissions appear to be existing incentive structures (Maki, Burns, Ha, & Rothman, 2016; Sloot & Scheibehenne, 2022) and people’s income levels (Bruderer Enzler & Diekmann, 2019; Chancel, 2022; Moser & Kleinhüchelkotten, 2018). According to this perspective, existing incentive structures must be altered in order to bring about social change. In our view, however, both can be true: incentive structures are well-researched (Nielsen et al., 2021) and have clear impacts on behavior. At the same time, our individual values, norms, and sense of purpose are important in shaping the overall situation – including incentive structures – in the first place (Otto, Wiedermann, et al., 2020): indeed, people’s (value-based) desire to preserve Earth’s climate for future generations can be translated into government subsidies for specific sectors of the economy which, in turn, transform the overall (e.g. financial) incentive structures that shape individual consumer behavior. When norms are implemented as the default option, they create new decision landscapes – as seen, for example, in nudge approaches (Byerly et al., 2018; Mertens et al., 2022). Crafting and enacting laws, building educational systems or realizing large infrastructure projects all hinge on values, norms, and ideas about how things *ought* to be. Therefore, the importance of concrete incentive structures for behavior does not negate the pivotal role that norms, values and purpose play in our society.

Taken together, we argue that psychological research is important for both individual and societal change, and that social norms and values as well as specific incentive structures are crucial in bringing about

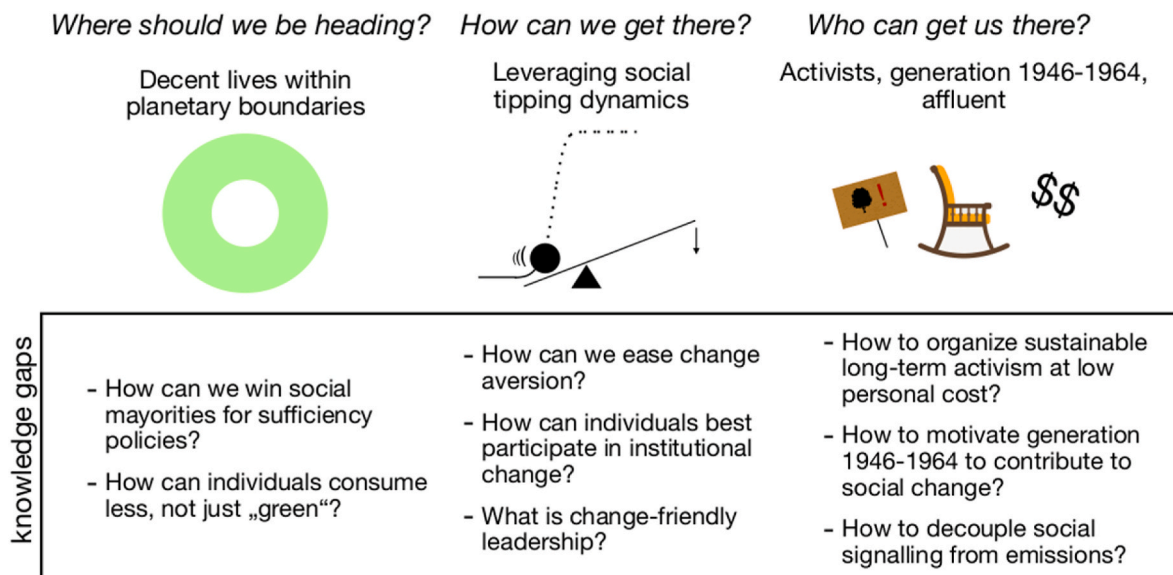


Fig. 1. Key knowledge gaps in terms of the “Where”, “How”, and “Who” of sustainability transformations, that psychology needs to address.

social transformation. Against this background, the question arises as to which targets and visions we should direct our efforts towards social transformation. In the next section, we consider what direction we should head.

2. Where should we be heading?

2.1. Decent lives within planetary boundaries

Visions for a sustainable future exist. Prominent concepts unite notions of preserving decent living standards for all, on the one hand, with exercising respect for planetary boundaries, on the other. According to this perspective, a safe space for humanity can be established between the social foundations for decent living on the one side and planetary limits on the other. Key related concepts include that of a “safe operating space” (Rockström, Steffen, K. Noone et al., 2009), “doughnut for humanity” or “doughnut economy” (Raworth, 2017) and “consumption corridors” (Fuchs et al., 2021; Sahakian, Fuchs, Lorek, & Di Giulio, 2021) – the latter putting consumption at the core. This vision for a good or decent life is situated between, firstly, a lower boundary or social foundation that is defined, for instance, according to the UN sustainable development goals (e.g. in the doughnut economy) or according to human needs (e.g. in consumption corridors); and, secondly, an upper boundary that is defined according to the biological, chemical, and physical limitations of our planet (Rockström, Steffen, Noone, et al., 2009; Steffen et al., 2015). Crucially, experts believe it is possible to extend “decent living standards, universally, to a population of ~10 billion” (O’Neill, Fanning, Lamb, & Steinberger, 2018). From this perspective, it is theoretically possible for everyone alive today to live well within the limits set by existing natural resources and corresponding strategies of sustainable use. With regards to industrialized, Western societies, however, major normative questions arise about how to bring excessive, disproportionate consumption back within environmental limits (Chancel, 2022; Fanning, O’Neill, Hickel, & Roux, 2022; O’Neill et al., 2018) and about how much (material) consumption is needed for a good/decent life (Kasser, 2017).

2.2. The contribution of psychology: foster sufficiency discourses

Psychology is already providing important knowledge needed to implement this vision. Regarding the lower boundaries or social foundations, for example, psychological research on subjective well-being (e.g. in positive psychology) is exploring the key factors of human flourishing and how these factors relate to money, income, and prosperity (Diener et al., 2017, 2018; Jebb, Tay, Diener, & Oishi, 2018; Kahneman, Alan, Schkade, Schwarz, & Stone, 2006; Kasser, 2017). In this way, psychology is already investigating and thereby specifying the lower boundaries of the safe space for humanity.

The upper boundary is set by the bio-chemical and physical properties of our planet (Rockström, Steffen, Noone, et al., 2009; Steffen et al., 2015) and, at first glance, it might appear that psychology has little to contribute in these areas. Upon closer inspection, however, chemical pollution, air pollution, land conversion, biodiversity loss – virtually all harms to our planet’s ecological boundaries – are occurring as a result of human behavior, in particular overconsumption. Tackling overconsumption is the aim of *sufficiency*, the third (and most neglected) pillar of strategies to combat climate change, in addition to the more widely known strategies of *efficiency* and *consistency* or substitution (Figge, Young, & Barkemeyer, 2014; IPCC, 2022).

Sufficiency discourses emphasize that – besides consuming better (efficiency) and in line with renewable resources (consistency/substitution) – we need to consume less (sufficiency). However, in Western democracies, sufficiency-oriented policy strategies are largely shunned, deemed unpopular, and considered politically impossible (Richters and Siemoneit, 2019; Spangenberg and Lorek, 2019). Yet, from a scientific perspective, sufficiency is absolutely crucial to mitigate climate change:

Western levels of consumption already jeopardize the foundations of human societies and cannot be extended to all people on the planet. Further, by definition, net-zero emissions targets cannot be reached solely by means of efficiency gains.

Against this background, the field of psychology can help to advance sufficiency discourses by providing answers to various key questions, including: How can the idea of sufficiency become more widely accepted, both at the individual (lifestyle) level and at the level of society? What could convince individuals to vote for sufficiency policies – e.g. maximum income, wealth taxes, basic income, working time reductions, meat taxes (Koch, 2022) – and to consume accordingly wherever possible? How should politicians frame sufficiency in order to achieve social majorities? And with whom (ethnicity, class, gender, age) are political alliances most probable?

Psychology has only recently begun to explore aspects of sufficiency, mainly focusing on individual consumption decisions and largely overlooking questions of how to reframe conditions at the societal level (see however Heidebreder et al., 2022; Hess, 2022; Matthies & Merten, 2022; Sorrell, Gatersleben, & Druckman, 2020; Tröger & Reese, 2021).

In practical terms, it should be possible to identify appealing, successful narratives on behalf of sufficiency. First, contrary to the mainstream economic assumptions, human wants are *not* infinite (Bain & Bongiorno, 2022). Secondly, sufficiency narratives relate to notions of living well that exist in both Eastern and Western religions and philosophy (Stillman, Fincham, Vohs, Lambert, & Phillips, 2012). This means that worldviews compatible with sufficiency are already in place. Thirdly, we can readily distinguish between human needs (e.g. mobility) and different forms of need satisfiers (car, bike, or public transport) that vary in their levels of sustainability (Max-Neef, Elizalde, & Hopenhayn, 1989); moreover, while human needs may be relatively stable and similar across human groups (Di Giulio & Defila, 2021), need satisfiers are culturally shaped and, by extension, can be transformed (Brand-Correa et al., 2020; Millward-Hopkins, Steinberger, Rao, & Oswald, 2020).

In this way, consumption corridors and the doughnut economy represent feasible visions for a desirable future – visions that could benefit from more knowledge about narratives capable of fostering sufficiency-oriented policies and consumption patterns. This gives rise to the question of how we can transform our current world in order to get where we want to be.

3. How can we get there?

3.1. Leveraging social tipping dynamics

The time for slow, incremental change is over. Such change will not reduce greenhouse gas (GHG) emissions fast enough to limit global warming to under 1.5 °C (Messerli et al., 2019, sec. 4.8). However, this does not mean that the transformation we need is impossible. One possible avenue forward is that of explicitly targeting social tipping points, that is, points in which certain small additional changes in one dimension disproportionately alter the overall state of the system. Tipping points are probably best known with regards to ecological systems (Lenton et al., 2019), such as coral reefs. A “healthy” coral reef is resilient to small, and temporary increases in water temperature. However, the same coral reef under stress – for example from increased water acidity, rising pollution, and loss of biodiversity – can reach a tipping point, beyond which any small, temporary increase in water temperature sets off a cascade effect leading to coral bleaching and the collapse of the entire ecosystem.

Similar to coral reefs, our societies and economies are complex systems that can reach tipping points. At a tipping point, a social system can tilt towards disaster or regeneration (Fesenfeld, Schmid, Finger, Mathys, & Schmidt, 2022; Lenton et al., 2022; Tàbara et al., 2018). In 2018, for instance, knowledge and concerns about climate change were sufficiently widespread such that one activist on the street, Greta Thunberg,

could bring about a cascade effect in terms of public attention to the topic (Winkelmann et al., 2022). Otto, Donges, et al. (2020) identified six social tipping areas in which, after reaching a critical threshold, a small and local change or intervention could have large-scale impacts on society that, in turn, could stabilize global warming by 2050.

According to Otto, Donges, et al. (2020), the area in which social tipping dynamics could be brought about most quickly (potentially within hours) is the financial market, in which the profitability of fossil-fuel extraction needs to decrease. Here, the divestment movement is already at work, pressuring investors to defund fossil-fuel extracting companies.

The second area in which social tipping processes could take place are information feedback systems. This is relevant, for example, with regards to company disclosures of emissions information, which is already done on a voluntary basis (*Carbon Disclosure Project*, n.d., founded in 2000). Voluntary disclosure could pave the way for governments to establish mandatory disclosure rules. According to Otto, Donges, et al. (2020), such action – achievable in a handful of years – could greatly enhance the available climate-relevant information that consumers use to make purchasing decisions.

Human settlements represent the third area in which social tipping points could be brought about within 5–10 years. Citizens and city administrations could plan and implement carbon-neutral cities, rapidly increasing demand for fossil-fuel free technology, for example in urban transport or the construction industry.

The fourth area is production and storage of energy. Here, in less than a decade (Otto, Donges, et al., 2020), cities and communities could develop decentralized energy production and storage, increasing the profitability of fossil-free energy forms. Even before the recent fossil-fuel price spikes linked to the war in Ukraine, there was evidence of tipping dynamics at play in this area (Sharpe & Lenton, 2021). With the support of government subsidies, such as those contained in the US Inflation Reduction Act of 2022, this area might cross the tipping point.

Education systems represent the fifth area. Teachers, climate educators, and social movements can raise awareness about climate change and its impacts and they can pass on knowledge about how to best react as individuals (ideally, as we argue, both as consumers *and* as citizens). This area could take 10–20 years to cross the tipping point. However, it is entirely possible that the process is already well underway and we have moved beyond “year one”. By now, most people are concerned by climate change (Brenan & Saad, n.d.; Flynn et al., 2021) and various social movements (Fridays for Future, Extinction Rebellion, Sunrise Movement, etc.) have emerged that have been organizing protests and mobilizing people for some time.

Lastly, Otto, Donges et al. (2020) highlight norms and values as the sixth and final area of social tipping dynamics. In this area, peer groups, environmental organizations, young people, and opinion leaders can foster the perception of fossil fuels as immoral. Estimated to take 30–40 years, this is the slowest-moving area of change. However, we argue that also in this area, we have moved well beyond year one. Today, even companies like BP feel under pressure to publish sustainability strategies, not to speak of the many declarations of climate emergencies. Of course, judging by the lack of real action, such strategies and declarations might be little more than lip service, features of climate delay discourses (Lamb et al., 2020) and green washing. Nevertheless, they still signal new social obligations to take a specific stance on climate change, possibly indicating that the tipping point in the area of norms and values is on its way.

Crucially, the six areas are interconnected. According to Otto, Donges, et al. (2020), changes to social norms and values, for example, influence the allocation of capital, which in turn influences energy production and storage systems. The authors argue that, both on their own and through their mutually reinforcing interconnections, these social tipping elements can lead to transformational change towards a low-emission future. In this way, social tipping dynamics can be a vehicle to reach the safe and just space for humanity we so urgently

need.

3.2. The contribution of psychology: from change aversion to acceptance

Concerted efforts to push social tipping dynamics forward can bring about desirable societal change. Notably, with regards to climate change, the necessary societal transformation must happen relatively quickly in order to limit global warming effectively. However, perceived societal changes are often met with resistance and reactance (Harich, 2010). It is here that psychology has a crucial role to play in easing and accelerating the process of desirable change. There are two key dynamics that stand in the way of a swift transition: individual change resistance (Gifford et al., 2018) and institutional inertia (De Young, 2014; Jost, Banaji, & Nosek, 2004).

3.2.1. Individual change resistance

Individuals can be rather change averse (Gifford et al., 2018; Samuelson & Zeckhauser, 1988). Yet advancing social tipping dynamics will require massive changes in daily life, especially for the citizens of industrialized countries (De Young, 2014; Millward-Hopkins et al., 2020). Thus, an important question is how individuals might better cope with the transition. Two lines of research can help to ease and speed up the necessary changes.

First, psychology can investigate promising narratives of change (Wittmayer et al., 2019). Might it help, for example, to stress what will not change, along with the things that will? Or is change aversion best mitigated by highlighting things that might improve thanks to the change? Especially in high-emitting countries, loss aversion may get in the way of individual (and structural) change (Knobloch, Huijbregts, & Mercure, 2019): High-consuming individuals will have to drastically alter and reduce their mobility patterns and meat eating, for example, in order to respect global energy limits (Chancel, 2022; Millward-Hopkins et al., 2020). In addition, corresponding efforts to design sustainable welfare systems will necessarily target the power and resources of the affluent (Koch, 2022). Psychology should investigate what kinds of framing might increase the willingness of specific individuals to accept related losses and embrace the coming changes. An initial step in this direction has already been made, for example, by research assessing how a “loss frame” can be turned into a “gain frame”, and the role played by positive emotions (Nabi, Gustafson, & Jensen, 2018; van der Linden, Maibach, & Leiserowitz, 2015).

As a second line of research concerned with easing individual change processes, we propose to focus on participation in change (Guckian, Harbo, & De Young, 2017). In order to cope with feelings of helplessness and climate anxiety, individuals can become active and engaged with others to work on the challenges (Bamberg, Rees, & Schulte, 2018; Barth, Masson, Fritsche, Fielding, & Smith, 2021). This active participation may reduce people’s change aversion, as it provides them with a sense of agency. Psychology has only recently begun to investigate how collective engagement impacts people’s cognition and feelings, and how it may spill over into other behavior domains, for example in relation to climate activism or engagement in grassroots initiatives (Ambuehl, Kunwar, Schertenleib, Marks, & Inauen, 2022; Hossain, 2018; Lang, Chatterton, & Mullins, 2020; Moser & Bader, 2023; Seyfang, Hielscher, Hargreaves, Martiskainen, & Smith, 2014; Vita et al., 2020). In order to advance this line of research, we should further investigate what kind of participation – beyond consumer choices – is best suited to reduce change aversion in what individuals (Moser & Bader, 2023). Here, a special focus should be put on exploring how participation can be made possible for all, regardless of their resources (temporal, financial, and beyond). Inspiration for low-threshold participation can be drawn, for example, from current experimentation with democratic participation in Taiwan (Hsiao, Lin, Tang, Narayanan, & Sarahe, 2018), and from research on citizens’ assemblies (Capstick, Demski, Cherry, Verfuert, & Steentjes, 2020; Sandover, Moseley, & Devine-Wright, 2021; Wells, Howarth, & Brand-Correa, 2021).

Importantly, investigation of change communication and people's participation in societal change will primarily target the individual level, however the consequences will be felt on the structural level as well. This, in turn, can contribute to overcoming institutional inertia.

3.2.2. Institutional inertia

Institutional inertia can present hurdles to the advancement of social tipping dynamics (Harich, 2010; Jost et al., 2004). Construction laws and restrictions (especially in high-emitting, industrialized countries), for example, can stall the refurbishment of houses. Slow-moving legislative processes can also delay effective climate laws: while corporations have long enjoyed the rights of juristic bodies, nature is only beginning to be granted similar rights (GARN, n.d.; Te Awa Tupua (Whanganui River Claims Settlement) Act, 2017). While institutional inertia and stable institutions can ensure a predictable future, with the benefits that can entail, we currently need our institutions to adapt quickly on behalf of climate change mitigation (Beddoe et al., 2009). Against this background, psychology should also address the obstacles to change on an institutional level.

Previous studies have investigated institutional change resistance (Geels, 2014; Harich, 2010) and others have identified factors that explain policy acceptance (Börjesson & Kristoffersson, 2018; de Groot & Schuitema, 2012; Drews & van den Bergh, 2016; Perlaviciute & Steg, 2014). To complement these efforts, psychology should investigate whether institutional change is best approached in a top-down or bottom-up manner, and what kind of leadership is necessary (Ernst & Fuchs, 2022; inner development goals: Inner Development Goals, n.d.). The question arises: What kind of participation in institutional change processes can alleviate resistance from within (see for example the concept of 'adhocracy,' Birkinshaw & Ridderstråle, 2015; Dolan, 2010)?

Tackling change aversion at the structural level can reduce political resistance to climate legislation, leading to swifter structural change and more adapted and adaptable institutions. Overall, building both individual and institutional willingness to change will be crucial to accelerate beneficial social tipping dynamics. The importance of this research area only increases as we fail to act on climate change collectively. If this continues for too long, climate change will act on us, bringing about rapid changes in its own way (De Young, 2014).

4. Who can get us there?

Different groups of individuals have different degrees of power and resources to shape society. Here, we propose three socio-demographic groups who, we argue, have extraordinary power over the way forward and who are typically not part of WEIRD study populations in psychology (Muthukrishna et al., 2020): (1) activists, (2) the generation 1946–1964, and (3) the affluent.

4.1. Activists

Today, climate activists must work to sustain their movements and continue to mobilize in order to maintain political pressure. These efforts face several challenges. Firstly, social movements are generally characterized by waves (Moyer, 1987). Secondly, the pandemic, the Ukrainian war, and resulting energy and supply-chain crises – despite ultimately illustrating the feasibility and reality of rapid societal change – have (ironically) diverted media attention and political momentum away from climate action. This has led to resignation among many activists (Hickman et al., 2021; Steinberger, 2022) and questions about how social protest can be organized in a sustainable fashion arise (Naberhaus & Sheppard, 2015).

Still, social protest and activism have significant potential to change our societies for the better (Engler, 2016, suffragette movement, abolition of slavery), and non-violent protests are often especially successful (Engler, 2016). Indeed, the Fridays for Future movement has already fundamentally changed how we talk about climate change (Winkelmann

et al., 2022) and the divestment movement has altered the investment landscape.

Because of its relevance for social change, psychology should investigate what forms of activism can best sustain long-term organized protest. Important questions include: Which organizational structures should be put in place to generate a resilient movement and what pitfalls can be avoided? How can individuals within a movement contribute in an effective, long-term way? And how can activists successfully fight for social change in states with varying degrees of democratic participation? When investigating these questions, psychology can draw on a large corpus of research in organizational psychology and burnout prevention. Finding answers will enable climate activists to organize their work more efficiently and more effectively, allowing them to mount and sustain political pressure over longer periods of time at a lower personal cost. To translate climate action into effective legislation, politicians require this kind of sustained public interest and pressure. In this way, research that supports climate activists in their organizing and mental health efforts can promote political change and shape the public discourse on climate change.

4.2. Generation 1946–1964

We further propose that psychologists investigate how “experienced” individuals belonging to the generation born between 1946 and 1964 could be motivated to contribute more to needed social change. Related questions include: What is needed to convince them to dedicate some of their resources to promote social change (e.g. contact to grand-children, cultivating a legacy mindset, Krznaric, 2020)? What specific obstacles do they face (e.g. health issues, ability to adopt new technologies and practices) and how could these be overcome? What are the most popular and impactful strategies to sow climate change mitigation in this demographic (Boucher, Kwan, Ottoboni, & McCaffrey, 2021)? What can these individuals gain from participating in social change movements (e.g. sense of purpose, community)?

Answering these questions has major potential to accelerate social change. Relative to other segments of society, the generation 1946–1964 has large resources in terms of time (due to pension funds and retirement plans), experience, and financial and social capital. In this way, their opinions and values have significant potential to influence many sectors of society, whether in finance, in housing (e.g. many elderly must move at least once during retirement, a rare but impactful decision: see Nielsen et al., 2021), or in community building and education (e.g. people over 60 spend significant time carrying out voluntary work that shapes society: see Kieffer, 1986). Further, in most high-emitting, industrialized countries, people over the age of 60 represent a relatively large portion of the population, which can also amplify the collective impact of their individual behavior. As a result, behavior and opinion change in this population segment – in terms of mobility, housing, and food – can have major impacts on human settlements, energy production, and financial markets. Finally, by virtue of their large numbers and their engagement, experienced individuals in this demographic comprise a major political constituency across all major parties (Magni-Berton & Panel, 2021). Recruiting and amplifying their voices for climate action is a powerful means of providing information feedback to politicians and increasing political pressure.

The relevance of experienced individuals for social change has already been realized by organizations such as Third Act (Third Act, n.d.), founded by Bill McKibben, or the Grandparents For Future movement. Thus, there are already networks of engaged experienced individuals with whom researchers could collaborate to amplify their efforts and to broaden their membership base. In addition, there is growing interest in understanding engagement in social movements in general (e.g. Boucher et al., 2021; Feola & Nunes, 2014; Moser & Bader, 2023; Vita et al., 2020; Wallis, Bamberg, Schulte, & Matthies, 2021), that research on experienced individuals can build upon.

4.3. The affluent

The last group we recommend investigating constitutes a relatively small proportion of the human population, but one with an especially large impact: the affluent. Wealthy individuals not only have disproportionately large individual carbon footprints (Chancel, 2022), they also hold positions of power (e.g. economic, political) and status within our societies (Wiedmann, Lenzen, Keyßer, & Steinberger, 2020). In this way, wealthy individuals possess significant social leverage. However, as a group, their characteristics and motives are decidedly under-researched.

Among other ways, the affluent translate their wealth into reputation and social status via conspicuous or luxury consumption (Keinan, Crener, & Goor, 2020). Here, psychology could investigate what other “satisfiers” or actions could provide social status without generating high emissions. We argue that it is possible to decouple signaling of social status from emissions. A vivid case in point is the example of two Australian millionaires who recently bought and then closed down a Tasmanian wood chip factory (O’Malley, 2022), resulting in Tasmania becoming carbon-negative (Mackey, Moomaw, Lindenmayer, & Keith, 2022). This can be seen as a form of conspicuous consumption that signals wealth and power (i.e. being able to invest money without extracting profit from the investment) yet has positive effects on the climate.

Second, given their extraordinary leverage for social change, it is crucial to understand how affluent individuals can best be reminded of the responsibility that comes with their power in society. Key questions include: What interventions are needed to enable the affluent to grasp what they can gain from acting in line with responsibility (e.g. ENROADS climate simulation, Rooney-Varga et al., 2020)? How can they best be supported when they want to live up to their responsibility? What are their specific obstacles or reasons for opposition (e.g. peer reactions, Kahan et al., 2012) and how can these be successfully overcome?

Affluent individuals play key roles in society. Improving our understanding of such powerful individuals who, in their day-to-day decisions, disproportionately shape our environment (Chancel, 2022; Wiedmann et al., 2020) can open up new ways of engaging them and their resources on behalf of urgently needed societal change. One key point of entry for research on wealthy individuals lies in the philanthropy sector.

The three proposed impactful social groups are, of course, not exhaustive or conclusive – they might overlap on an individual level, and other crucial social actors may not belong to any of these groups. Nevertheless, all three groups have the potential to accelerate desirable social tipping dynamics. On the one hand, effective activists can mount much-needed political pressure. On the other, experienced individuals and the affluent are impactful demographics in which individual behavior change, when scaled, can impact greenhouse gas emissions significantly. Further, the purchasing decisions of these latter groups – and their engagement in companies and on a political level – disproportionately shape human settlements, financial markets, and energy systems. Taken together, the three groups of impactful individuals we highlight have significant potential to shape social norms: activists by directly and vocally arguing from a moral/ethical stance, experienced individuals by virtue of their demographic majority and their political and civil engagement, and the affluent by virtue of their social status and power. Indeed, we believe these identified groups represent powerful societal actors who have major potential to accelerate beneficial social tipping processes.

5. Conclusion

Climate change is caused by human behavior in numerous and complex ways. We do not propose to have identified a comprehensive or exclusive list of psychology-related silver bullets that can solve the

current climate crisis. Instead, the present article proposes a set of high-priority research topics on the basis of their potential to bring about transformational social change. We argue that psychology can contribute significantly to the questions of *where to*, *how*, and *who* of societal transformation. The “where to” encompasses consumption corridors (Di Giulio & Fuchs, 2014; Fuchs et al., 2021) and/or the doughnut economy (Raworth, 2017), in which decent living within planetary boundaries is, in principle, possible for all (Millward-Hopkins et al., 2020). Here, psychology can investigate how to foster and support discourses of sufficiency.

The question of “how” is answered with reference to social tipping points – that is, advancing the state our societies to the point at or beyond which further, localized small change can have a cascade effect that brings about large, transformative changes in the entire system. Here, psychology should investigate how these conditions and beneficial transformations can be brought about by identifying optimal framings for necessary change, by specifying low-threshold ways of participation in citizen movements and democratic processes, and by investigating leadership on behalf of adaptable institutions.

Finally, we answer the question of “who” can move us forward by highlighting activists, the generation 1946–1964, and the affluent. These three groups greatly influence our societies, whether in their individual consumption choices, their political engagement, or their function as leaders in society. Relatedly, we need to better understand how to build sustainable, long-term political activism at lower personal cost, how to motivate experienced individuals to foster social change, how to decouple status signaling from greenhouse gas emissions, and finally how to support the affluent to live up to their social responsibility.

Answering these research questions of where to, how, and who of social change is critical. Doing so bears the potential to accelerate beneficial social tipping dynamics (Otto, Donges, et al., 2020). At the same time, these topics and individuals remain under-researched in the field of psychology. They represent little-explored areas with major impact potential, both on the individual *and* the structural level (Brownstein et al., 2022). When combined, they can work synergistically and lead to even greater impacts. For example, improved sufficiency discourses might make it easier for affluent individuals to gain social status in a way that is decoupled from resource consumption. Meanwhile, greater activism can advance discussions of sufficiency-oriented lifestyles and enhanced change-ability can ease the transition to such lifestyles for everyone.

Our proposed research agenda also offers two advantages to the field of psychology itself: It can benefit theory development and strengthen inter- and transdisciplinary links. Firstly, in terms of theory development, applying theories of human behavior in an effort to *change* said behavior can highlight which factors significantly shape behavior and which do not (Nielsen et al., 2021; Van Valkengoed et al., 2021). Furthermore, including concepts such as Raworth’s doughnut economics or UN sustainability goals into psychological research has the potential to integrate new pools of knowledge and can allow psychology to systematically explore how societal structures shape individual behavior and cognition. Initial attempts to link psychological theories to models of social transformation show that identifying such links is challenging, but certainly possible (Bögel & Upham, 2018; Wullenkord & Hamann, 2021).

Secondly, answering the research questions we propose will most likely require forming inter- and transdisciplinary teams. Such teams come with specific challenges: there are inherent difficulties in terms of different understandings of methods, concepts and research practices. In addition, in most universities, the disciplines are rather segregated to begin with, and interdisciplinary work tends to earn less career capital than disciplinary work (Wullenkord and Hamann, 2021). Nevertheless, inter- and transdisciplinary research exists and it can broaden our understanding of human behavior, for example by specifying the psychosocial moderators of behavior (Bögel and Upham, 2018). Further, the

results of our proposed research agenda will be of particular interest to a variety of important actors – including politicians, civil servants, NGOs, and social movements. This responds to the call for more impact-oriented psychology research (Kühn & Bobeth, 2022; Nielsen et al., 2021). On the practical side, the impact of the field can be broadened by providing approaches to reconcile conflicting SDGs, such as the balance between economic growth and the preservation of terrestrial life, and by providing missing links from other disciplines to foster social tipping dynamics.

Impact-oriented research can have a normative “flavor” that some observers believe goes against scientific objectivity. Indeed, we agree that the doughnut economy and consumption corridors are, ultimately, visions for the future rooted in specific viewpoints of what is “desirable”. Nevertheless, these concepts have a solid evidentiary foundation in physical reality (upper boundaries) and in scientific understanding of human flourishing (lower boundaries). Even if the situation were less existential than it is in terms of the climate crises, we believe these scientific foundations for the proposed desirable futures would be more than enough to justify applying current psychological knowledge to contribute to beneficial social change.

In sum, climate change is human-made and psychology studies human thinking and behavior. Against this background, psychology must contribute to shaping our visions of decent living for all, to accelerating the social tipping dynamics that can propel us towards these visions, and to support and activate those segments of society with the greatest leverage to bring about the needed changes – both on an individual and on a structural level.

Author note

The authors made the following contributions. Lilla Gurtner: Conceptualization, Writing - Original Draft Preparation, Writing - Review & Editing; Stephanie Moser: Writing - Review & Editing, Supervision.

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