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Behaviour change to address climate change

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Abstract

Addressing climate change requires profound behaviour change, not only in consumer action, but also in action as members of communities and organisations, and as citizens who can influence policies. However, while many behavioural models exist to explain and predict mitigation and adaptation behaviours, we argue that their utility in establishing meaningful change is limited due to their being too reductive, individualistic, linear, deliberative and blind to environmental impact. This has led to a focus on suboptimal intervention strategies, particularly informational approaches. Addressing the climate crisis requires a focus on: high-impact behaviours and high-emitting groups; interdisciplinary interventions that address the multiple drivers, barriers and contexts of behaviour; and timing to ensure interventions are targeted to moments of change when habits are weaker.

1 Introduction

Behaviour change is a central element of addressing the climate crisis. Most of the interventions required to reach global emission reduction targets (i.e., climate *mitigation*) require at least some behavioural change (CCC, 2019) and *adapting* to the growing impacts of climate change similarly requires significant lifestyle and societal change (IPCC, 2015). Impactful mitigation actions include avoiding flying and driving, and reducing red meat, dairy, material and energy consumption (Wynes & Nicholas, 2017; Ivanova et al., 2020); while adaptation measures include emergency and long-term behavioural responses such as preparing for extreme weather events (Van Valkengoed & Steg, 2019).

Behaviour change is often narrowly conceived as individual-level consumer action (e.g., buying a low-carbon product, recycling, reducing meat-eating), but is more appropriately understood as extending across the many roles and contexts humans occupy: as members of communities, participants in organisations, and as citizens who can influence policies (Nielsen et al., 2021). In addition to consumer action, behaviour of relevance for climate action thus encompasses the adoption of low-carbon and climate-resilient technologies (e.g. installing insulation); support for large-scale low-carbon infrastructures (e.g., windfarms); political action to support or demand climate change measures (e.g., voting and protesting); participation in policy formulation (e.g., through citizen juries) and grassroots activities (e.g., community energy or transport initiatives); and engaging in climate change conversations and interactions with others that raise awareness, enable and normalise low-carbon lifestyles. This extensive list highlights the need for all areas of psychology (social, environmental, community, organisational, political, economic, health, and developmental etc.) to develop, test and apply behaviour change theories and interventions (Clayton et al., 2015; Nielsen et al., 2021). In this article, we describe recent progress in psychological research, identify knowledge gaps, and set priorities for further research to inform more effective mitigation and adaptation behaviour change to address the climate crisis.

2 Behaviour (change) models and their limitations

2.1 Overview of models

Numerous behavioural theories and models exist to explain and predict mitigation and adaptation actions. The Theory of Planned Behaviour (TPB; Ajzen, 1991; Yuriev et al., 2020), the Value-Belief-Norm (VBN; Stern, 2000; Stern et al., 1999) and the Transtheoretical Model (TTM, Prochaska et al., 2002) are most commonly applied to mitigation behaviours. The TPB, originating in broader social psychology research, posits that intentional behaviour is predicted by attitudes, social norms, and perceived behavioural control (PBC); in other words, what we think and feel, social pressure, and capacity to act drive action. The VBN, by contrast, was developed specifically with pro-environmental behaviour in mind, and emphasises the role of personal norms in personal action, which are a product of people's awareness of consequences and ascription of responsibility to the self. These beliefs in turn are rooted in deeper personal values and worldviews. Broadly, the VBN has

been shown to predict political or low-impact pro-environmental actions (e.g., recycling); whereas the TPB can explain higher-impact environmental behaviours (e.g., avoiding driving), since it incorporates structural constraints via the PBC construct (Stern, 2000; Steg & Nordlund, 2018). Unlike the TPB and VBN, the TTM is a more dynamic theory of behaviour *change*, describing the stages a person moves through in establishing new behaviours, including contemplation, preparation, action, and maintenance of behaviour change. This model has been influential in health psychology, but has also been used to predict certain climate mitigation behaviours such as red meat reduction and cycle use (Wolstenholme et al., 2020; Forward, 2014).

Protection Motivation Theory (PMT; Rogers, 1983) has been applied to adaptation behaviours such as flood protection. This model posits that risk-protection measures result from appraisals of a threat and an adaptive coping response to deal with the threat (Grothmann & Patt, 2005). These appraisals are in turn influenced by knowledge of available adaptation strategies (Blennow & Persson, 2009); descriptive norms (i.e., what is seen as 'normal'), negative emotions, perceived self-efficacy and outcome efficacy (belief that the adaptive actions will have intended benefit) of adaptive actions (Moser, 2014; van Valkengoed & Steg, 2019).

2.2 Critiques and gaps

While these models highlight some of the main drivers of and barriers to climate action, recent critiques have identified limitations and gaps that impede significant progress in this area. First, the models are restricted to a small number of common theoretical constructs which limits their utility in understanding behaviour and informing interventions (cf., Sniehotta et al., 2014; Ferguson et al., 2016). Second, a related criticism is that the models are too *individualistic*. Structural factors (e.g., income, location) have been shown to far outweigh psychological factors in predicting carbon-emitting behaviours (Whitmarsh et al., 2017; Whittle et al., 2019), and yet with the partial exception of PBC, the cultural and physical context of action is absent from these models, and interventions have not been targeted towards high-emitters (Nielsen et al., 2021; Galvin, 2013). Attempts to offer more integrative and interdisciplinary perspectives on pro-environmental action, such as the Attitude-Behaviour-Context (ABC; Stern, 2000) or Capability, Opportunity, Motivation-Behaviour (COM-B; Michie et al., 2011) models, have hardly been taken up by psychologists working on climate action.

Third, widely-used behaviour models can be considered too *linear*, by assuming that behaviour is the end-point of a causal chain of attitudinal-psychological factors. Yet, behaviour change can lead to changed attitudes or identity (Bem, 1972; Thomas et al., 2019) and impact on other behaviours via spillover or rebound effects (Nash et al., 2017; Nilsson et al., 2016). Fourth, with the exception of some research on collective action (e.g., van Zomeren et al., 2019) psychological approaches assume people act alone and in isolation from others; even social norms are conceived as individual *perceptions* of expectations and obligations held by the individual, and there have been few attempts to understand how personal action influences others, or affects the broader contexts within which people act (e.g., via processes of 'social contagion' and peer influence; Wolske et al., 2020). Together, these concerns highlight the need for more interdisciplinary and systems

perspectives to understand how to establish pro-environmental behaviour change (cf. behavioural ecology; Geller, 2002; social influence and cooperation; Henrich & Muthukrishna, 2020; social-ecological systems; Masterson et al., 2017).

Fifth, models typically assume a 'rational', or at least *deliberative*, mode of decision-making, whereas much of our behaviour (including climate-relevant action) is habitual, i.e., unconscious routines triggered by contextual cues rather than a conscious deliberation of alternatives (Kurz et al., 2015). This omission has meant interventions have failed to factor in habit-breaking as a precursor to behaviour change (Thomas et al., 2019). Finally, the models fail to distinguish *types of behaviour* in terms of their impact or malleability, and thus provide no practical guidance for which behaviours interventions should focus on for maximal climate benefit. Consequently, there has been a tendency for environmental psychologists to focus on low-impact, incremental behaviour changes (e.g., curtailment of energy use) that is 'simple and painless' (Thøgersen & Crompton, 2009) rather than higher-impact, more transformative behaviour changes, such as purchasing energy-efficient or renewable energy equipment (Nielsen et al., 2021) which are necessary for lifestyle change that is in line with effective climate change mitigation (UNEP, 2020). As we discuss in the next section, these gaps and limitations in theory has led to suboptimal interventions (e.g., information provision).

3 Behaviour change interventions

3.1 Intervention typologies

Different typologies of behaviour change interventions exist that target *individual decision-making* ('downstream') versus the *context* in which decisions are made ('upstream'; Verplanken & Wood, 2006); measures that *provide/improve* options ('pull') versus *removing* them ('push'; De Groot & Schuitema, 2012); or that make use of automatic ('nudge') versus more intentional or deliberative processes (e.g., citizens assemblies; Capstick et al., 2020). In general, evidence from climate change and related areas suggests the need for combining multiple approaches. Changing choice architecture 'behind the scenes' may help to change specific behaviours, but this is not sufficient for the profound and participatory social transformation required to respond to the climate crisis (Corner et al., 2014; Otto et al., 2020); information provision and incentives are more effective when combined with broader social and infrastructural interventions (UNEP, 2020); and removing high-carbon options may be needed alongside providing low-carbon ones in order to establish the greatest change (Cairns et al., 2002).

3.2 Efficacy of different interventions

Psychologists have tended to focus on informational interventions – whether to raise knowledge, or influence psychological variables – in line with the individualist, deliberative focus of their behavioural models. Yet, evidence shows that informational approaches are generally less effective than other types of intervention

(Abrahamse & Matthies, 2012). Information campaigns may raise awareness and concern, but do not always produce behaviour change (Staats et al., 1996). Informational approaches that are more effective in changing behaviour: (a) tailor messages to audience values and beliefs (Whitmarsh & Corner, 2017); (b) communicate the wider (co-)benefits of climate action (Maibach et al., 2010; Bain et al., 2016; Wolstenholme et al., 2020); (c) target times and locations of decision-making, such as via product labels (WRAP, 2019; Kaiser et al., 2020) or energy feedback meters (Abrahamse et al., 2005); (d) leverage moral or social influence through normative messaging (Kormos et al., 2015; Sweetman & Whitmarsh, 2016); (e) promote self-efficacy instead of, or in addition to appealing to fear (Peters et al., 2013; Hunter & Röös, 2016), and (f) encourage setting specific and realistic goals to motivate action (Abrahamse et al., 2005).

Social influence is one of the strongest factors shaping behaviour, yet rarely recognised by individuals themselves (Nolan et al., 2008). Adoption of low-carbon innovations, such as electric cars and solar panels, is significantly shaped by social norms and neighbourhood effects (Bollinger & Gillingham, 2012; Graziano & Gillingham, 2015; Pettifor et al., 2017). The importance of social modelling in low-carbon, climate-resilient behaviours highlights the relevance of leadership in reshaping social norms (Gössling, 2019) and fostering collective efficacy (Sabherwal et al., 2021); and the potential for more discursive approaches (e.g., group discussion) to promoting climate action (cf. Lewin, 1947; Kurz et al., 2010). Among interventions that leverage social norms, the block leader approach, public commitment, and social modelling have been shown to be effective, with direct personal influence from similar others a key process shaping action (Abrahamse & Steg, 2013). Effective organisational interventions similarly find that social factors, such as management support, are important for bringing about behaviour change, alongside informational, financial and infrastructural measures (Young et al., 2015; Henderson & Mokhtarian, 1996).

Public commitment approaches involve asking respondents to make a pledge to change their behaviour, and rely on the psychological drive for consistency (or reducing 'cognitive dissonance') between attitudes and behaviours (Abrahamse & Matthies, 2012). Commitment interventions can be effective for promoting climate actions, such as using public transit (Matthies et al., 2006). Consistency processes are also thought to be relevant for behavioural spillover – the notion that changing one behaviour may trigger further behavioural changes (Thøgersen, 2012). Yet, a growing evidence base shows that spillover remains an elusive or even counter-productive phenomenon (Thomas et al., 2016; Thøgersen & Ölander, 2003; Steinhorst et al., 2015; Maki et al., 2019; Nash et al., 2017).

Economic and structural interventions have been studied much less in the psychological literature, consistent with gaps in the dominant behavioural models. Pricing policies can change incentives in favour of low-carbon alternatives and/or away from high-carbon options. Congestion charging has been shown to reduce car use (TfL, 2006) and shift demand towards public transport (Agarwal & Koo, 2016) and lower-emission vehicles (Percoco, 2014). Charges have also been suggested as a way to disrupt automatic behaviours by making purchase decisions more deliberative (Thomas et al., 2019), but may need to be combined with other

approaches to boost their efficacy (Poortinga & Whitaker, 2018). Physical and broader structural measures might include designing stair use (rather than lift use) as the default in buildings; pedestrianisation and cycle lanes; green infrastructure; low-carbon buildings and so on (e.g., RAE, 2015; Cairns et al., 2002).

A growing literature points to the importance not only of *how* to intervene to achieve social and lifestyle change, but also *when.* Habits are one of the strongest impediments to lifestyle change, acting to 'lock in' behaviour (Marechal & Lazaric, 2011). Many interventions (e.g., information campaigns) are ineffective because they are not strong enough to disrupt habits (Verplanken et al., 1997). But since habits are cued by stable contexts (i.e., the same time, place and/or social group; Wood et al., 2005), change in context disrupts habits (Verplanken et al., 2008). Consistent with this, times of significant change or transition (Thompson et al., 2011) have been identified as key opportunities for reconfiguring lifestyles (Capstick et al., 2014; Graham-Rowe et al., 2011) and identities (Devine-Wright et al., 2020). Research shows that disruptions – either life-course (e.g. moving home) or structural events (e.g. economic downturn, extreme weather events, the COVID-19 pandemic) – provide opportunities to more effectively change behaviours (Verplanken et al., 2018; Birkmann et al., 2010; Marsden et al., 2020; Carroll & Conboy, 2020). For example, low-carbon behaviours, such as bus use, energy efficiency and waste reduction measures, have been shown to be more effectively changed using low-cost interventions in the 12 weeks following relocation (Verplanken & Roy, 2016; Thøgersen, 2012; Ralph & Brown, 2017), as well as at other moments of change (Nicolson et al., 2017).

4 Conclusion

While several behaviour models exist to explain and predict mitigation and adaptation behaviours, their utility in establishing meaningful change is limited due to their being too reductive, individualistic, linear, deliberative and blind to environmental impact. This has led to a focus on suboptimal intervention strategies, particularly informational approaches, that are relatively ineffective in changing impactful climate behaviours. Addressing the climate crisis requires a focus on high-impact behaviours (mobility, food, consumption, resilience) and high-emitting groups; interdisciplinary approaches to designing interventions that address the diverse and interacting behavioural barriers and drivers; people's multiple roles (not only as consumers), including professional and collective actions; and temporal dynamics to ensure interventions are targeted to times when habits are weaker.

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