Literature Review

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1 Introduction

It is factually acknowledged that developed countries have historically contributed disproportionately to climate change (Hickel, 2020); and while to the status quo, carbon-intensive industries have increasingly been relocated to the Global South (Jorgenson, 2016), excessive use of household energy consumption becomes one of the main contemporary symptoms in the developed regions (Sovacool & Griffiths, 2020). Unlike the complex structural dilemmas facing developing countries (Roberts & Parks, 2009), these consumption patterns represent a more tractable problem that can be addressed through behavioral interventions such as mobile apps (Froehlich et al., 2010), social media campaigns, and gamifications (Johnson, 2017). This review explores how digital tools can influence sustainable behaviors in developed countries by examining three key behavioral theories: the Theory of Planned Behavior (TPB) (Ajzen, 1991), Nudge Theory (Thaler, 2008) and Theory of Social Practice (SPT) (Shove et al., 2012). By understanding these frameworks, we can better design interventions that address the unique challenges of reducing the environmental impact of developed nations. In the begining, the research question was selected to be *How can digital interventions, informed by the Theory of Planned Behavior, Nudge Theory, and Social Practice Theory, effectively promote behavioral change in sustainable lifestyles in developed countries?*, however its ambiguity is self-evident, thus the term *sustainable lifestyles* is changed to *household energy consumption* for a detailed, clear and approachable literature review.

2 Research Question

How can digital interventions, informed by the Theory of Planned Behavior, Nudge Theory, and Social Practice Theory, effectively promote behavioral change in household energy consumption in developed countries?

3 Theory of Planned Behavior

The theory of Planned Behavior assumed that behavior is driven by intentions, which are shaped by three main factors: attitudes, subjective norms, and

perceived behavioral control(Ajzen, 1991). Digital interventions can target these factors to encourage sustainable behaviors in developed countries. For example, apps that calculate carbon footprints help change attitudes by showing users the direct impact of their actions on the environment (Whitmarsh et al., 2011). Social media campaigns, such as #FridaysForFuture, influence subjective norms by making sustainable actions appear more socially acceptable and widespread (Pearce et al., 2019). Additionally, apps that provide real-time feedback on household energy usage can boost perceived behavioral control by making it easier for users to see how small changes can make a difference (Abrahamse et al., 2007).

However, TPB has its limitations; it assumes people make rational decisions; but in reality emotions and habits often play a bigger role in behavioral change. For example, an individual might know that driving less is better for the environment, but still choose to drive because it is a habit or feels more convenient (Gifford, 2011). In the context of household energy consumption, TPB helps identify which norms are most 'influential' in shaping energy use habits, guiding digital intervention designers to target the most impactful psychological levers. But TPB's assumed nature of conscious deliberation means an overlook of automatic behaviors that drive energy waste, highlighting the need to integrate other perspectives for a more holistic intervention strategy (Darby, 2006).

4 Nudge Theory

On another hand, digital interventions can act as "nudges" by making sustainable choices in households easier or more appealing; for example, apps can set renewable energy plans as the default option, making it simpler for users to choose green energy (Sunstein & Reisch, 2013). Nudge Theory indicates that nudges gently guide choices by changing how options are presented, while still leaving all decisions available (Thaler, 2008). Gamification, like earning points for reducing energy use, can nudge people toward more sustainable behaviors (Thaler & Sunstein, 2008). Exemplifications as simple as a smart meter showing real-time energy usage can nudge households to cut back on consumption (Darby, 2006). When used transparently, nudges are a cheap, scalable way to tilt behavior toward sustainability, one small win at a time.

We know though, that nudges aren't perfect; critics argue that they might not lead to long-term change because they don't always address the underlying reasons for unsustainable behavior (Bovens, 2009), after all, nudges may bypass reflective reasoning, exploiting cognitive biases (e.g., inertia, social norms)(Hansen, 2013). There's also the ethical concern that nudges can feel manipulative if users aren't aware of how their choices are being influenced. Still, Nudge Theory offers a practical way to design low-cost, scalable interventions that can drive small but meaningful changes in household energy consumption. In the case of reducing household energy consumption, nudges can help trigger immediate behavioral shifts—such as reducing heating or switching off appliances—that, when reinforced consistently, may accumulate into significant environmental

benefits (Schultz, 2007).

5 Social Practice Theory

In the context of household energy consumption, SPT suggests that long-term behavioral change is most likely when digital interventions work to shift the shared routines embedded in daily domestic life—such as normalizing energy conservation. It is assumed that behavior isn't just about individual choices, but is deeply tied to social practices—everyday routines that are shaped by materials, competences, and meanings (Reckwitz, 2002). Digital interventions can influence these practices by altering the elements that sustain them; for example, apps that connect users to carpooling services or recycling centers can change the materials involved in daily life (Shove et al., 2012). Online tutorials or educational platforms can build competences by teaching people how to live more sustainably (Hargreaves et al., 2013). Social media campaigns can shift meanings by reframing sustainability as a social norm or a moral responsibility (Geels, 2012).

We know that SPT has its challenges; it focuses on systemic and cultural factors, which can be harder to design specific interventions compared to theories like TPB (Ajzen, 1991) or Nudge Theory (Thaler, 2008). It also tends to downplay the role of individual agency, which can be important for driving change. However, SPT provides a valuable perspective for understanding how digital tools like smart meters can reshape the broader social practices that contribute to behavioral change in household energy consumption in developed countries.

6 More Effective Interventions with a Combination of Theories

To change climate-friendly behavior at scale, especially in developed countries where habits and lifestyles are deeply ingrained, interventions must operate at *individual*, *situational*, and *systemic* levels.

Firstly, TPB helps tailor digital interventions to individuals' beliefs, attitudes, and perceived social norms, which are key to influencing intentional engagement with climate issues (Whitmarsh, 2010). For example, personalized apps that calculate carbon footprints or track energy use can enhance household awareness and shift attitudes, while social media campaigns normalize sustainable behaviors by highlighting collective action and efforts. In the continuing steps, Nudge Theory works to make sustainable choices easier and more automatic, perfect for promoting initial uptake of household eco-friendly behaviors without demanding *significant* cognitive effort or lifestyle disruption (Thaler, 2008). These digital interventions subtly guide behavior by redesigning choice environments in favor of sustainability, such as having automated digital energy-reduction plans to form unconscious habits. Next, SPT captures the broader

social routines that shape daily life—helping to institutionalize sustainable behavior as part of the cultural norm, rather than a one-time choice (Shove, 2012). For instance, since individuals in developed states have a broader range and easier acquirable diversity of resources, digital platforms that encourage community sharing of resources and online tutorials that teach low-energy living practices can help people embed sustainability into the social part of their everyday life.

In an organized way as such, a combination of TPB, Nudge Theory, and SPT allows digital tools can not only initiate behavioral change at the individual level, but also scale it into widespread, socially reinforced, embedded patterns of low-carbon living for households in developed countries.

6.1 Additional Problems

Assumably, integrating these theories poses challenges. TPB's focus on intentionality conflicts with Nudge Theory's reliance on subconscious cues, potentially undermining reflective engagement, in other words, users of the digital interventions might adopt sustainable behaviors without fully understanding or internalizing the reasons behind them, reducing long-term commitment; those behaviors will be more susceptible to reversal once the nudges are removed or altered. Similarly, TPB and nudges prioritize individual agency, while SPT emphasizes systemic factors, creating tension in intervention design. Without careful synthesis, interventions risk becoming overly complex or counterproductive, hindering long-term behavioral change, undermining the purpose of reducing household consumption.

7 Analysis

When discussed respectively, each of these theories offers a different lens for understanding how digital interventions can drive behavioral change. TPB focuses on individual decision-making, making it useful for designing tools that target attitudes and norms (Ajzen, 1991; Whitmarsh, 2011). Nudge Theory emphasizes small, subtle changes in choice architecture, which can be effective for encouraging immediate, low-effort actions (Thaler, 2008; Tiefenbeck et al., 2018). SPT, on the other hand, looks at the bigger picture, showing how digital tools can reshape the social and cultural practices that underpin unsustainable behaviors (Shove, 2012). We know that no single theory has all the answers. TPB and Nudge Theory are great for addressing individual behaviors but may overlook systemic issues. SPT helps us understand the broader context but can be harder to apply in practice.

Using the three theories alone respectively offers a compromised pathway to designing (digital) interventions. The overarching goal of this review is to explore how digital interventions can promote behavioral change in climate issues, particularly in developed countries. In this context, using the Theory of Planned Behavior (TPB), Nudge Theory, and Social Practice Theory (SPT) in combination offers a more powerful—and nuanced—strategy than relying on

any one framework alone (Whitmarsh, 2011). Nonetheless, they can also introduce contradictions and complexities that if unaddressed, hinder effective climate action.

Together, TPB, Nudge Theory and SPT offer a layered approach: TPB informs the motivational foundation (Ajzen, 1991), Nudges create seamless opportunities to act (Thaler, 2008), and SPT embeds new habits into the social framework (Whitmarsh, 2011). For example, a household might begin reducing its energy use because they intend to (TPB), are nudged by their energy app to turn off unused lights (Nudge Theory), and eventually adopt it as part of their everyday norm because it's what their peers are doing and talking about (SPT).

When cautiously integrated, an integrated framework of these theories can help digital interventions shift from simply influencing behavior to redefining lifestyles effectively in households of developed countries.

8 Respond to Peer Review

8.1 Peer Review text

This literature review does a great job of clearly explaining how digital interventions can promote sustainable behaviors in developed countries, using three different theories: the Theory of Planned Behavior (TPB), Nudge Theory, and Social Practice Theory (SPT). Each theory is described clearly, with helpful examples that show exactly how digital tools like apps and social media can be used practically. Examples such as carbon footprinting apps or the #FridaysForFuture movement truly allows the reader to visualize these concepts being put into practice.

A particular highlight of the review is that it is even-handed. The writer is not simply describing how these theories operate; they are also not afraid to discuss each theory's limitations and ethical concerns. It is to the text's credit, for example, that it highlights how the TPB may overlook emotions and habits, or how Nudge Theory may appear manipulative to those using it. Acknowledging these concerns makes the review come across as considered and realistic.

Yet, the review would be even stronger if it more clearly demonstrated how these theories may complement or contradict one another when used in tandem. Currently, the last analysis summarizes the theories independently but does not develop on how using them in combination may create more effective interventions or generate additional problems. Addressing this interplay more directly could yield greater insights and practical suggestions.

Overall, this is a very clear, informative, and interesting review. It shows a good understanding of the theories and gives good examples. It would be even better if there was a little more discussion of how these theories might mix together in actual digital tools.

8.2 Amendaments after peer review

I added the "More Effective Interventions with a Combination of Theories" and its corresponding "Additional Problems" part. In the former part I discuss how theories work *together* under one framework, the latter addresses theoretical flaws, and exemplified interpretations of them.

Also, I chose to make the research question more specific after peer review due to the ambiguity of the concept.

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