**Background**

Increasing the consumption of plant-based products is fundamental to promoting sustainable food choices because plant-based diets reduce overall greenhouse gas emissions (GHGE), water use, biodiversity loss, and cancer and chronic disease risk

1-5. We propose to influence sustainable food choices by designing and testing interventions that target the deliberate and the automatic decision-making processes surrounding food choice and the perception of climate change (CC)6,7. Based on behavioral science principles, food selection choices may be theorized to arise from dual decision-making pathways8: (a) System 1 choices utilize rapid, automatic processing (e.g. selecting foods that are conveniently located within a supermarket) and (b) System 2 choices require slow, deliberative processing (e.g. rationalizing that red meat consumption is detrimental to the environment) 9.

We will first design and then test interventions that manipulate System 1 pathways (via educational and behavior-change messages, labels) and System 2 pathways (via salient positioning of sustainable food options) to assess shifts in food choices of individuals in Brazil and the US. Similarly, individuals’ ability to counter CC - often conceptualized as abstract, uncertain, distant, and ultimately fatalistic - can be made more tangible to individuals through educational messaging which could trigger System 2 processing. By linking CC to everyday food choices, individuals can be empowered and motivated to make rational decisions that are climate friendly which in turn would boost efforts targeting sustainable diets 10,11. Here, we propose a mixed-methods project with the goal of leveraging insights from behavioral sciences to inform interventions designed to promote sustainable dietary choices in Brazil and the US.

To inform intervention design, we aim to:

1. **Conduct a secondary literature search to identify strategies that most effectively manipulate System 1 pathways to influence sustainable food choice.** We assume that salient positioning interventions will be identified as one such strategy and therefore use this example in our proposal.
2. **Assess individual beliefs, knowledge and barriers and the process of internalizing the association between food choices and CC within participants in Brazil and the US.** Information gathered from this research will aid in tailoring messaging and labelling interventions that target System 2 pathway proposed in Aim 3.
3. **Identify effective label designs, prompts and framing of behavior-change messages to encourage climate-friendly food choices within a representative sample in Brazil and the US.** Once designed, we will then:
4. **Evaluate the impact of educational and behavior-change messages, labels, and salient positioning interventions on food choices within representative samples in both study sites.**

**Methods**

This study consists of four research activities that align with the four study aims. The pathways of influence of this proposal are summarized in Figure 1 and described below.

1. Review of existing literature: We will conduct a review of published and grey literature (working papers, program evaluation documents) to identify strategies and initiatives that encourage healthier food choices via System 1 processing, while preserving choice (nudges) 12. Nudges with the most demonstrated impact on food choices and relevance to a restaurant setting will be chosen to be part of the intervention. We choose restaurant settings because they are crucial decision points of food choice and can leverage technology to lower the cost of implementation of interventions (ex. electronic menus). See Figure 2 for study timeline.
2. Qualitative component: We will conduct six, country-specific focus group discussions, three for either sex, with adults recruited from urban settings. A pilot-tested focus group guide will be used to elicit information on (a) perceptions of the association between food choices and CC; (b) awareness of climate-friendly food options; (c) barriers to making climate-friendly food choices; and (d) strategies that may support a shift in participants’ food choices. Thematic analysis will highlight similarities and differences in how participants understand and internalize CC in Brazil and the US. Findings from this activity will be used to design behavior-change messages/vignettes/labels for research activity three.
3. Semi-quantitative component: A web-based survey instrument with short-listed label designs and behavior-change messages/vignettes in Portuguese and English will be administered online by two survey firms (700 participants/country). Participants will respond to a series of questions designed to identify the message content that is most effective at prompting climate-friendly food choices. Respondents will choose between label designs and vignettes that highlight alternative dimensions of the food-CC link (e.g. food choices that minimize livestock GHGE vs those that minimize deforestation).
4. Quantitative evaluation component: Based on results from previous activities We will test the impact of the most effective educational and behavior-change messages, labels, and salient positioning interventions (and other nudges) on food choices, using a web-based instrument that simulates meal choices made within a restaurant setting (2000 participants/country). Participants will be randomly allocated into one of five arms and asked to make a meal choice and rate their preference of meal choice. These five arms test: salience of climate-friendly options, label indicating climate-friendly meal options, behavior-change messages about the influence of meal options on CC, a combination of arm 2 and 3, and finally a control arm with meal options appearing in no particular order. Analysis will indicate effective interventions towards sustainable diets in each study site.

**Study relevance**

Current literature suggests that the motivation to adopt a sustainable diet is frequently found among individuals, but its translation into food consumption remains a challenge. We address this gap by developing and testing interventions leveraging the individual’s automatic as well as rational decision-making process to achieve meaningful shifts in food choice. Our intervention will also measure the relative impact of interventions targeting these dual-processing pathways.

We focus on urban Brazil and the US. A comparison between these two contexts will elucidate contextual differences and similarities in the internalization of CC, and in food choices in contexts where the potential to shift to more plant-based diets is relatively large (the average meat consumption in Brazil and the US is between 128-164 grams/day compared to the recommended 21 grams) 13,14. Our proposed interventions are a direct application of the Brazilian Dietary Guidelines and the Sustainable Development Goals to which Brazil and the US are signatories.