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Exploring consumer motivations to increase pulse protein in Portuguese family meals using means-end chain theory and novel recipes

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ABSTRACT

European food systems and public health communities are increasingly pressured to promote reductions in meat intake. Persuading consumers to curtail or abandon meat consumption requires shifting their beliefs about the power of meat and its alternatives to deliver desired benefits and align with core life values. Effective strategies must acknowledge that meat substitution can occur at different consumption levels (ingredient, dish, meal), depending on the context in which meat is to be traded off against plant-based alternatives. Using Means-End Chain theory and soft-laddering interviews, this study investigated how omnivorous consumers (n = 43) evaluated three novel dish concepts – a high-protein soup with chickpea sprouts, a vegetable *terrine* with chickpea sprouts, and an oven-baked meat and chickpea patty – designed to increase pulse protein in family meals at the expense of meat. Novel dishes were evaluated against three traditional recipes – a chickpea soup with spinach, a vegetable salad with chickpeas, and a meat, chickpea and pasta stew – to uncover underlying motivations for preferences. Novel dishes were well accepted and demonstrated adoption potential. Preferences were driven by hedonic (taste, variety, satiation), health (lower energy intake, weight control, avoid illness) and conformity (maintain eating habits, meal preparation convenience) motivations but not sustainability or animal welfare concerns. Motivations determine consumers' food choices, providing insights into barriers and levers of behaviour change. Based on the motivations uncovered, this study proposes differentiated strategies for replacing meat with pulses: product development and innovation (ingredient); traditional recipe reformulation, creation of plant-centric dishes and improvement of plant proteins' sensory quality (dish); enhancement of starters and sides' plant protein content, reconfiguration of the meal structure to remove meat's central role, and reintroduction of Mediterranean *mezze* tradition (meal).

1. Introduction

Contemporary food systems face the immense challenge of delivering adequate and affordable nutrition while protecting the planet and human health. Under the pressures of global climate change, recurring conflicts, rising population and escalating rates of obesity, they are being forced to adopt more sustainable production practices and ensure the consistent provision of healthy diets (Crippa et al., 2021; Ng et al., 2025; Rockström et al., 2025). A key element in addressing this challenge is achieving substantial reductions in the current levels of meat production and consumption in middle- and high-income nations, especially of red and processed meats. Meanwhile, both supply and demand for high-quality protein from alternative sources, namely legumes and grains, should increase substantially (Rockström et al., 2025). This protein transition is necessary given that the environmental effects of even the lowest-impact animal foods and omnivorous diets typically exceed those of plant-based alternatives (Poore & Nemecek, 2018; Scarborough et al., 2023), whereas increasing vegetable protein intake is linked to better diet quality and lower risk of obesity (Arini et al., 2025; Kaimila et al., 2025). Importantly, reducing red and processed meat consumption will almost certainly reduce the burden of multiple chronic diseases in high-income countries (Kennedy et al., 2024; Meinilä & Virtanen, 2024). Furthermore, contemporary ethical concerns surrounding animal rights and welfare are increasingly

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challenging conventional livestock production, contributing to the social normalisation of vegetarianism (Croney & Swanson, 2023) and the emergence of plant-forward dietary patterns such as flexitarianism (Rosenfeld et al., 2020).

Several strategies for consumers to transition from a meat-centric diet – where meat or meat products are present in most meals in sizable portions – to a vegetarian, or a flexitarian one – where meat is only occasionally eaten and in small portions – have been proposed (de Boer & Aiking, 2019; Lemken, 2021; Spencer et al., 2021). The majority go beyond the mere curtailment of meat in diets (de Boer et al., 2014; Reinders et al., 2020; Verain et al., 2015) to advocate its substitution by protein-rich plant foods (Lemken & Langen, 2023; Reuzé et al., 2022; Spencer, Cienfuegos, & Guinard, 2018; Spencer, Kurzer, et al., 2018). This substitution can occur at different levels of consumption – ingredient, dish, meal or meal plan –, depending on the context in which meat is to be traded off against plant-based alternatives (de Boer & Aiking, 2019; Elzerman et al., 2021; Spencer, Cienfuegos, & Guinard, 2018). At the ingredient level, meat can be fully or partially replaced by whole plant foods (such as legumes, grains, seeds or vegetables), traditional meat substitutes (such as tofu, seitan or tempeh), or novel plant-based meat analogues made from soy or pea (Cosson et al., 2025; Giacalone et al., 2022; Spencer, Kurzer, et al., 2018; Volden, 2023). At the dish level, the application of different culinary techniques and recipes will lead to a wide variety of outcomes, ranging from traditional meat-centric recipes where meat is replaced wholly or partially, to classic vegetarian dishes often rooted in international cuisine (de Boer & Aiking, 2019; Groen et al., 2025; Lemken & Langen, 2023). At the meal level, courses typically served with little or no meat, such as salads, soups and sides, can take the place of meat-centric main dishes, with or without recipe reformulation to increase their original plant protein content (Lemken & Langen, 2023; Varela et al., 2022; Weinrich, 2018). Finally, ingredients, dishes and meals can be combined into daily or weekly menus that purposefully include meatless meals or distribute a fixed amount of meat across meals and days (e.g., "Meatless Mondays") (de Boer et al., 2014; Kemper & White, 2021; Verain et al., 2015).

Consumers tend to favour whole plant foods over processed meat substitutes when replacing meat at ingredient level, as they deem them to be more natural and familiar (Elzerman et al., 2021; Groen et al., 2025; Hartmann et al., 2022; Varela et al., 2022; Volden, 2023). Similarly, at dish level, they tend to prefer authentic vegetarian recipes drawn from global cuisines to those where meat is replaced, particularly by meat analogues (Groen et al., 2025; Lemken et al., 2019; Schösler et al., 2012). Moreover, they seem to find meat substitution more acceptable when (red) meat is not the centre of the original dish, but rather combined with other main ingredients, and when substitution is partial rather than complete (de Boer & Aiking, 2019; Kemper & White, 2021; Spencer, Cienfuegos, & Guinard, 2018; Spencer et al., 2021). Evidence syntheses show that reformulating dishes effectively reduces meat consumption (Bianchi et al., 2018) and increases plant-based food intake, improving overall diet quality (Stiles et al., 2022). Such subtle dietary shifts maintain or even enhance consumer satisfaction while yielding greater public health and environmental benefits upon large-scale implementation than the adoption of vegetarianism or veganism by small groups (Spencer et al., 2021; Stiles et al., 2022).

Research on consumer preferences for meat reduction strategies that involve balancing meat and plant protein intakes across days, meals or courses – and, more importantly, on what drives them – is limited (Carvalho et al., 2023; Kemper & White, 2021; Lemken & Langen, 2023). Melendrez-Ruiz, Buatois, et al. (2019) investigated how French consumers select different food groups to compose their main dishes, both at home and in restaurants. Results showed that 80% of dishes contained meat, with over half being classified as meat-centric, meaning that plant foods served merely as complements. Despite their high protein content, pulses were predominantly used to accompany meat rather than replace it. However, they were much less frequently selected as a side dish than starches or vegetables. It was concluded that for pulses to become a viable alternative to meat, consumers must reframe them as high-protein centrepieces rather than high-carb sides (Melendrez-Ruiz, Buatois, et al., 2019). This transition is nevertheless challenging, as it requires overcoming deep-seated notions regarding the function of pulses in meals.

A more feasible approach might be to reconfigure the proportions of meat and plant foods in recipes – a strategy appealing to consumers seeking to reduce, rather than eliminate, meat from their diets (de Boer & Aiking, 2019; Reinders et al., 2020). Cosson et al. (2025) recently investigated how reducing meat (beef or pork) by 40% in a classic composed dish and increasing pulse (white beans or chickpeas) content by 30% affected liking, taste evaluation, intake and subjective appetite among campus restaurant patrons in France. Overall acceptance and taste ratings of the reformulated dish were generally high (especially among frequent pulse consumers) but significantly lower than for the original recipe. No significant differences were found in course intake or subjective appetite, however.

Earlier research by Spencer, Cienfuegos, and Guinard (2018) showed that replacing half of the meat with legumes decreased the acceptance of a meat-centric Latin American pork dish (*Carnitas Arepas*) among U.S. diners. Yet, the same type of reformulation did not affect the acceptability of an Indian/British chicken dish with a higher vegetable content (*Tikka Masala*). This suggested that combining legumes and vegetables would enhance the acceptability of reformulated mixed dishes, compared with using legumes as the sole substitute. Follow-up studies confirmed this hypothesis, showing that replacing up to two-thirds of the beef in Mexican- or East Asian-inspired bowl recipes with a mix of pulses and vegetables did not significantly affect consumer liking, satisfaction or satiety (Spencer et al., 2021; Spencer, Kurzer, et al., 2018).

Altogether, these findings indicate that mixed dishes present greater opportunities for rebalancing the proportions of meat and pulses in main courses than composed ones, without compromising their acceptance and intake. They also suggest that any reformulations should include larger vegetable portions to raise acceptability. Research exploring these opportunities in the context of family meals is, however, notably lacking.

Portugal has consistently ranked among the highest meat-consuming nations in Europe over the last four decades. Currently, 90% of the adult population is omnivorous and approximately half of all meals consumed are meat-centric (Carvalho et al., 2023). Paradoxically, nearly half of these individuals report efforts to reduce their meat intake, with one third expressing a specific intent to reduce red meat consumption (Lantern, 2023). Importantly, a large share of consumers finds the replacement of meat with protein-rich legumes to be an acceptable dietary shift (Duarte et al., 2020). However, and with the notable exception of the research conducted by Graça et al. (2019), little is known about the motivations and rationales Portuguese consumers advance to justify their ongoing transition to more plant-based diets or lack thereof.

Using the Means-End Chain (MEC) theory and soft-laddering techniques, this study investigated how a sample of Portuguese omnivorous adult consumers ($n = 43$) evaluated three novel dish concepts – a high-protein soup with chickpea sprouts, a vegetable *terrine* with chickpea sprouts, and an oven-baked meat and chickpea patty – designed to increase pulse protein in family meals at the expense of meat. Novel dishes were evaluated against three traditional recipes – a chickpea soup with spinach, a vegetable salad with chickpeas, and a meat, chickpea and pasta stew. Laddering interviews were then conducted to uncover the underlying motivations for dish preferences. Results were aggregated across participants and analysed in light of the MEC theory to create HVMs depicting the primary consumption motives for each dish and their relative importance.

2. Methods

2.1. Ethical approval

This study was conducted as part of the first author's Ph.D. project on promoting legume consumption through gastronomic innovation. This research was approved by the Ethics Committee of University of Porto, Portugal (No. 59/CEUP/2019). Written informed consent, including consent to audio recording interviews, was obtained from all participants. The study was conducted ethically in accordance with the Declaration of Helsinki and the General Data Protection Regulation.

2.2. Participants

The study population comprised healthy, omnivorous Portuguese adults (25–50 years old) who were regularly in charge of cooking household dinners and consumed chickpeas. These eligibility criteria underscore the importance of selecting main household meal preparers as participants. As the dietary gatekeepers of their families, their motivations and values reflect not only individual preferences but collective household wants and needs, offering important insights (Groen et al., 2025). Furthermore, this recruitment strategy accounts for the diverse motivations of individuals with varying levels of meat and pulse consumption (Volden, 2023).

In line with recommendations for homogeneous samples in qualitative research (Hennink & Kaiser, 2022) and previous soft-laddering studies (Phillips & Reynolds, 2009), the target sample size was set at 15–25 participants per sex. A consumer panel service provider recruited a sample of residents from northern Portugal ($n = 43$, stratified by sex, age, and education level). Participants agreed to take part in a brief online questionnaire and a 45-min in-person audio-recorded interview regarding pulse consumption and were compensated for their time.

2.3. Study design

2.3.1. Questionnaire

A brief questionnaire was created using Qualtrics CoreXM (Provo, UT) and administered online to participants in the week prior to the interview. The goal was to collect data about individual characteristics likely to impact the preparation and consumption of family meals with chickpeas, especially those involving novel recipes. The questionnaire began with standard measures of demographics (sex, age, education, household composition), weekly frequency of cooking the household dinner and frequency of consuming chickpeas at home. Next, participants were asked to self-rate their ability to cook meals in general (1 item; 5-point bipolar rating scale, 1 = *Very bad*; 3 = *Reasonable*; 5 = *Very good*) and assess their self-efficacy in cooking meals with pulses specifically (3 items, $\alpha = .84$; 9-point bipolar rating scale, 1 = *Extremely insecure*; 5 = *Neither confident, nor insecure*; 9 = *Extremely confident*) (Costa & Simão, 2018; Hertzler & Bruce, 2002). Finally, they completed measures of Food Neophobia (10 items, $\alpha = .80$; 7-point Likert scale, 1 = *Completely disagree*; 3 = *Neither agree, nor disagree*; 7 = *Completely agree*) (Paupério et al., 2014; Pliner & Hobden, 1992) and Food Disgust Sensitivity (8 items, $\alpha = .73$; 6-point bipolar rating scale, 1 = *Not disgusting at all*; 6 = *Extremely disgusting*) (Costa et al., 2024; Hartmann & Siegrist, 2018). The order of presentation of psychometric scales and items was randomised across participants. Further details about these measures can be found in Table S1.

2.3.2. Interviews

2.3.2.1. Stimuli. Participants evaluated three traditional Portuguese dishes (*chickpea soup with spinach*, *vegetable salad with chickpeas*, and *meat, chickpea and pasta stew*) and three novel dishes (*high-protein soup with chickpea sprouts*, *vegetable terrine with chickpea sprouts*, and *oven-baked meat and chickpea patty*) (illustrated in Fig. 1). Stimuli were presented solely as standardised dish descriptions detailing main ingredients and method of preparation. This approach was used to prevent aesthetic or visual bias from driving participants' cognitive associations. Stimuli were not matched for exact ingredient or nutritional composition.

Chickpeas were chosen as plant protein source because they are the second most consumed type of pulse in Portugal (after beans) and offer great versatility as meat substitute in a variety of both traditional and modern dishes (Duarte et al., 2020; Melendrez-Ruiz et al., 2022). Soups and salads were selected in addition to entrées to assess the viability of increasing the legume content of starters and side dishes at the expense of the meat content of main dishes in family meals (Lemken & Langen, 2023; Varela et al., 2022; Weinrich, 2018). Chickpeas are excellent soup and salad ingredients (Polak et al., 2015), featuring in several dishes of the Portuguese cuisine (Duarte et al., 2020).

Pulse sprouts have a lower energy value than dried pulses due to their lower carbohydrate content, and they are also easier to prepare (Polak et al., 2015). To reflect this increasingly popular way of consuming pulses (Andersen et al., 2022), the novel soup and salad featured chickpea sprouts instead of whole chickpeas. Otherwise, the novel dishes maintained the familiar formats of traditional dishes, with the exception of the oven-baked patty. This dish was designed as a modern chickpea-centric counterpart to traditional meat-and-chickpea recipes, such as stews (Duarte et al., 2020).

2.3.2.2. Design. MEC theory (Gutman, 1982) improves understanding of consumer decision-making by uncovering the rationales individuals use to evaluate and select among alternative products or services (Reynolds, 2006). This is achieved through an in-depth interviewing method, known as Laddering (Reynolds & Gutman, 1988), which employs a probing script to gather and interpret the motivations underlying consumers' choices, and present them as ordered sequences of associations. These sequences, or Chains, start with concrete Means (associations between product attributes and self-relevant consequences of product use) and finish with an abstract End (associations between consumption consequences and personal goals and ultimately life values) (Gutman, 1991; Reynolds & Gutman, 2001). Chains are then aggregated across consumers to create Hierarchical Value Maps (HVM). These are structured models of target consumers' knowledge about the qualities and personal value of products, depicting the prevalent consumption motives, their relative importance and underlying rationale (Olson & Reynolds, 2001). MEC theory has been applied to investigate motivations to consume ethnic food (Arsil et al., 2022; Barrena et al., 2015), organic food (Winterstein et al., 2024; Zanoli & Naspetti, 2002), sheep/goat dairy (Mandolesi et al., 2024), olive oil (Santosa & Guinard, 2011) and bread (Wang et al., 2024). Detailed overviews of MEC theory, laddering methods and food research applications can be found elsewhere (Costa et al., 2004; Jervis & Drake, 2014; Kilwinger & van Dam, 2021; Reynolds & Phillips, 2009).

Interviews were designed according to the general guidelines for applying MEC theory and soft-laddering techniques (Reynolds & Gutman, 2001; Reynolds & Phillips, 2009). The design also incorporated specific recommendations for food studies (Costa et al., 2004; Kilwinger & van Dam, 2021). The first stage of the interview aimed to uncover the motivations underlying the consumption of traditional chickpea dishes. To elicit preferences and related attributes, participants rated their liking for each traditional dish on a standard hedonic scale (9-point bipolar rating scale, 1 = *Dislike extremely*; 5 = *Neither like nor dislike*; 9 = *Like extremely*) (Peryam & Pilgrim, 1957). Participants then indicated the reasons for their ratings and their relative importance.

The second stage of the interview sought to ascertain the motivations for consuming novel chickpea dishes. To elicit preferences and related attributes, participants were asked to rate their willingness to consume each novel dish on the Food Action Rating Scale (FARS) (9-point bipolar

Fig. 1. Stimuli (left to right): chickpea soup with spinach, vegetable salad with chickpeas and meat, and chickpea and pasta stew (traditional); high protein soup with chickpea sprouts, vegetable *terrine* with chickpea sprouts, and meat and chickpea patty (novel).

rating scale, 1 = *I would eat this only if forced to*; 5 = *I would eat this if available but would not go out of my way*; 9 = *I would eat this at every opportunity*) (Ribeiro et al., 2019; Schutz, 1965). Acceptance was measured with the FARS to account for participants' lack of prior experience with the novel recipes. Participants then indicated the reasons for their ratings and their relative importance.

The attributes recorded for each dish served as the starting point for eliciting individual MECs using the soft-laddering interview technique (Grunert & Grunert, 1995; Reynolds & Gutman, 1988). This method was selected due to the diversity, complexity, and varying degree of novelty of the food stimuli evaluated, as well as the exploratory nature of the research. Soft-laddering methods also promote a higher level of participant engagement than hard-laddering techniques (Phillips & Reynolds, 2009; Russell et al., 2004). Laddering was performed for all six stimuli, beginning with the attributes recorded for the traditional dish with the highest acceptance. For each attribute, the interviewer posed a sequence of "Why is this important to you?'' questions with the goal of leading participants "up the ladder'' of associated consumption consequences and personal values. Standard soft-laddering probes were applied to facilitate the conversation flow and the generation of Attribute-Consequence-Value (ACV) chains, as well as to accommodate any negative attributes or consequences elicited (Oliveira et al., 2006; Reynolds et al., 2001). The process was then repeated for the remaining traditional dishes and the novel dishes in their respective order of preference.

2.3.2.3. Procedure. All interviews were conducted face-to-face according to established soft-laddering procedures. An interview guide was developed to standardise the presentation of stimuli, record ratings and related attributes, and steer the subsequent laddering conversations. Three pilot interviews were conducted to refine the guide and practice the interview method. These pilots underscored the need to provide participants with additional information regarding the ingredients and mode of preparation of the novel chickpea dishes; these details were therefore integrated into the final interview guide.

Interviews began with a brief description of the tasks and questions involved. Participants were reminded that the sole purpose of the study was to gain a better understanding of their views on the consumption of pulses, and hence there were no right or wrong answers. Accordingly, they were asked to be candid about their judgements of the traditional dishes and the novel recipes, and to discuss the underlying motives frankly. At the end of each laddering task, the interviewer summarised the main lines of reasoning elicited and probed participants for their completeness and accuracy. Once all laddering tasks were concluded and there was no more information to be added, participants were thanked and the interview ended.

2.4. Data analysis

Once all interviews were concluded, their audio-recordings were transcribed and individual anonymised files – comprising each participant's profile (based on questionnaire responses), stimuli acceptance ratings and interview transcript – were compiled. Files were then independently analysed by the first and second authors.

2.4.1. Individual characteristics and stimuli acceptance

Descriptive statistics of participants' characteristics and stimuli acceptance ratings were computed using IBM SPSS Statistics (Version 29). To test the significance of differences in the liking of the traditional dishes and willingness to consume the novel dishes, a Related-Samples Friedman's Two-Way ANOVA by Ranks was performed, followed by pairwise comparisons with Bonferroni corrections. Furthermore, Spearman's rank correlations were computed to investigate the significance of associations between individual characteristics and stimuli acceptance. The level of significance was set at $p < .05$ throughout, and all statistical tests were two-tailed.

2.4.2. Reconstruction of ACV chains

To reconstruct the lines of reasoning offered by participants to justify their degree of acceptance of the different stimuli (Reynolds & Gutman, 1988), laddering interview transcripts underwent content analysis (Kassarjian, 1977) with Lumivero NVivo (Version 14) (Jose et al., 2025). Excerpts describing relevant cognitive constructs associated with each stimulus were isolated and coded as nodes. The dialogue stream was then used to establish each node's meaning, degree of abstraction, relative position in the cognitive structure, and interlinkages. This enabled the classification of nodes into one of the following hierarchical levels: product attributes (concrete or abstract), consumption consequences (functional or psychosocial), or personal values (instrumental or terminal) (Barrena et al., 2015; Olson & Reynolds, 1983). Nodes were labelled based on their hierarchical classification and the meaning attributed by participants. A codebook describing these summary labels was developed through consensus between the two content analysts. This codebook was subsequently used by each analyst to independently reconstruct individual ACV chains for each stimulus (Kim et al., 2023; Wang et al., 2024). Resulting chains were compared to generate a single

dataset for further analysis; any discrepancies in the content or structure of chains were resolved through consensus.

2.4.3. Aggregation of ACV chains

The final and most actionable outcome of a MEC study is the HVM depicting the dominant product-specific ACV chains generated by a consumer segment (Gutman, 1991; Reynolds, 2006). The first step in creating this map is to compute an Implication Matrix (IM). This is a square matrix that systematically records the frequency of the associations made by consumers between any two ACV nodes linked to the same product. By capturing both the direct and indirect relationships established between ACV nodes across multiple chains, the IM effectively aggregates the coded laddering information to generate a network of associative stimulus- and self-knowledge bearing relevance to consumer decision-making (Reynolds & Gutman, 1988, 2001).

To create an IM for each traditional and novel dish, the number of participants making the same connections between any two ACV constructs was tallied with the help of NVivo (Version 14) and Microsoft Excel (Version 16). Following the number-of-respondents-based aggregation approach (Kilwinger & van Dam, 2021), each connection was counted only once per participant and stimulus. In accordance with the hierarchy of MECs, direct links between concrete attributes and psychosocial consequences were allowed, but those between attributes and values were excluded (Costa et al., 2004).

The second step in creating an HVM is deciding what portions of the IM – specifically, which ACV chains – should be represented so that consumers' dominant cognitive structures about a stimulus are accurately depicted (Reynolds & Gutman, 2001). This decision implies trading-off part of the information gathered from laddering interviews for the ability to create maps that are clear, simple, and self-explanatory. This trade-off is typically achieved by defining a cut-off point, i.e., the minimum number of times a linkage between any two ACV nodes must occur before it can be represented in an HVM (Gengler et al., 1995; Reynolds & Gutman, 1988).

The selection of a suitable cut-off point for a soft-laddering study is an iterative process, in which multiple values are applied to extract IM content and the resulting graphical solutions evaluated in terms of interpretability versus amount of interview information retained (Kilwinger & van Dam, 2021; Reynolds & Gutman, 2001). The main factors constraining this selection are the degree of homogeneity of interview content – which depends on the selection of study stimuli, the definition of target consumer group and sample size –, and the degree of parsimony applied to the generation of ACV chains during content analysis (Costa et al., 2004; Grunert & Grunert, 1995; Humble et al., 2021).

As a general rule of thumb, cut-off points between 3 and 5 should be applied in MEC studies conducting between 50 and 60 interviews (Reynolds & Gutman, 2001). Following these guidelines, cut-off points of 3, 4 and 5 were used sequentially to convert the IM content into an HVM for each dish. As higher cut-off points resulted in the loss of highly relevant ACV chains in several stimuli, a cut-off point of 3 was ultimately selected for all maps. This value represents 7.0% of the total participant sample, which is in line with the minimum of 5.0% recommended in the literature (Gengler et al., 1995). Applying this cut-off retained an average of 83.3% [79.0%–86.2%] of the total number of associations in the IMs (Supplementary Material, File S3). These high reconstruction ratios ensure sufficient coverage of the dominant ACV chains, indicating that the HVMs generated provide a faithful representation of consumers' core cognitive structures (Reynolds & Gutman, 1988).

2.4.4. Generation of HVMs

Once an optimal cut-off point is found, dedicated software is typically used to convert the relevant sections of the IM into an HVM (Kilwinger & van Dam, 2021). However, the software programs historically used for this purpose (e.g., MECanalyst, LadderMap, Ladder UX) (Gengler & Reynolds, 1995; Vanden Abeele, Hauters, & Zaman, 2012) are no longer maintained, supported or compatible with modern computing environments. Additionally, standard data analysis software like NVivo or R do not currently integrate the qualitative and quantitative stages of MEC research effectively. Furthermore, software-generated HVMs often require extensive graphical refinement to improve interpretability and usability (Gengler et al., 1995; Jose et al., 2025).

Recent research has favoured the manual conversion of IM entries into HVMs using high-fidelity graphic design tools (Humble et al., 2021; Wang et al., 2024; Winterstein et al., 2024). Following this approach, the web-based diagramming app Lucidchart (Lucid Software Inc.) was used to manually draw the HVM for each dish, ensuring visual clarity and compliance with IM content and the ACV chain hierarchy. The same colour scheme was used across all maps to differentiate attributes (concrete vs abstract) from consequences (functional vs psychosocial) and values (instrumental vs terminal). To further aid the analysis, the proportion of participants mentioning each construct was depicted for each stimulus, and the thickness of the arrows connecting constructs was scaled proportionally to the frequency of the links (Gengler et al., 1995; Winterstein et al., 2024).

Approaches to HVM generation span from methods that strictly prioritise aggregate link frequency (Reynolds & Gutman, 1988) to those seeking to preserve chain-level integrity without compromising the representation of dominant cognitive structures (Phillips & Reynolds, 2009). The first approach typically collapses all links above the cut-off point directly into a single aggregate HVM according to their frequency. The second approach, however, derives the HVM from consolidated ACV chains that account for both the frequency of links and their structural relationships. While strict aggregation is more straightforward, it can create spurious associations – pathways that appear numerically valid but were never articulated as a continuous thought by any participant (Grunert & Grunert, 1995).

To ensure a faithful representation of participants' cognitive structures, this study diverged from aggregate-only methods by generating HVMs from consolidated ACV chains. To preserve chain-level integrity, link frequencies were distributed across distinct chains as appropriate. While the total frequency of links remained unaffected, the thickness of each repeated link is proportional only to the specific segment of participants who followed that exact cognitive path. High-frequency links and corresponding nodes were occasionally repeated horizontally to maintain the integrity of distinct cognitive chains within the HVMs. This approach also minimised line crossing, improving both the clarity and interpretability of the final maps.

Furthermore, it was decided to group ACV chains according to their prevailing terminal value orientation and represent these groups in separate, thematic HVMs (Baker et al., 2002; Jose et al., 2025; Kirchhoff et al., 2011). Following content analysis, three main terminal value orientations were identified across participants' laddering interviews: *Pleasure* ($M = 77.5\%$, $SD = 10.6$), reflecting essentially hedonic motivations for consuming traditional and novel chickpea recipes, *Health and Wellness* ($M = 54.3\%$, $SD = 8.3$), expressing motivations related to the preservation of physical health and wellbeing, and *Conformity* ($M = 48.8\%$, $SD = 10.2$), revealing motivations rooted in the need to comply with social and personal norms regarding food practices (Costa et al., 2007; Schwartz et al., 2012). The other three values uncovered (*Family Care*, *Safety* and *Achievement*) were mentioned by far fewer participants ($\leq$23.3% across stimuli). Consequently, three thematic HVMs were generated for each of the traditional and novel chickpea recipes, with each corresponding to one of the dominant terminal value orientations. This decision did not alter the chains already obtained; their content and structure remained identical to those extracted from the IMs. It merely involved their spatial rearrangement into individual maps to enable a more nuanced analysis of the different motivations uncovered. This approach improved the clarity and interpretability of some HVMs by reducing the density of their content, which resulted from the low cut-off point used to convert IM entries.

3. Results

3.1. Individual characteristics

Participants were mostly females (56%), between 36 and 45 years old (42%) ($M = 37.6$, $SD = 7.1$), holding a university degree (56%) and living in a household with two adults (65%) and no underaged children (51%). Although the vast majority (77%) cooked the household dinner regularly (i.e., five or more times/week), only 42% rated their ability to cook meals as *Good* or *Very good*. Notwithstanding, participants were moderately confident in their ability to cook meals with pulses that were tasty, healthy and liked by household members ($M = 7.35$, $SD = 0.87$). The frequency of at-home chickpea consumption was evenly distributed across the sample, with 30% of participants being heavy consumers (at least once a week), 33% moderate (2-3 times/month) and 37% light (up to once a month). Finally, while rejection or reluctance to try new and unfamiliar foods was generally low among participants ($M = 2.63$, $SD = 0.91$), food disgust sensitivity was high ($M = 3.61$, $SD = 0.92$). Descriptives of sample characteristics are provided in greater detail in Table S2.

3.2. Stimuli acceptance and associations

Table 1 shows the means of participants' acceptance of the traditional dishes and novel recipes. Participants generally liked the stew and the vegetable salad very much but appreciated the chickpea soup with spinach moderately. Only the differences in mean ratings between the stew and the soup were significant, showing a moderate effect size ($z = -2.64$, $p = .025$, $r = .29$). Meanwhile, novel recipes were all equally well accepted, with participants stating to be willing to eat any of them regularly.

Table 2 depicts Spearman's rank correlations between stimuli acceptance ratings and individual characteristics (all $df = 41$). There were no relevant associations between the ratings of different stimuli, except for the positive marginal correlation observed between the high-protein soup and the meat and chickpea patty ($r_s = .29$; $p = .055$). However, several moderate effects were uncovered in what respected associations with demographics, behaviours, cooking self-efficacy and food disgust sensitivity. Regarding sociodemographics, being male was marginally associated with higher willingness to eat the high-protein soup ($r_s = -.26$; $p = .091$), while having higher education was marginally associated with higher liking of the traditional soup ($r_s = .25$; $p = .099$) but lower acceptance of the stew ($r_s = -.27$; $p = .080$) and the *terrine* ($r_s = -.29$; $p = .057$). Age was significantly negatively correlated with frequency of consuming chickpeas at home ($r_s = -.34$; $p = .025$)

Table 1
– Acceptance of traditional dishes and novel recipes ($n = 43$).

Stimuli	Mean [95% CI]
Traditional dishes	Overall liking[a]
Chickpea soup with spinach	7.1 [6.7 – 7.5][b]
Vegetable salad with chickpeas	7.9 [7.6 – 8.2][a,b]
Meat, chickpea and pasta stew	8.0 [7.6 – 8.4][a]
Novel recipes	**Willingness to eat**[b]
High-protein soup with chickpea sprouts	6.8 [6.4 – 7.2][a]
Vegetable *terrine* with chickpea sprouts	6.7 [6.3 – 7.1][a]
Oven-baked meat and chickpea patty	7.1 [6.7 – 7.4][a]

CI: Confidence Interval.

[a] 9-point hedonic scale; 1 = *Dislike extremely*; 5 = *Neither like nor dislike*; 9 = *Like extremely*. Related-Samples Friedman's Two-Way ANOVA by Ranks: *Chi-Square* (2) = 8.780, $p = .012$.

[b] 9-point Food Action Rating scale; 1 = *I would eat this dish only if forced to*; 5 = *I would eat this if available but would not go out of my way*; 9 = *I would eat this at every opportunity*. Related-Samples Friedman's Two-Way ANOVA by Ranks: *Chi-Square* (2) = 0.600, $p = .741$. Different lowercase letters in superscript indicate a significant difference ($p < .05$) in rank of sample ratings according to pairwise Friedman's tests applying Bonferroni correction.

Table 2
Spearman's rank correlations between stimuli acceptance ratings and individual characteristics ($n = 43$).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Liking																	
1 Chickpea soup with spinach	—																
2 Vegetable salad with chickpeas	−.060	—															
3 Meat, chickpea and pasta stew	.008	.161	—														
Willingness to eat																	
4 High-protein soup with chickpea sprouts	.210	−.054	−.018	—													
5 Vegetable *terrine* with chickpea sprouts	−.115	.232	−.043	.232	—												
6 Oven-baked meat and chickpea patty	−.104	.075	.033	**.292**†	−.022	—											
Sociodemographics																	
7 Female	.084	.149	−.058	**−.261**†	.028	.029	—										
8 Age	.216	−.048	.126	−.019	−.019	.046	.004	—									
9 Higher Education	**.254**†	.087	**−.270**†	−.135	**−.292**†	−.162	.057	−.142	—								
10 #Adults in household	−.157	.095	−.086	.057	**.305***	**−.292**†	.020	.023	−.149	—							
11 #Children in household	.011	−.105	**.333***	.061	.019	.015	.148	**.441****	**−.322***	−.054	—						
Behaviours and traits																	
12 Frequency of consuming chickpeas	.143	−.030	−.085	**.301***	**.333***	.115	−.110	**−.341***	−.029	.166	−.070	—					
13 Frequency of cooking dinner	−.178	.079	.023	−.079	**.317***	.244	**.370***	−.004	**−.330***	−.201	.189	.140	—				
14 Self-rated ability to cook meals	.158	.043	−.076	−.113	−.145	−.005	**.317***	.100	.094	.093	−.141	**−.466****	−.127	—			
15 Confidence to cook meals with pulses	.082	**.309***	.113	.157	**.276**†	.120	−.063	.025	−.136	.221	−.124	**.374***	.096	**−.295**†	—		
16 Food Neophobia	−.178	.011	−.121	−.013	.207	-.015	−.011	.032	−.142	**.311***	−.069	−.066	.000	.039	.029	—	
17 Food Disgust Sensitivity	**−.270**†	.228	**−.276**†	−.205	**.441****	−.120	.123	−.068	−.110	.218	.019	.070	**.324***	.040	.174	**.288**†	—

†Correlation is significant at 10%.
*Correlation is significant at 5%.
**Correlation is significant at 1%.

but had no relevant associations with stimuli acceptance. Furthermore, the number of adults in the household was significantly associated with willingness to eat the *terrine* ($r_s = .30$; $p = .047$) and marginally negatively correlated with willingness to eat the meat and chickpea patty ($r_s = -.29$; $p = .058$), while the number of children was significantly associated with the liking of the stew ($r_s = .33$; $p = .029$).

Frequency of consuming chickpeas at home was significantly associated with willingness to eat both the high-protein soup ($r_s = .30$; $p = .048$) and the *terrine* ($r_s = .33$; $p = .029$). Moreover, participants' self-efficacy in cooking meals with pulses was significantly associated with their liking of the vegetable salad ($r_s = .31$; $p = .044$), while it also marginally correlated with their willingness to eat the *terrine* ($r_s = .28$; $p = .073$). Importantly, this motivational construct was also significantly positively correlated with the frequency of eating chickpeas at home ($r_s = .37$; $p = .013$). On the other hand, participants' frequency of cooking dinner at home was significantly associated with willingness to eat the *terrine* ($r_s = .32$; $p = .038$), while their self-efficacy in meal preparation in general was marginally negatively correlated with self-efficacy to cook meals with pulses ($r_s = -.29$; $p = .055$). Contrary to what might be expected, particularly in the case of the novel recipes, there were no relevant associations between participants' food neophobia scores and their acceptance of the different stimuli. On the contrary, food disgust sensitivity was significantly positively correlated with the willingness to eat the *terrine* ($r_s = .44$; $p = .003$) and marginally negatively correlated with the liking of two traditional dishes – the chickpea soup with spinach ($r_s = -.27$; $p = .080$) and the meat stew ($r_s = -.28$; $p = .073$).

3.3. Stimuli ACV

The codebook of ACV labels used to reconstruct MECs for each stimulus is provided as Supplementary Material (File S3), along with the percentage of participants generating the content classified under each label at least once. A grand total of 167 labels were created, mostly classifying abstract attributes (35%), concrete attributes (27%) and functional consequences (22%), i.e., constructs reflecting stimuli knowledge rather than self-knowledge (Mulvey et al., 1994). Content related to salads was the most abundant and heterogeneous, requiring the largest proportion of labels to be fully classified (38%), followed by soups (35%) and meat dishes (30%). The number of labels associated with traditional dishes was similar to that of novel recipes.

Concrete attributes were mainly descriptive of the dish type (e.g., *soup*, *salad*), ingredients (e.g., *chickpeas*, *chickpea sprouts, spinach*), and mode of preparation (e.g., *oven-baked*, *pureed*, *patty*, *terrine*). The attributes *vegetables* and *no meat* were more often associated with traditional dishes and with salads and soups. While *meat* was more frequently linked to the hybrid patty than the traditional stew, it was also associated with the vegetable salad. Similarly, the attribute *seafood* was associated with the vegetable salad. As expected, novel recipes were more often classified as *unfamiliar* than traditional ones, particularly the high-protein soup.

Abstract attributes referred mostly to stimuli's energy content (e.g., *hearty* vs *light*), sensory properties and hedonic evaluations (e.g., *tasty* vs *not tasty*, *crunchy* vs *soft*, *nice texture* vs *poor texture*), nutrition and health value (e.g., *healthy*, *nutritious*, *high protein*), function in a meal (e.g., *starter*, *side dish*, *cold dish*) and consumption occasions (e.g., *summer* vs *winter meal*). The attribute *hearty* was much more often associated with the traditional dishes, especially the stew and the soup, than with novel recipes, particularly the *terrine*. Meanwhile, *light* was used mainly to classify the salad and the *terrine*, and to some extent also the soups, but never or almost never to classify the meat-containing stimuli. In turn, these stimuli were most often categorised as *tasty* (followed by the traditional soup and the *terrine*), but also as *unhealthy*. Congruently, they were also the least often associated with the attribute *healthy*, especially the stew. Except for the meat dish, traditional dishes were more often classified as *healthy* and *nutritious* than novel recipes, particularly the chickpea soup. In this instance, the presence of spinach in the recipe may have reinforced these associations. On the other hand, *high protein* was mostly connected to the novel soup and, to some extent, the traditional salad. The attributes *cold dish*, *side dish* and *summer meal* were associated with the salad and the *terrine* only.

Functional consequences related to dietary intake (e.g., *eat less* vs *eat more*, *satiation*, *no mains*), diet quality (e.g., *good diet*, *varied diet*), weight status (*control weight*), health status (*no illness*) and, to a lesser extent, convenience in meal preparation (e.g., *cook less*, *more time*). *Satiation* was much more often associated with traditional dishes (particularly the soup and the stew), than with novel recipes (especially in the case of the patty). The attribute *eat more* was used to primarily to classify the stew while *eat less* was mostly used to qualify the salad and *terrine*, (and also the soups, albeit to a lesser degree). Nevertheless, salads were much more frequently classified as appropriate substitutes for the main dish of a meal (*no mains*) than soups. The traditional salad, in particular, was also more often associated with the consequences *cook less* and *more time* than any other stimulus. Health outcomes – such as *good diet*, *control weight* or *no illness* – were most frequently used to classify the soups and the traditional salad. Meanwhile, *varied diet* was more often linked to the high-protein soup and the salads than to other stimuli. Conversely, the stew was the stimulus least often associated with positive health outcomes.

Along with instrumental and terminal values, psychosocial consequences reveal individuals' cognitions regarding the internal factors driving their decisions and behaviours – i.e., self-knowledge (Mulvey et al., 1994). In this study, such consequences consisted primarily of affective outcomes (e.g., *like*, *dislike*, *no boredom*) and behavioural outcomes (e.g., *try*, *won't try*, *don't eat*, *eat often*, *keep habits*) associated with stimuli consumption. Expectedly, constructs related to behavioural maintenance and habits were more often associated with traditional dishes than with novel recipes, and with soups and salads than with meat dishes. Meat dishes, especially the stew, were much more frequently classified as a *family meal* and less often as an *everyday meal* compared to the other stimuli. Conversely, the traditional salad was more commonly associated with consequences unrelated to food consumption (e.g., *active life*, *look good*, *leisure*) than the remaining stimuli. Moreover, this stimulus was very often linked to instrumental values such as *performance*, *parenting*, and *self-esteem*. The latter value was, in turn, much more frequently associated with traditional dishes than with novel recipes. Noticeably, the instrumental value *stimulation* was much more frequently associated with novel recipes than with traditional dishes, especially in the case of the high-protein soup. This dish was also often linked to *performance*. A terminal value used by nearly all participants was *pleasure*, with traditional dishes, especially the salad and soup, being more often associated with this value than with novel recipes, except for the *terrine*. The value *health and wellness* was also commonly employed to classify stimuli, especially the soups and the traditional salad. Expectedly, both *conformity* and *family care* were more frequently associated with traditional dishes than novel recipes. *Safety*, on the other hand, was mostly associated with the *terrine*.

3.4. ACV chains

A grand total of 1404 ACV chains were reconstructed from transcripts, averaging 32.7 per interview ($SD = 9.4$) and 5.4 per stimuli ($SD = 1.6$) (File S3). These results are in line with those of soft-laddering MEC studies performed with similar sample sizes (Wang et al., 2024) and investigating the same type and number of stimuli (Costa et al., 2007). It should be noted that reconstructed ACV chains did not include every node originally coded. Those pertaining to only one or two stimuli with low mention frequencies across participants, or with high frequencies mentioned but by a single participant, were excluded (File S3).

Significantly more chains were obtained for traditional dishes ($M = 19.6$, $SD = 5.7$) than novel recipes ($M = 13.1$, $SD = 5.2$; $t(42) = 7.78$, $p < .001$), as would be expected given the differences in participants' familiarity with the two types of stimuli (Barrena et al., 2015). The stimuli

with the highest number of ACV chains were the vegetable salad with chickpeas ($M = 8.2$, $SD = 4.0$) and the chickpea soup with spinach ($M = 7.4$, $SD = 3.1$; $t(42) = -1.22$, $p = .229$), with differences to all other stimuli being significant for both dishes (all $p's < .001$). Meanwhile, the stimuli with the lowest number of chains were the meat, chickpea and pasta stew ($M = 4.0$, $SD = 1.6$) and the meat and chickpea patty ($M = 3.7$, $SD = 1.9$; $t(42) = .82$, $p = .418$), with only differences to the *terrine* ($M = 5.1$, $SD = 3.0$) being significant ($t(42) = -2.36$, $p = .023$ and $t(42) = 2.94$, $p = .005$, respectively). There were further no significant differences in the number of chains between stimuli (File S3).

More ACV chains were generated by female than male participants across most stimuli, except for the high-protein soup, where this trend was reversed. Nevertheless, differences in the average number of chains between sexes only reached statistical significance for the meat and chickpea patty (female: $M = 4.2$, $SD = 2.0$; male: $M = 3.1$, $SD = 1.4$; $t(41) = -2.08$, $p = .044$). No significant associations were observed between the number of ACV chains and other individual characteristics. Similarly, no significant associations with stimuli acceptance ratings were found, except for the meat, chickpea and pasta stew, where acceptance was significantly associated with the number of chains ($p = .025$). Conversely, acceptance was negatively correlated with the number of chains generated for the traditional salad ($p = .048$).

3.5. HVMs

3.5.1. Hedonic motivations to consume traditional chickpea dishes

The HVMs representing hedonic motivations for consuming the traditional chickpea dishes are depicted in Fig. 2a-c. Acceptance of the chickpea soup with spinach (Fig. 2a) was mainly driven by positive evaluations of its sensory quality (e.g., *nice texture*, *tasty*) and energy value (*hearty*). The fact that the soup was a *hot dish* made with chickpeas (*whole* or *pureed*) was also positively appreciated. These attributes were linked to valued, pleasure-related outcomes such as enjoyment (*like*), *satiation*, and *warm up*. However, consistent with this being the least appreciated traditional dish, several negative sensory evaluations were observed. These stemmed primarily from the addition of spinach (*not tasty*) and the pureeing of chickpeas (*thick broth/grainy-poor texture*), both of which were associated with *dislike*. Additionally, parents anticipated that their children would reject soup containing whole chickpeas, creating a barrier to household consumption. The perception of soup as a *light* dish (i.e., containing *vegetables* but *no meat*), particularly when served as a main course, was the most prevalent barrier to the acceptance of the traditional soup. Participants believed that this lack of animal protein would lead them to *eat less* and feel less satiated – outcomes they deemed undesirable. This rationale extended to chickpea soups, even though they were considered to be heartier and more satiating than standard vegetable soups. This underscores a persistent cognitive link between animal protein and meal sufficiency, rendering a chickpea soup inappropriate to replace a standard main course.

This hypothesis is reinforced by the HVM representing the hedonic motivations for consuming the vegetable salad with chickpeas (Fig. 2b). The negative MEC *salad-vegetables-no meat-light-no mains-eat less* stands out as the sole motive offered by participants for disliking the dish and avoiding its consumption as a main course. This reasoning further supported the belief that eating salads as main courses should be limited to *summer meals*; this was the only context when consuming *cold* (meatless)

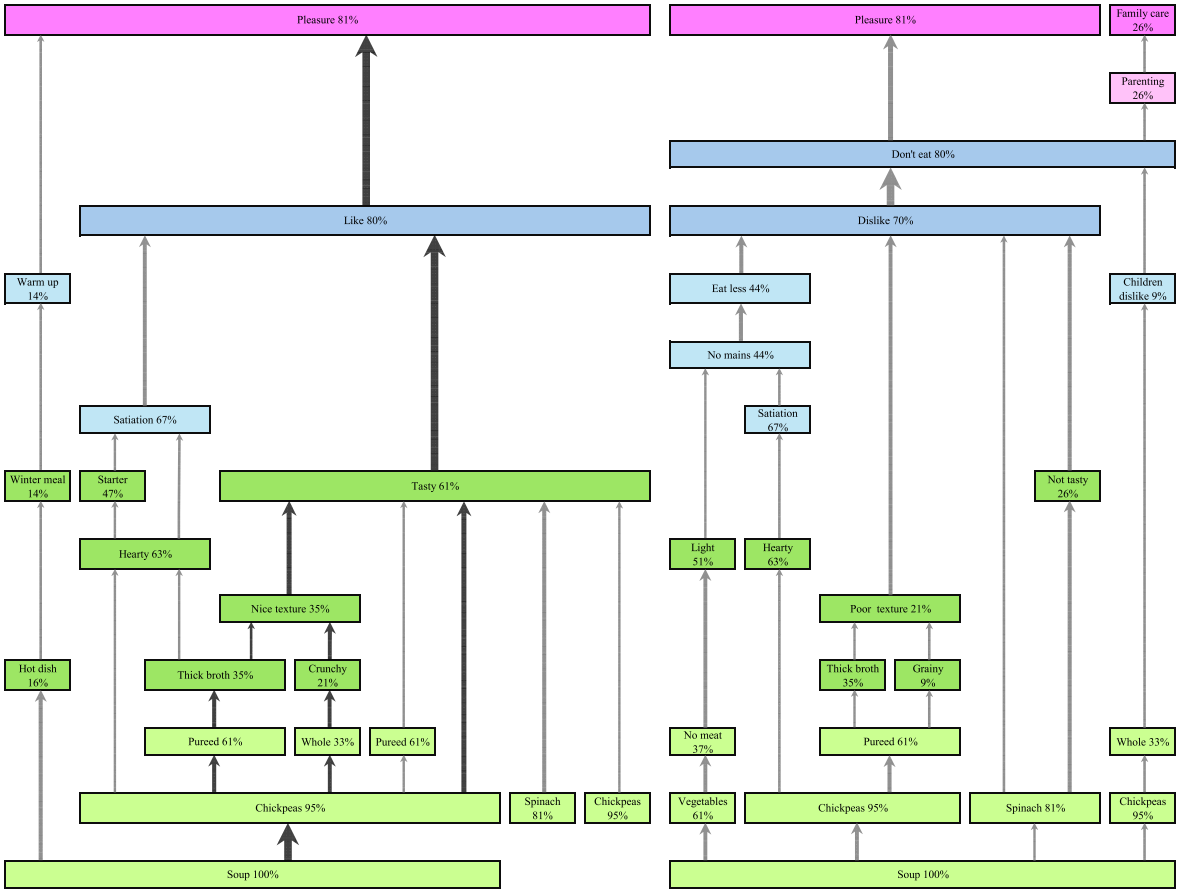


Fig. 2. HV maps of participants' hedonic motivations to consume the traditional dishes (a) chickpea soup with spinach; (b) vegetable salad with chickpeas; (c) meat, chickpea and pasta stew ($n = 43$). Line thickness is proportional to the number of unique links (cut-off = 3; 3-5, 6-10, 11-15, 16-20 or ≥ 21). Node colour: concrete (light green) and abstract (dark green) attributes; functional (light blue) and psychosocial (dark blue) consequences; instrumental (light pink) and terminal (dark pink) values. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article)

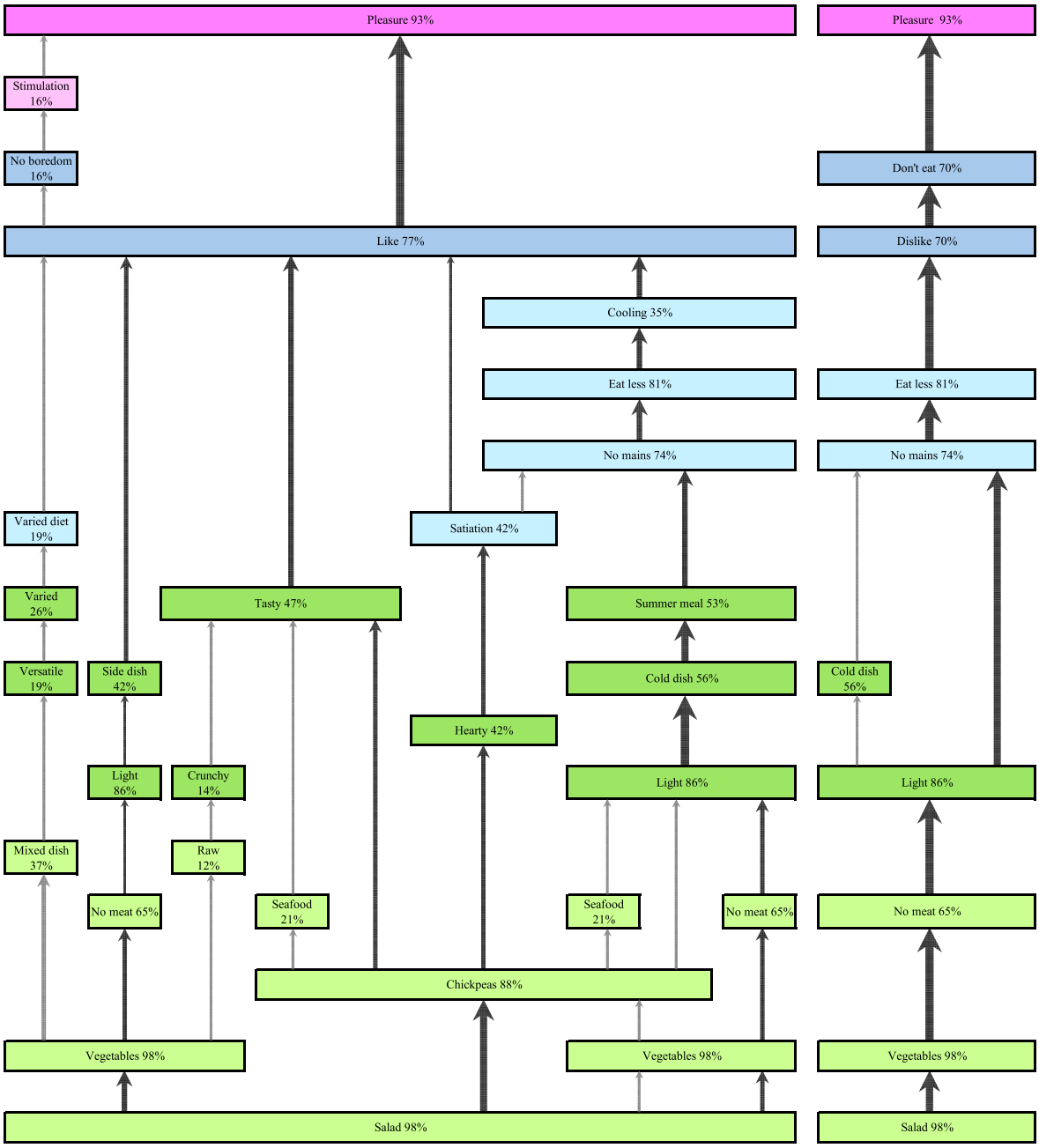


Fig. 2. (*continued*).

dishes (potentially containing *seafood*) was deemed appropriate, given their light and refreshing nature. Meanwhile, eating vegetable salads as a side dish in everyday meals was appreciated, as evidenced by the positive MEC *salad-vegetables-no meat-light-side dish-tasty-like*. Unlike the traditional soup, vegetables played a major role in driving participants' positive evaluations of the sensory quality and hedonic benefits of the salad (*vegetables-raw-crunchy-tasty-like*). Chickpeas, on the other hand, were much less frequently connected with the energy value of the meal or its ability to satiate. The possibility of mixing different vegetables resulted in the salad being viewed as a highly versatile dish (*mixed dish-versatile-varied-varied diet*), which increased dietary variation and, consequently, stimulation (*varied diet-no boredom-stimulation-pleasure)*.

Participants were overwhelmingly positive regarding the sensory quality (*unique taste-tasty, thick broth-nice texture-tasty*) and energy value (*hearty-satiation*) of the meat, chickpea and pasta stew (Fig. 2c). Consequently, they considered that this dish delivered high hedonic value, making it one of the most appreciated dishes. Notably, only a few participants expressed dislike for this dish, primarily due to a "mushy" texture which was anticipated to induce disgust (*stew-poor texture-disgust-dislike-don't eat*). Hedonic appreciation of the stew was mainly driven by its recipe, which combined several high valued ingredients – *meat*, *sausages*, *vegetables*, *chickpeas,* and *pasta* – thought to complement one another well in terms of flavour and satiety. Several participants emphasised the combination of meat with chickpeas as being especially flavourful (*good protein-carb mix*) and a key driver of their positive evaluation of the stew. Others highlighted the elaborate nature of the recipe as something that their mother would cook and that always resulted in a tasty meal (*mom's food-elaborate-tasty)*. Furthermore, participants viewed the stew as the kind of hearty dish that epitomised traditional Portuguese gastronomy, particularly during winter months *(traditional-hearty-winter meal-satiating)* when smoked pork meats and dried pulses are most available.

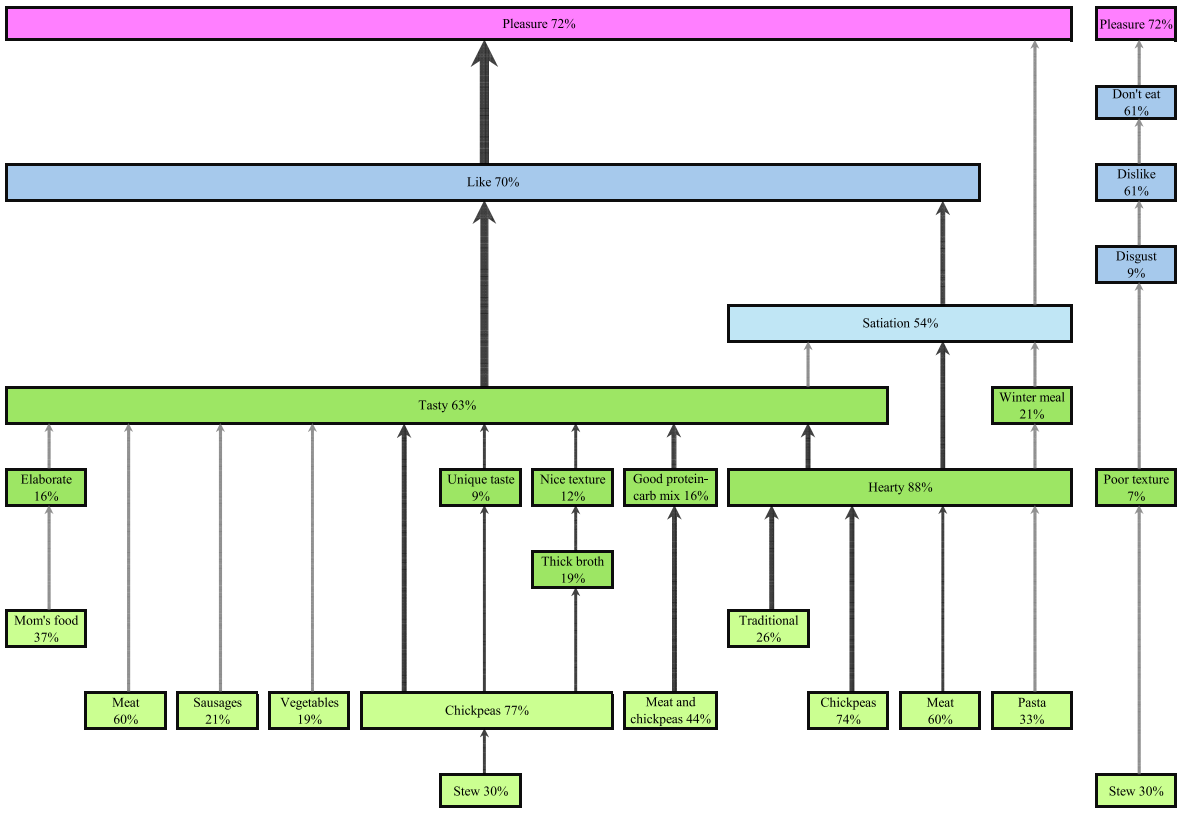


Fig. 2. (*continued*).

3.5.2. *Hedonic motivations to consume novel chickpea dishes*

The HVMs representing the hedonic motivations for consuming the novel chickpea dishes are depicted in Fig. 3a-c. The perceived sensory characteristics of chickpeas and soup were the main drivers of liking of this novel chickpea dish (Fig. 3a). Furthermore, the novelty of chickpea sprouts was thought to introduce variety in the diet, contribution to liking and increasing stimulation. Predominantly favourable assessments of the taste and comforting qualities of a hot soup (*satiation*, *warm up*), especially one made with chickpeas, drove hedonic motivations to consume the high-protein soup. This mirrored the findings for the traditional soup. However, there were considerably fewer negative evaluations of the hedonic value of the high-protein soup compared to its traditional counterpart. Negative evaluations stemmed from participants' lack of familiarity with chickpea sprouts, both generally and as a soup ingredient. Such unfamiliarity led to the anticipation of poor sensory experiences (*unique taste - not tasty - dislike*) or even disgust, ultimately resulting in rejection (*won't try*). Conversely, several participants felt that the use of unfamiliar ingredients, such as chickpea sprouts, introduced variety in both the soup and the diet in general; this resulted in greater stimulation and enjoyment (*sprouts-unfamiliar-varied-varied diet-like-try*).

Similarly, the primary motive driving the acceptance of the vegetable *terrine* was to increase variety in diet and stimulation (Fig. 3b). Such motivation stemmed from the dish's potential to combine different vegetables (similar to the traditional salad) as well as from the inclusion of chickpea sprouts. The main sensory drivers of liking were the expected pleasant taste of chickpeas (including sprouts) and their combination with vegetables. This mix was perceived to deliver a dish with an appetising appearance and pleasant flavour (*vegetables-sprouts/mixed dish-colourful-looks nice-tasty*). Importantly, chickpea sprouts were thought to increase the protein value of the recipe, thereby enhancing its appropriateness as a main course. The remaining ACV chains were similar to those observed for the traditional salad.

Like the traditional stew, the oven-baked meat and chickpea patty was deemed tasty due to its two main ingredients and the way they were combined (Fig. 3c). Furthermore, the dish's distinct preparation method added hedonic value, primarily due to the appealing texture of baked chickpeas (*chickpeas-oven baked-crunchy-nice texture-tasty*) and associations with a meat roast (*meat-roast-unique taste-tasty*). Lack of familiarity with this novel chickpea recipe also led participants to appreciate its consumption as a means of introducing variety in their diet, delivering stimulation and pleasure. Yet, similar to the stew, expectations of poor texture led some participants to anticipate experiencing disgust, resulting in a dislike for the patty.

3.5.3. *Health and wellness motivations to consume traditional chickpea dishes*

The HVMs representing the health and wellness motivations for consuming traditional chickpea dishes are shown in Fig. 4a-c. The predominant ACV chain in the HVM of the traditional soup related to its composition and perceived nutritional value (Fig. 4a). Participants perceived vegetable soups, including those containing chickpeas and spinach, to be *nutritious* and *healthy* – outcomes linked to a *good diet*. This consequence was, in turn, associated with positive outcomes and values such as avoiding illness and being healthy (*good diet-no illness-health and wellness*), respectively, and providing proper nutrition for children (*good diet-children eat well-parenting-family care*). Furthermore, the soup's meatless composition led it to be deemed a *light* dish, suitable as either a *starter* or a main course, enabling participants *to eat less* and *control weight*. This contributed to both physical well-being and higher self-appreciation (*control weight-look good-self-esteem*). Similar reasoning applied to *chickpeas* being *hearty*, as some participants associated this with a *high protein* content, which was thought to deliver greater energy. This was believed to be instrumental in leading an active lifestyle and improving performance (*chickpeas-high protein-hearty-satiation-more stamina-active life-performance)*. Conversely, the heartiness of the chickpeas led some participants to dislike the soup as a starter, as they believed it would cause them to *eat more*.

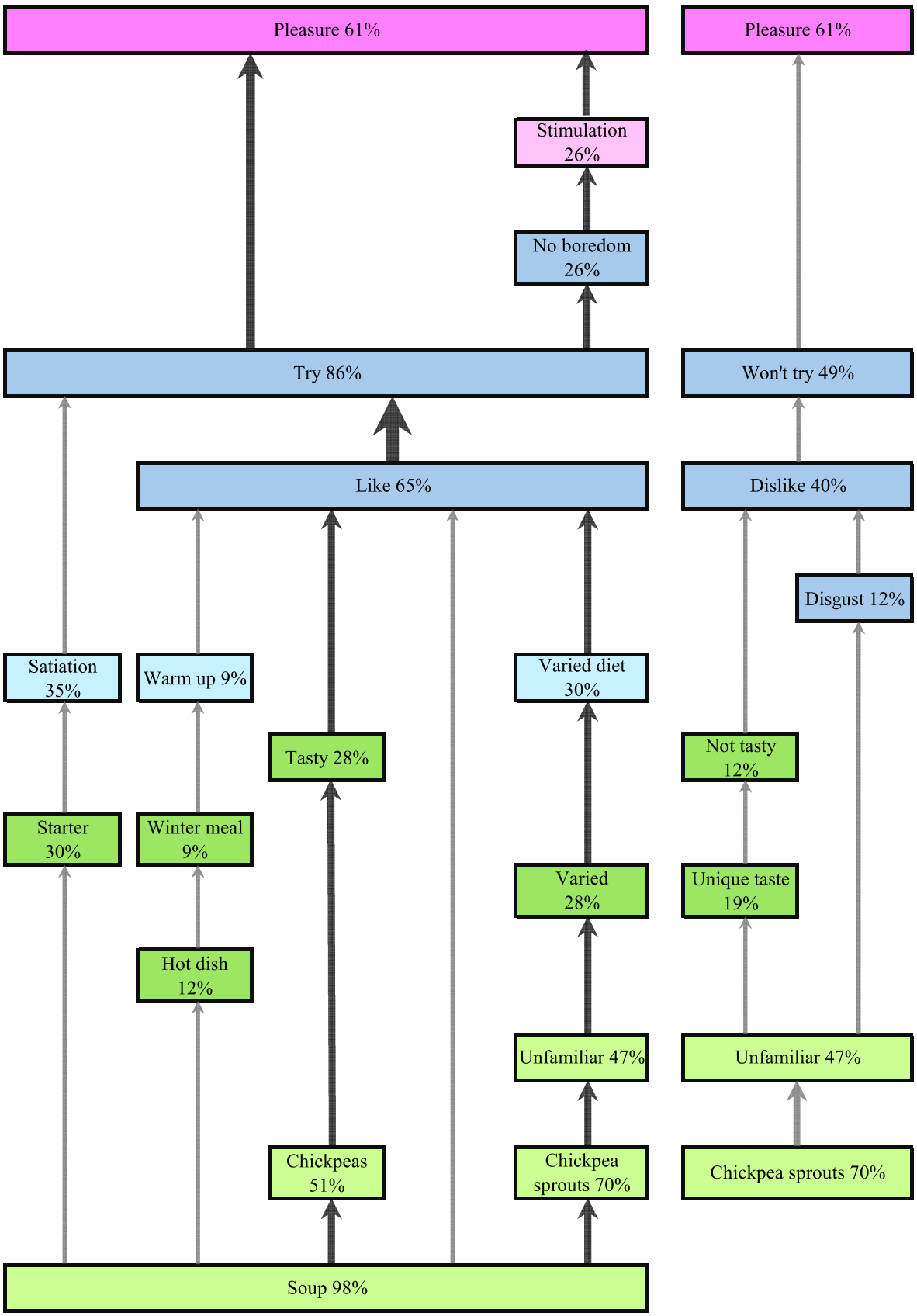


Fig. 3. HV maps of hedonic motivations to consume the novel dishes (a) high protein soup with chickpea sprouts; (b) vegetable *terrine* with chickpea sprouts; (c) meat and chickpea patty ($n = 43$). Line thickness is proportional to the number of unique links (cut-off = 3; 3-5, 6-10, 11-15, 16-20 or ≥ 21). Node colour: concrete (light green) and abstract (dark green) attributes; functional (light blue) and psychosocial (dark blue) consequences; instrumental (light pink) and terminal (dark pink) values. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article)

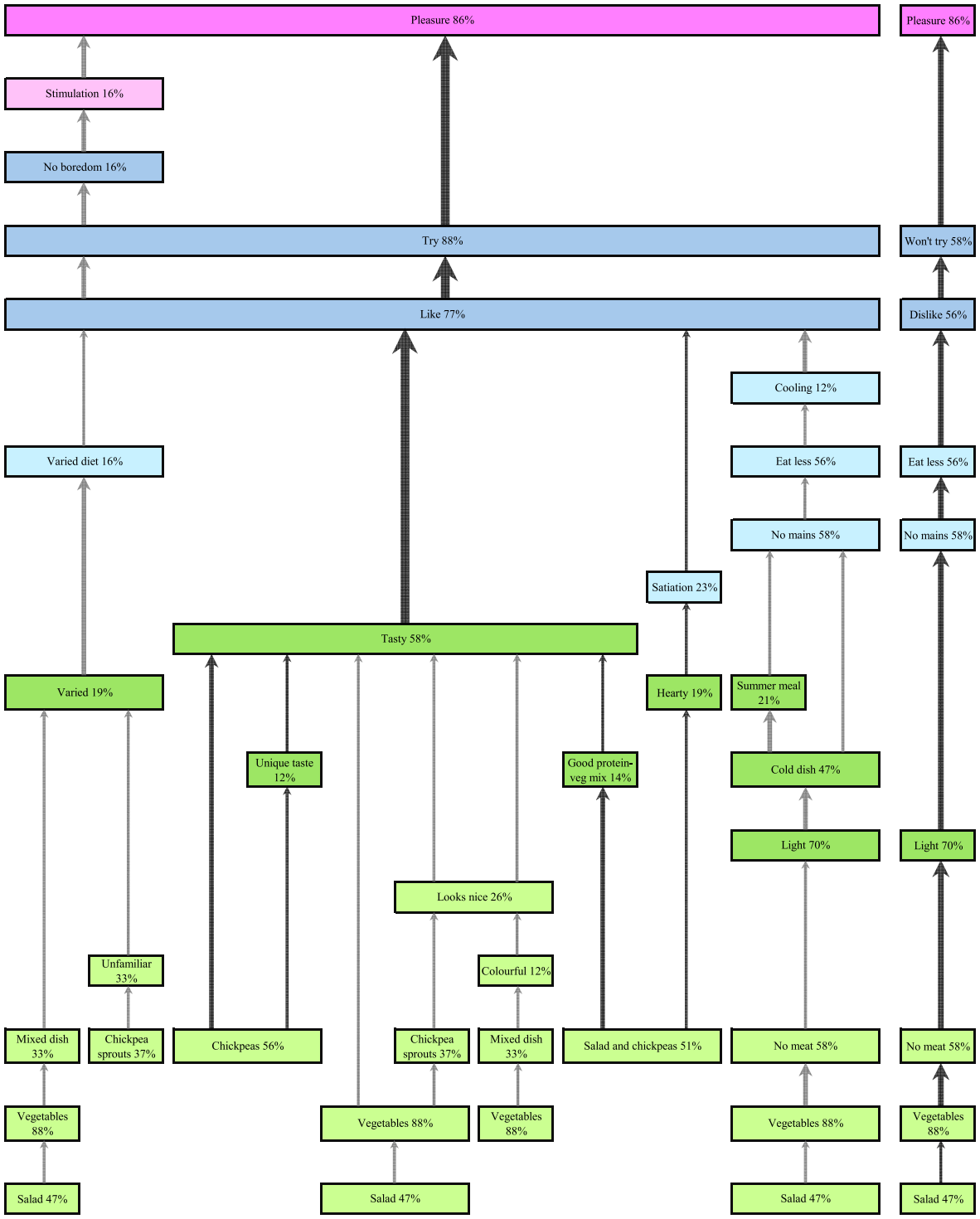


Fig. 3. (*continued*).

Being a vegetable-based dish, the salad was deemed to be simultaneously light, nutritious and healthy, thereby enabling a good diet and a healthy life (Fig. 4b). An important motivation for consuming the vegetable salad with chickpeas was the ability of this pulse to replace starchy carbohydrates, thereby producing *light* meals (Fig. 4b). Similar reasoning was applied to the traditional soup, where pureed chickpeas were deemed a lighter substitute for potatoes. *Light*, however, was a far more central attribute in the salad's HVM, being linked to several functional contexts such as *summer meal*, *side dish*, or *dinner dish*. Importantly, many participants viewed a vegetable and chickpea salad as a suitable replacement for a meat-centric main dish, especially during the summer. Others considered it highly appropriate as an evening meal, as it was perceived to be easier to digest and conducive to a better night's sleep. Irrespective of context, most participants viewed the consumption of the meatless salad as instrumental in eating less and controlling weight (*no-meat-eat less-control weight*). The remaining ACV chains were similar to those obtained for the traditional soup.

The inclusion of *pork*, *sausages*, and *pasta* in the meat and chickpea stew led many participants to dislike this dish and avoid its consumption for health reasons (Fig. 4c). Due to these ingredients, the stew was

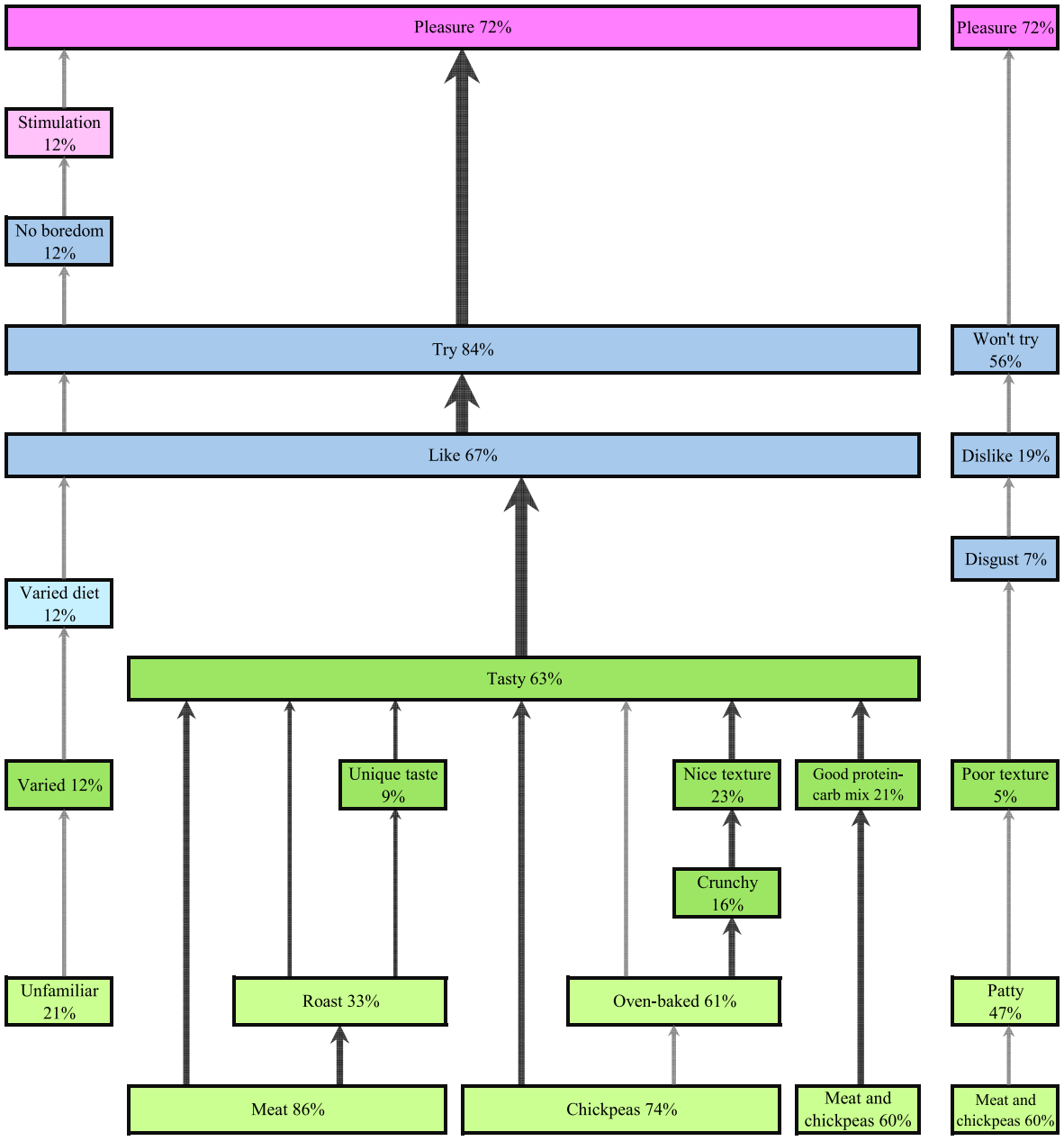


Fig. 3. (*continued*).

deemed *hearty* and *unhealthy*. Consequently, its consumption was believed to result in a *poor diet* and increased food intake (*eat more*), ultimately leading to an increase in weight (*gain weight*). Some participants noted that the chickpeas also contributed to the stew being *hearty*, which was associated with *poor digestion* and *poor sleep*, rendering the dish unsuitable as a dinner meal. Nevertheless, this heartiness was viewed as advantageous by other participants, particularly for lunch. In this context, the stew was thought to increase satiety and deliver high energy, thereby enabling an active lifestyle and improved performance (*meat and chickpeas-hearty-lunch dish-satiation-more stamina-active life-performance*). Conversely, the inclusion of *vegetables* and the association with a dish that their mothers would prepare (*mom's food*) led some participants to consider the stew *nutritious* and conducive to a *good diet*. This was thought improve *health and wellness* and promote better *parenting*.

3.5.4. Health and wellness motivations to consume novel chickpea dishes

The HVMs representing the health and wellness motivations for consuming novel chickpea dishes are shown in Fig. 5a-c. The cognitive map generated for the high-protein soup was very similar to that of the traditional soup (Fig. 5a). The key distinction was the greater relevance given to the *high protein* attribute, which participants frequently linked to the use of chickpea sprouts. This association reinforced the perception that this novel dish was *healthy* and its consumption conducive to a *good diet*. Furthermore, the *high protein* attribute was associated with the concepts of a *hearty* meal and *satiation*, which in turn were linked to positive outcomes like *eat less*, *avoid meat* or *more stamina*, and their associated values.

Likewise, most participants expressed a willingness to try the vegetable *terrine* with chickpeas, largely for the same reasons driving the preference for the traditional salad (Fig. 5b), namely being simultaneously light, nutritious and healthy. The *terrine*, however, was perceived to be less versatile than the salad – both in terms of its

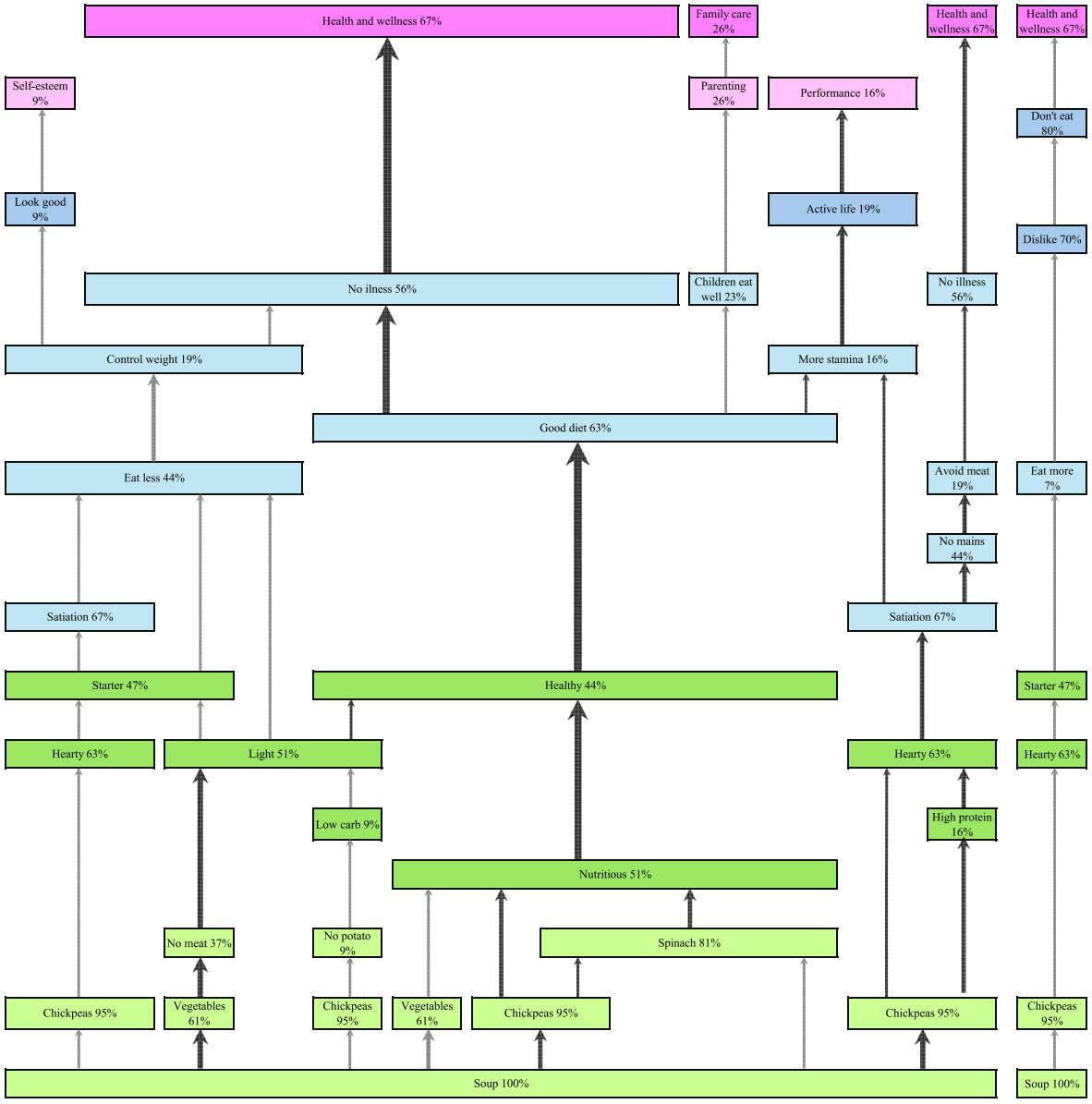


Fig. 4. HV maps of health and wellness motivations to consume the traditional dishes (a) chickpea soup with spinach; (b) vegetable salad with chickpeas; (c) meat, chickpea and pasta stew ($n = 43$). Line thickness is proportional to the number of unique links (cut-off = 3; 3-5, 6-10, 11-15, 16-20 or ≥ 21). Node colour: concrete (light green) and abstract (dark green) attributes; functional (light blue) and psychosocial (dark blue) consequences; instrumental (light pink) and terminal (dark pink) values. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article)

situational appropriateness and its role in a meal – and was less frequently associated with providing a good diet for children.

Meanwhile, the motivations behind participants' willingness to try the meat and chickpea patty differed considerably from those driving the preference for the traditional stew (Fig. 5c). Because it is *oven-baked* rather than fried, the patty was deemed to be *low fat* and, consequently, both *light* and *healthy*. *Healthy* was, in turn, associated with a *good diet* and *no illness*, while being *light* was linked to *eat less* and *control weight*. Furthermore, by replacing a portion of the meat with ground chickpeas, the patty was perceived as both *nutritious* and *high protein*. Consequently, it was viewed as *healthy* and capable of delivering the *satiation* and *stamina* needed for an *active lifestyle*. To some participants, however, it was precisely the composition and *high protein* content that rendered the patty unappealing. Due to the combination of meat and chickpeas, the dish was perceived to be hearty, leading to expectations of greater caloric intake and weight gain (*hearty-eat more-gain weight*). Moreover, being perceived as a meat-centric dish led it to be viewed as *unhealthy* and conducive to a *poor diet*.

3.5.5. *Conformity motivations to consume traditional chickpea dishes*

The HVMs representing the conformity motivations for consuming traditional chickpea dishes are shown in Fig. 6a-c. The habitual consumption of soups at family meals emerged as the primary conformity motivation driving the preference for the traditional soup (*soup-like-eat often-keep habits-conformity*) (Fig. 6a). Moreover, the fact that this dish – like most soups in Portuguese cuisine – contained *no meat* led many participants to consider it a *light* dish. Therefore, it was deemed highly appropriate as a *starter* for a meal where the main course is meat-centric. Meanwhile, soups in general were perceived as *practical* dishes since they could be *made in advance* and consumed across multiple meals, including as a standalone main course (*no mains*). This offered the benefit of *cooking less* and, consequently, having *more time* to dedicate to

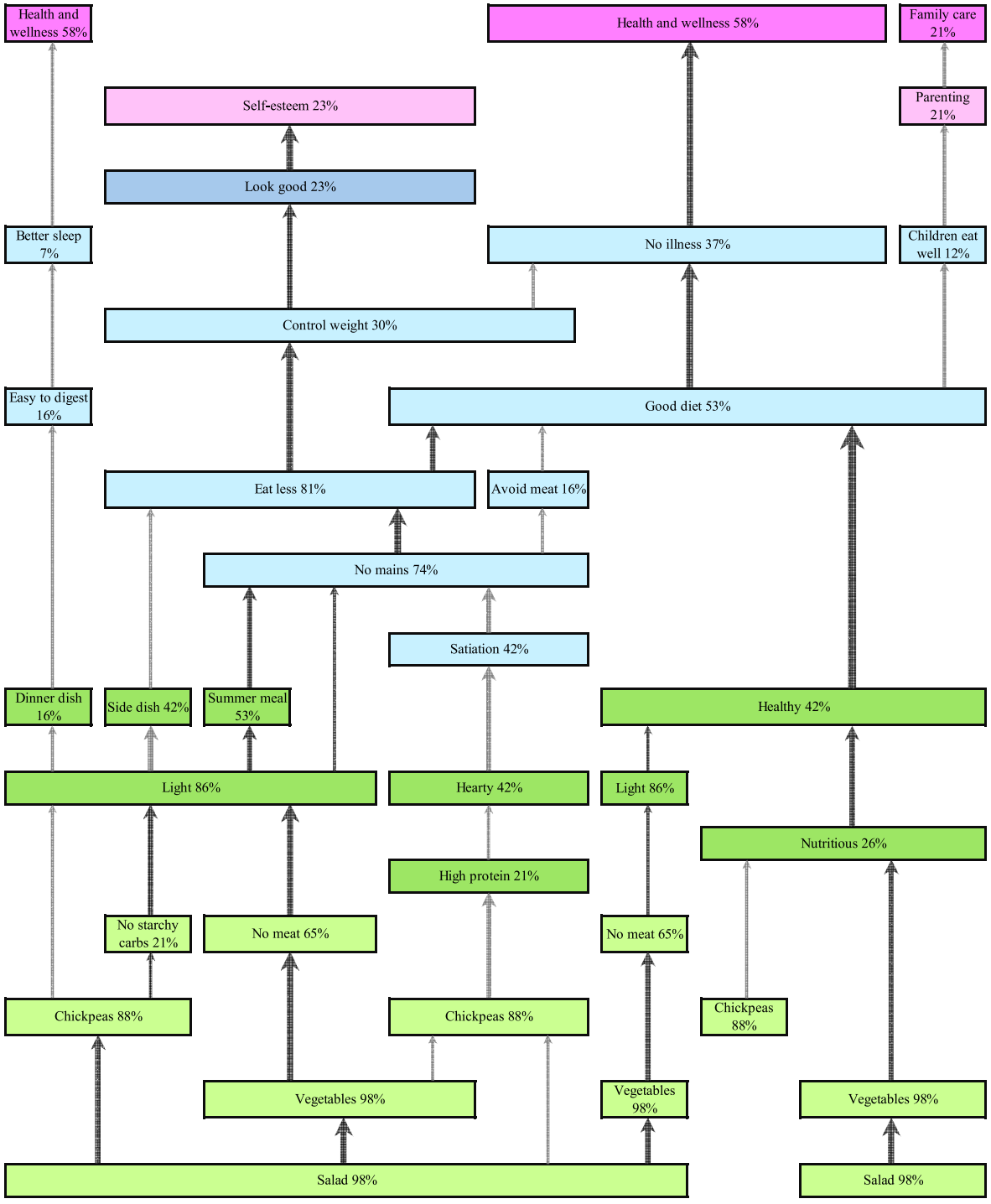
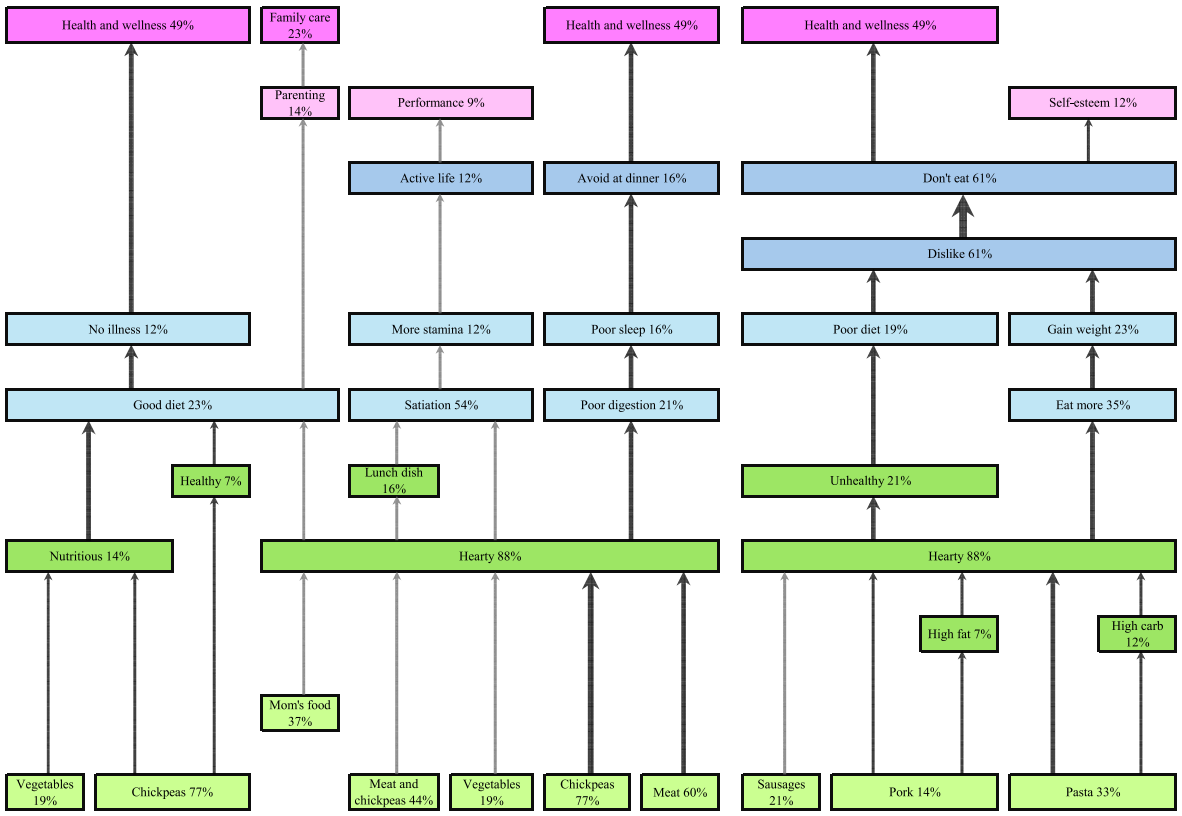


Fig. 4. (*continued*).

leisure. Furthermore, participants found that soups containing *chickpeas* or other pulses (*beans*) were *hearty* and satiating, making them highly suitable for providing children with a proper diet. Pureeing the chickpeas instead of serving them whole was, however, deemed essential for children to accept and enjoy the soup. In spite of its traditional character, several participants were unfamiliar with the use of chickpeas in soup, and with the *chickpea and spinach* soup specifically, which ultimately led them to reject it.

The use of raw vegetables and the lack of meat led participants to consider the traditional salad a *light* dish and, therefore, most suitable as the *side dish* or the main course of a *summer meal* (Fig. 6b). These perceptions drove the regular consumption of salads, particularly in warmer days. Combining *vegetables*, *chickpeas*, and *seafood* (e.g., canned tuna) was a particularly well-liked recipe that several participants stated to *eat often*. Moreover, because the salad is a *cold dish* requiring *no cooking*, it was deemed to deliver several highly appreciated convenience benefits, such as being *quick to make*, *easy to make*, and easy to transport (*carries well*). Being quick to prepare made it suitable for a weekday dinner, even as a substitute for a main course (*quick to make-no mains*). However, several participants noted that this was the type of meal one could easily take to work or classes; consequently, they considered it more appropriate for lunch. Yet others viewed salads as a



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staple in their diet – an *everyday meal*. Irrespective of the specific context, the preparation and consumption of the traditional salad were thought to be highly *practical*, leaving *more time* for activities such as work, sports, or study, thereby improving *performance*. Furthermore, its convenience in preparation made the salad ideal for weekends, particularly during summertime or holidays, as it freed up time for *leisure*. Nevertheless, some participants were unfamiliar with using chickpeas in salads or generally disliked salads for being cold and meatless, characteristics which, in their opinion, rendered them unsuitable substitutes for meat-centric main courses. Ultimately, these reasons led them to reject the consumption of the traditional salad.

Motivations driving the consumption of the meat and chickpea stew were more consensual (Fig. 6c). Participants classified this dish primarily as *traditional* and *mom's food*. Both attributes were associated with *hearty family meals* – such as those typically eaten for *Sunday lunch* – driving preference for and habitual consumption of this dish. However, the preparation required for such a stew was perceived as laborious and time-consuming by several participants, who thought that it demanded too great an investment of time and effort in cooking. These consequences were highly disliked and served as a barrier to regular consumption (*elaborate-cook more-dislike-don't eat*).

3.5.6. Conformity motivations to consume novel chickpea dishes

The HVMs representing the conformity motivations for consuming novel chickpea dishes are depicted in Fig. 7a-c. The most common motivation driving the willingness to try the high-protein soup was that soups, in general, were well-liked by participants and considered part of an everyday diet, particularly as the *starter* of a meal (Fig. 7a). Being a vegetable-only recipe, and, consequently, a *light* dish, reinforced its suitability as starter. The use of chickpea sprouts in soups was unfamiliar to most participants, which carried both advantages and disadvantages. New ingredients were thought to introduce variety in soups and thus in diets; this was considered particularly important for ensuring that children adhered to a proper diet. However, a general lack of familiarity with chickpea sprouts lowered some participants' willingness to try the soup.

The same lack of familiarity – both with the main ingredient and the specific recipe – led many participants to dislike the vegetable *terrine* prepared with chickpea sprouts, consequently lowering their willingness to try the dish (Fig. 7b). Conversely, similar to the traditional salad, perceiving the *terrine* as a *cold dish* made with chickpeas meant for some that it was a *practical* substitute for the main course. This reduced the time and effort dedicated to cooking, thereby enabling an *active lifestyle*. For others, however, being a meatless dish necessarily implied that it could only function as a vegetable side dish, akin to a salad that they ate often. Interestingly, some participants perceived the mixing and layering of different vegetables and the sprouts in a *terrine* as producing a colourful and visually appealing dish. These sensory characteristics were, in turn, associated with ingredients being *fresh* and, therefore, *safe to eat*.

Motives for trying the meat and chickpea patty were more nuanced than those driving the preference for the meat and chickpea stew (Fig. 7c). The patty was generally deemed much easier to prepare than the stew given that it is *oven-baked*. Consequently, it was seen as a *practical* dish that reduced the time spent cooking, leaving *more time* for other activities – chiefly *parenting*. Some participants compared the patty to a Sunday roast prepared by their mothers, linking it, like the stew, to family meals and traditional diets (*roast-mom's food-Sunday lunch-family meal-try*), which was viewed very positively. Importantly, several participants viewed it as a version of the familiar meat patty, which they ate often, leading to an increased willingness to try the novel recipe. Conversely, being an oven-baked rather than a fried patty increased its unfamiliarity for some, while its perception as a *small* dish meant it could only serve as a *starter* – a role thought to be at odds with the inclusion of meat. Both these motives decreased participants' willingness to try this dish.

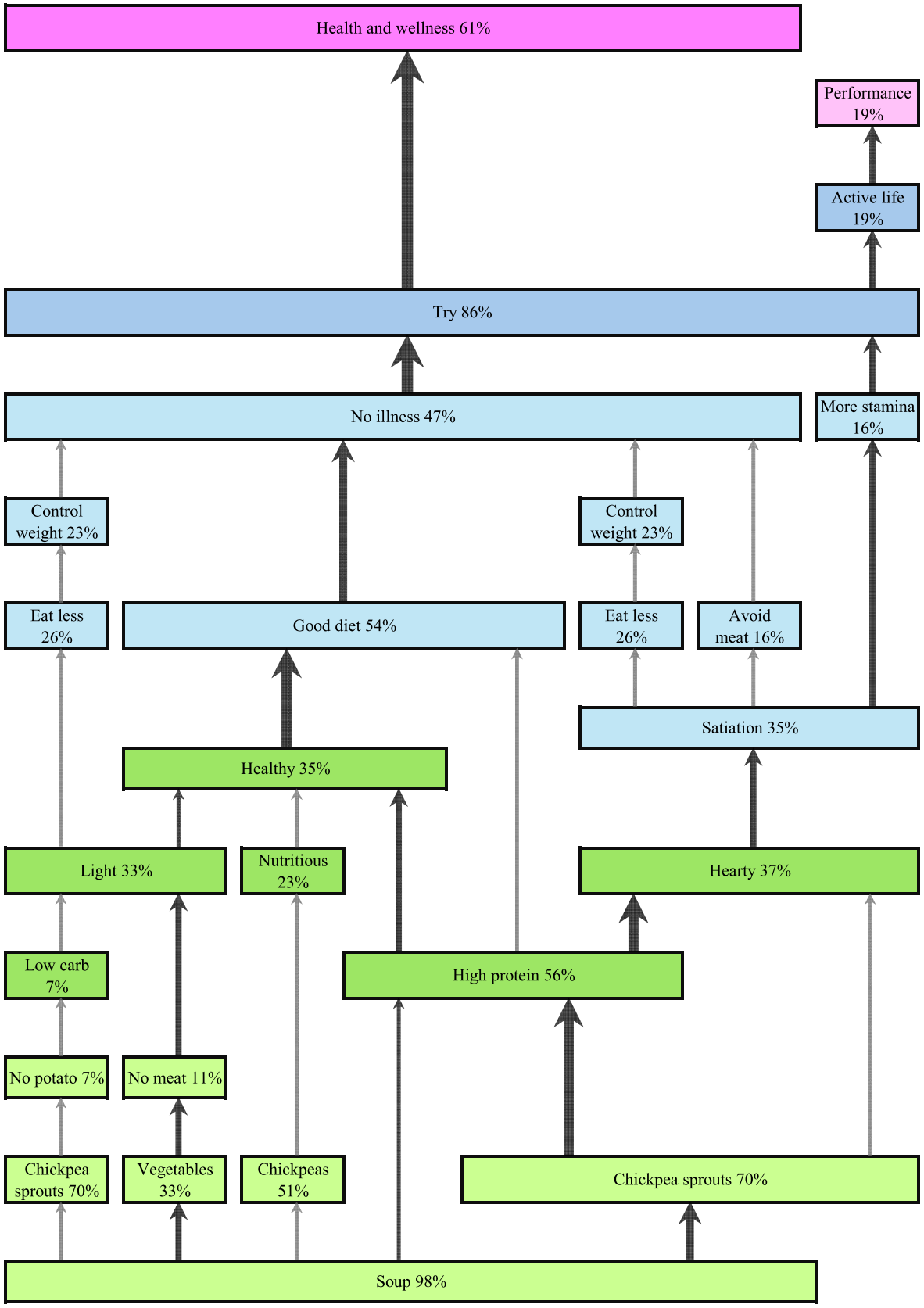
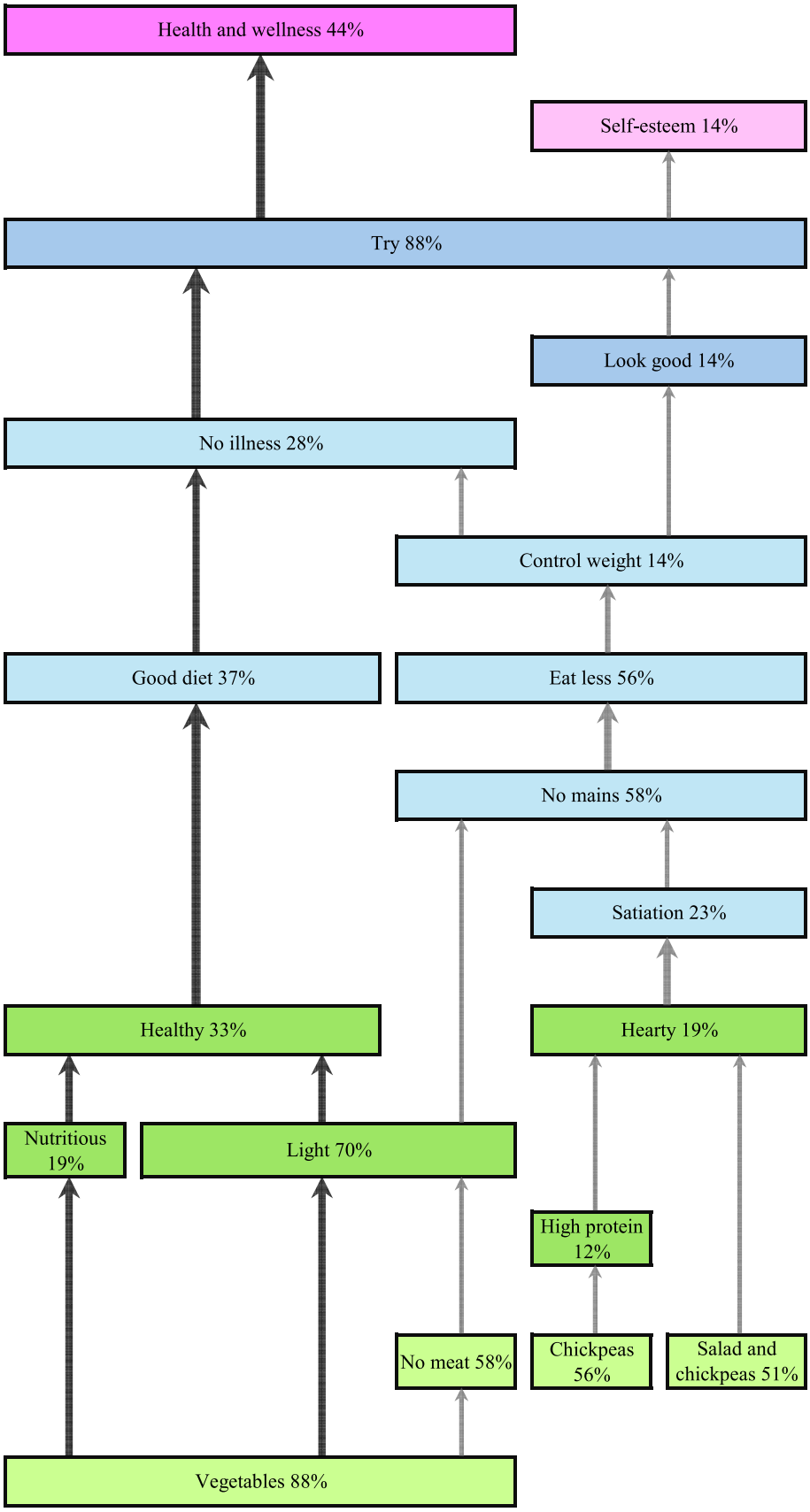


Fig. 5. HV maps of health and wellness motivations to consume the novel dishes (a) high protein soup with chickpea sprouts; (b) vegetable *terrine* with chickpea sprouts; (c) meat and chickpea patty ($n = 43$). Line thickness is proportional to the number of unique links (cut-off = 3; 3-5, 6-10, 11-15, 16-20 or ≥ 21). Node colour: concrete (light green) and abstract (dark green) attributes; functional (light blue) and psychosocial (dark blue) consequences; instrumental (light pink) and terminal (dark pink) values. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article)



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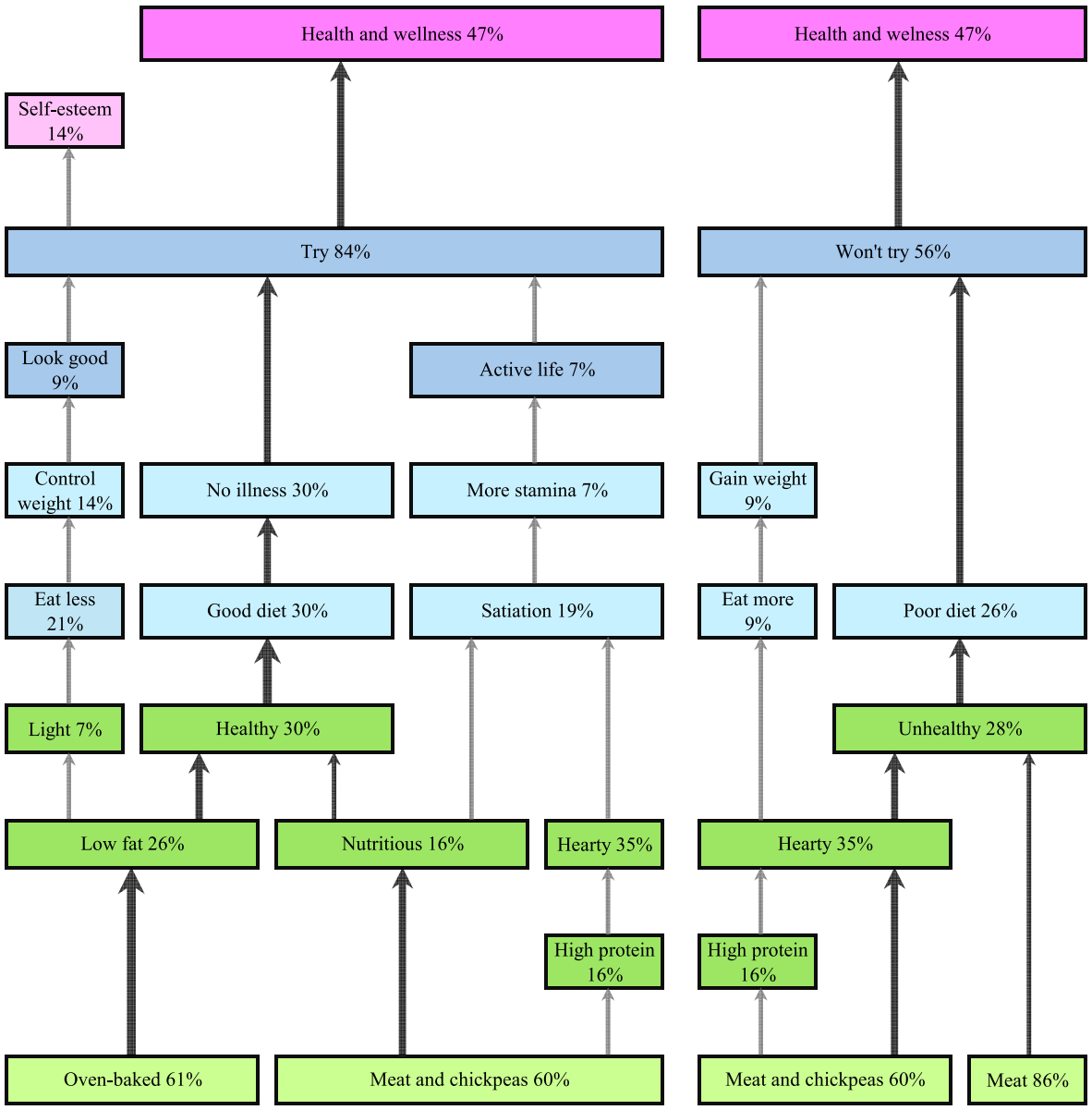

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4. Discussion

4.1. Stimuli acceptance and associations

4.1.1. Participants' individual preferences

Participants rated both the traditional vegetable salad with chickpeas and the meat and chickpea stew highly, whereas the chickpea and spinach soup was only moderately accepted. The lower preference for the soup may be partially attributed to participants' residence in Northern Portugal. Given that vegetable soups containing chickpeas are more characteristic of Southern regional gastronomy, this suggests that regional familiarity influenced acceptance. Overall, participants viewed the prospect of consuming the novel dishes favourably and would consider their regular consumption. Although the willingness to try the meat and chickpea patty scored slightly higher than other stimuli, differences were not statistically significant. In contrast, French consumers' hedonic evaluations of a reformulation of a classic composed dish, featuring 40% less meat and 30% more white beans or chickpeas, were lower than those of the original recipe (Cosson et al., 2025). Several factors can explain why recipe reformulations in the present study were met with high consumer acceptance.

Two of the courses investigated – soups and salads/sides – are not necessarily main courses or meat-based dishes. Yet, they can serve as alternatives to meat-centric main dishes regardless of whether they have been reformulated to increase plant protein content (Lemken & Langen, 2023; Varela et al., 2022; Weinrich, 2018). In the present study, the reformulation of these dishes included the substitution of traditional chickpeas with chickpea sprouts, in what represents a culinary whole-food innovation. Unlike highly processed pulse products, sprouted chickpeas maintain the integrity of the seed, thus aligning better with consumer preferences for naturalness and traditional plant-based formats (Melendrez-Ruiz et al., 2022; Varela et al., 2022). Sprouting also introduces variety and novelty relative to traditional chickpeas, while simultaneously reducing their carbohydrate and caloric density (Polak et al., 2015). Such attributes may address common barriers, as perceptions of pulses being "old-fashioned" or too high in carbohydrates are among the main motives identified by French and Portuguese consumers to justify their low consumption of this food group (Duarte et al., 2020; Melendrez-Ruiz, Chambaron, et al., 2019; Melendrez-Ruiz et al., 2020).

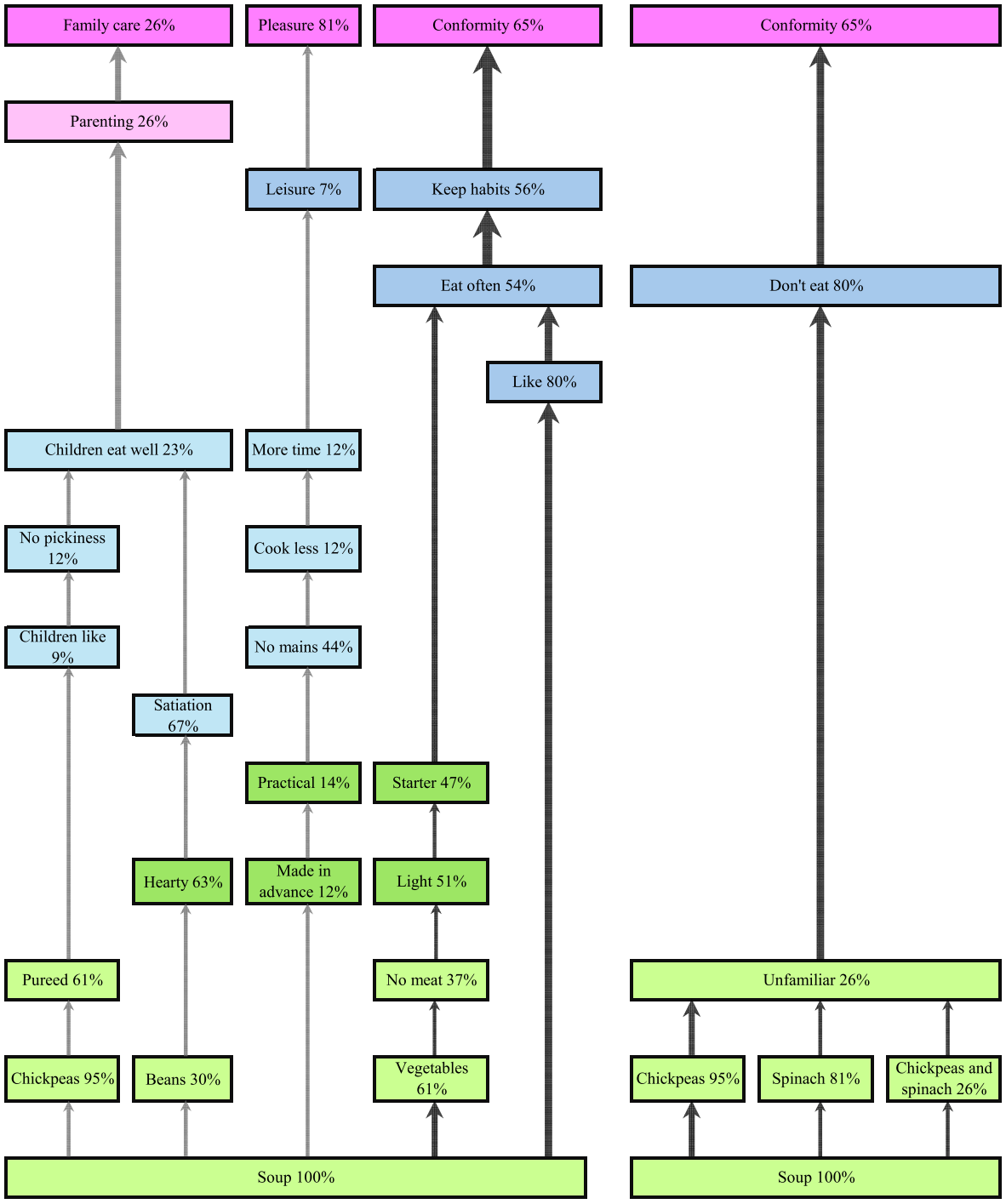
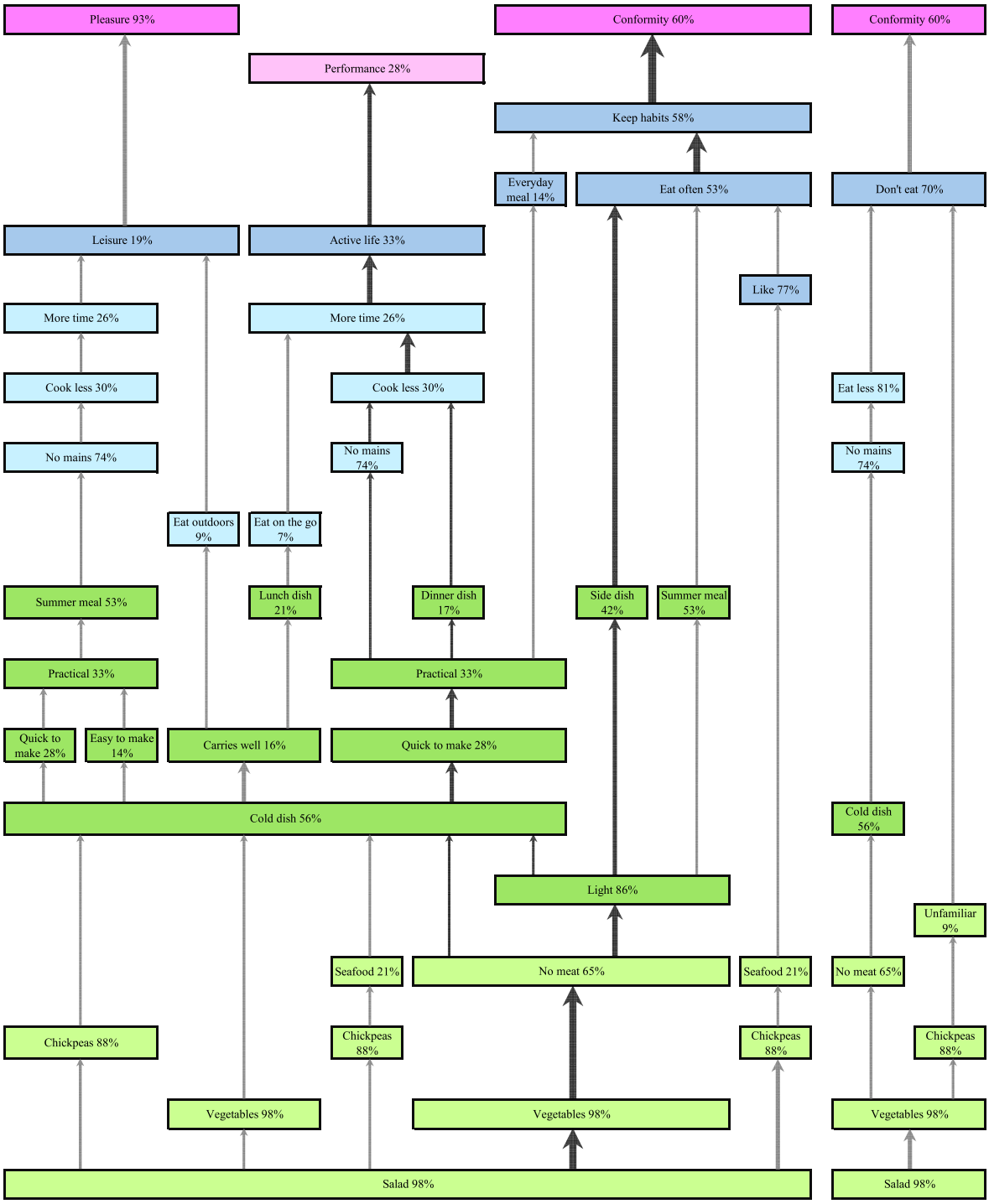


Fig. 6. HV maps of conformity motivations to consume the traditional dishes (a) chickpea soup with spinach; (b) vegetable salad with chickpeas; (c) meat, chickpea and pasta stew. ($n = 43$). Line thickness is proportional to the number of unique links (cut-off = 3; 3-5, 6-10, 11-15, 16-20 or $\geq$ 21). Node colour: concrete (light green) and abstract (dark green) attributes; functional (light blue) and psychosocial (dark blue) consequences; instrumental (light pink) and terminal (dark pink) values. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article)

Furthermore, both soups and salads combined chickpeas with vegetables, a strategy known to reframe pulses as the high-protein core of a dish in place of meat, thereby preserving liking and satiety (Spencer et al., 2021; Spencer, Kurzer, et al., 2018). This reframing also shifts the traditional perception of pulses as high-carbohydrate side dishes, increasing their acceptability further (Melendrez-Ruiz, Buatois, et al., 2019). Additionally, cooking the vegetables and changing their presentation in the *terrine* increased its visual appeal and anticipated satiety. Meanwhile, whereas the traditional meat and chickpea stew contained various red meats and sausages, the patty blended a much smaller portion of pork mince with chickpeas to create a mixed dish with lower meat content. Consumers generally find the partial replacement of meat more acceptable when legumes are used as high-protein plant--based meat substitutes (de Boer & Aiking, 2019; Kemper & White, 2021; Spencer, Cienfuegos, & Guinard, 2018; Spencer et al., 2021).

A number of factors are crucial to overcome engrained preferences



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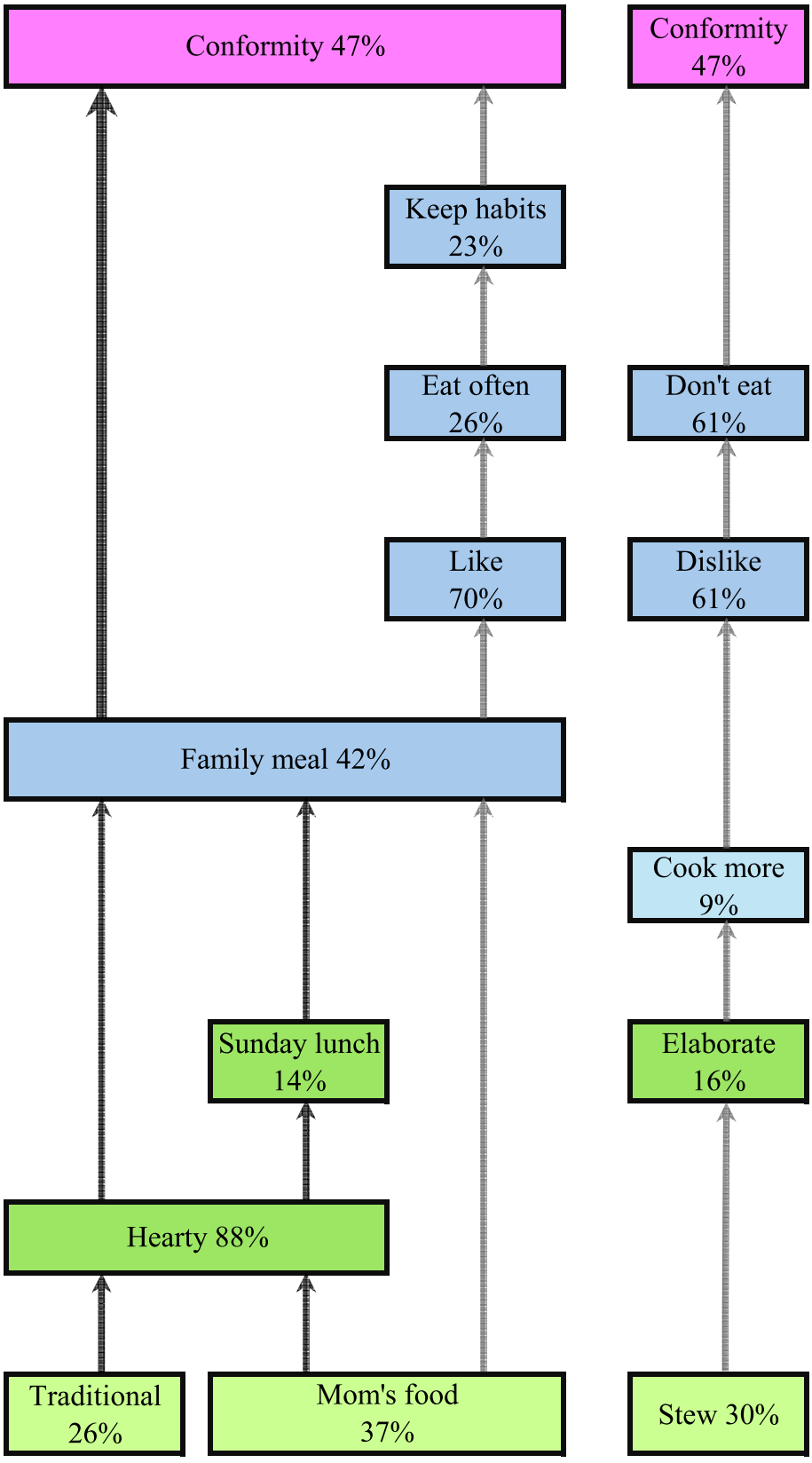
for traditional pulse meals and promote consumer adoption of reformulated recipes. High familiarity with pulse consumption, involvement in meal preparation, and self-efficacy in cooking meals with pulses were important correlates of the evaluations of the novel dishes in this study. This suggests that increasing familiarity with pulse meals and improving pulse cooking knowledge and skills are likely to increase the use of reformulated recipes thereby accelerating meat transition at household level (Appleton, 2024; Groen et al., 2025; Whittall et al., 2024). The use of sprouted chickpeas is particularly promising in this context as it requires minimal changes to traditional cooking techniques, potentially lowering the self-efficacy barrier to consumers (Polak et al., 2015).

Novel dishes – specifically the high-protein soup and the *terrine* with chickpea sprouts – were more frequently associated with following a varied diet, avoiding boredom, and enjoying greater sensory stimulation than traditional ones. Variety-seeking tendencies are known to influence consumers' desire for alternative products even if they are satisfied with their habitual choices (Van Trijp & Steenkamp, 1992). Meanwhile, households with children are more likely to avoid novel foods and recipes due to the risk of Food Neophobia and subsequent rejection (Pliner & Hobden, 1992). This is particularly the case with meat alternatives containing chickpeas (Elzerman et al., 2021). Adults, however, generally exhibit lower Food Neophobia and greater openness to experiencing



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new dishes, especially those offering a sophisticated take on a traditional ingredient (Januszewska & Viaene, 2012; Nicklaus et al., 2005), such as the *terrine* with chickpea sprouts. Despite these tendencies, Food Neophobia scores did not show significant associations with the acceptance of either traditional or novel dishes in the present study. Weak associations between Food Neophobia and the situational appropriateness of meat alternatives were also reported among Dutch adults (Elzerman et al., 2021).

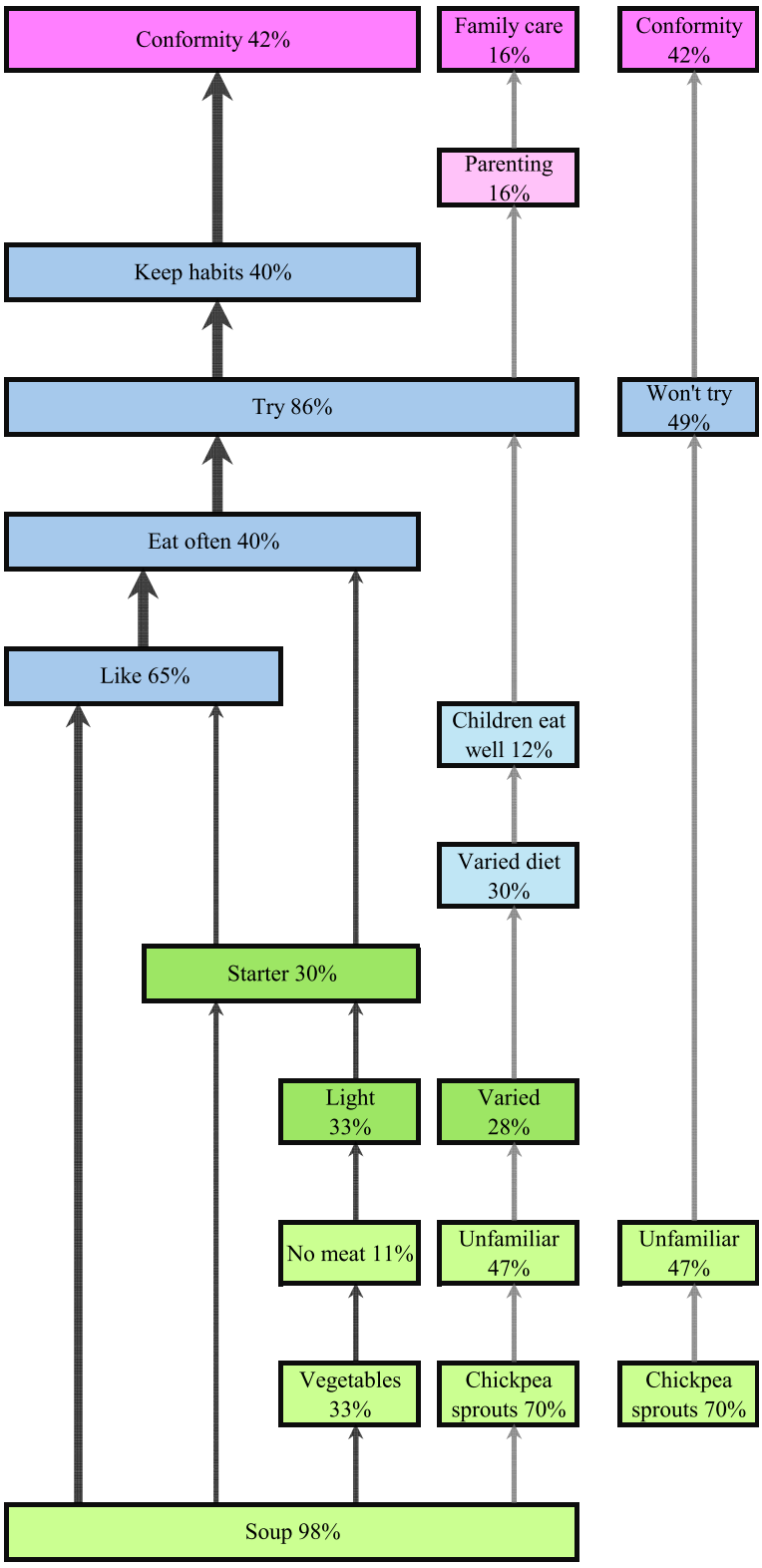
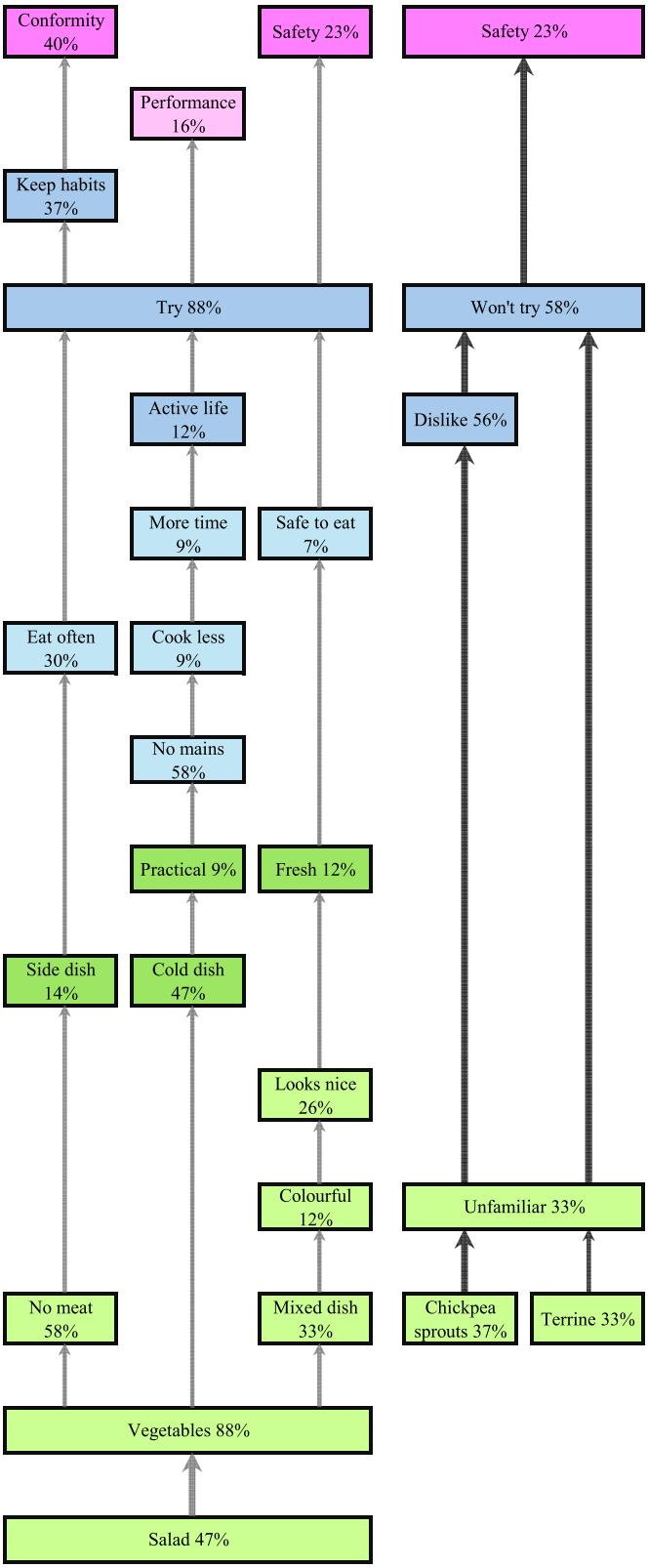


Fig. 7. HV maps of conformity motivations to consume the novel dishes (a) high protein soup with chickpea sprouts; (b) vegetable *terrine* with chickpea sprouts; (c) meat and chickpea patty. ($n = 43$). Line thickness is proportional to the number of unique links (cut-off = 3; 3-5, 6-10, 11-15, 16-20 or ≥ 21). Node colour: concrete (light green) and abstract (dark green) attributes; functional (light blue) and psychosocial (dark blue) consequences; instrumental (light pink) and terminal (dark pink) values. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article)

Age was significantly and negatively correlated with the frequency of at-home chickpea consumption. A study conducted in France found that consumers under 40 years of age choose pulses more frequently when creating a main dish than their older counterparts (Melendrez-Ruiz, Chambaron, et al., 2019). This trend may be driven by a greater preference for high-fibre, plant-based protein dishes associated with health



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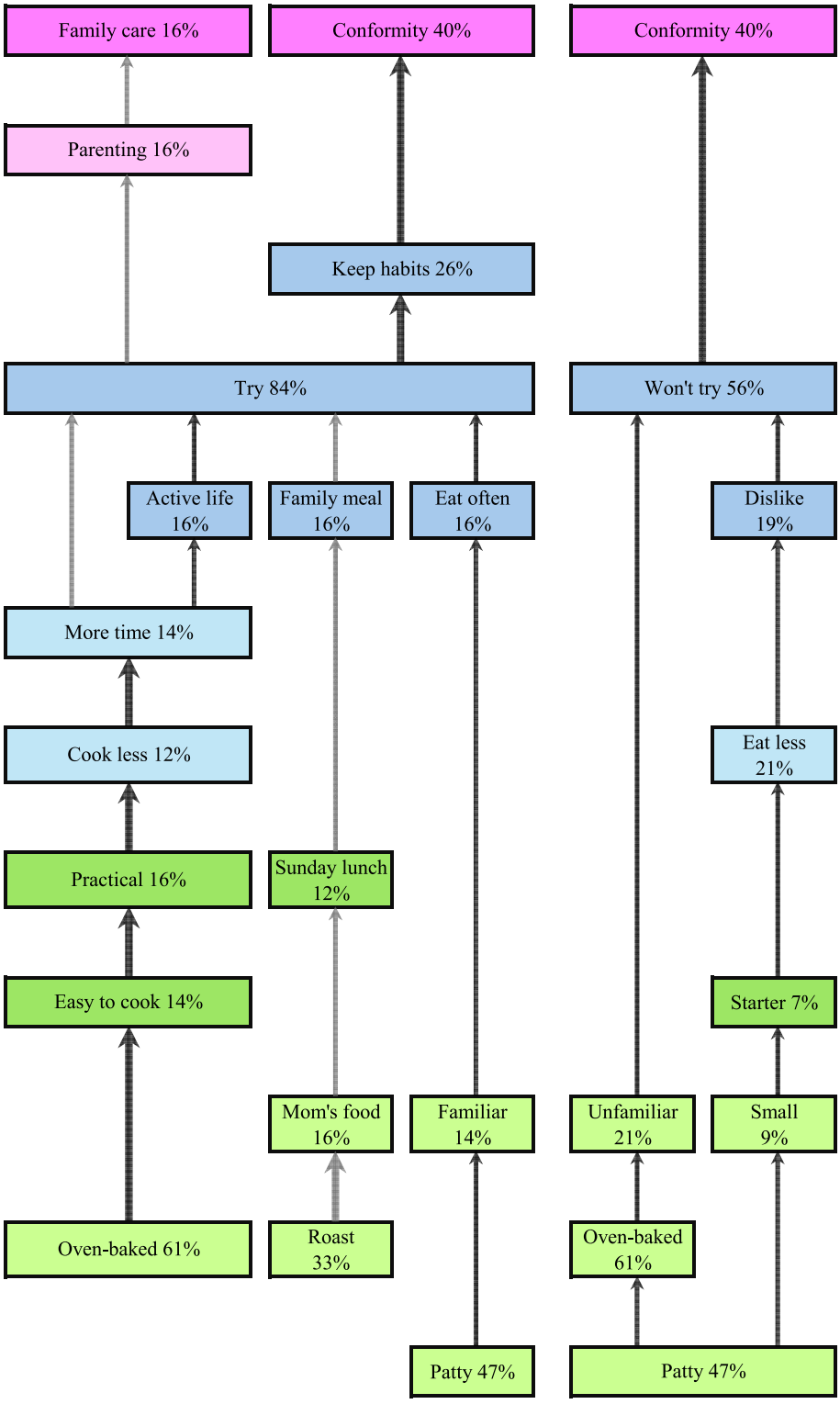
and sustainability concerns. Indeed, research performed in the Netherlands revealed that young adults found meat substitutes and meat alternatives more appropriate across several eating contexts than older adults (Elzerman et al., 2021). Furthermore, older Portuguese adults reported a lower intention to consume pulses compared to younger ones (da Luz Botelho, 2021). This was related to their greater preference for meat-centric dishes, a historic association of pulse consumption with poverty and food insecurity, the attribution of gastrointestinal discomfort to pulse intake, and the perception of pulses as a mundane, old-fashioned staple. Paradoxically, these perceptions may explain why



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age was significantly and positively linked to participants' willingness to try the two novel dishes featuring chickpea sprouts. It suggests a desire among older Portuguese adults to move beyond stigmatized, familiar recipes and integrate more sophisticated ways of eating chickpeas into their diets.

The frequency of at-home chickpea consumption was significantly and positively correlated with self-efficacy in cooking meals with pulses. A similar association was found in a recent survey of the UK adult population (Appleton, 2024). The perception that pulses are time-consuming to prepare and require specific culinary skills to transform into palatable dishes is frequently cited as a barrier to consumption (Affrifah et al., 2023; da Luz Botelho, 2021). Self-efficacy was, in turn, significantly and positively correlated with the acceptance of both the traditional vegetable salad and the novel *terrine*. Cooking vegetarian meals where chickpeas serve as the primary source of protein requires confidence in one's culinary expertise – particularly when replicating

familiar dishes like the traditional salad or exploring innovative recipes like the *terrine* with sprouts (Groen et al., 2025; Polak et al., 2015).

4.1.2. Participants' household preferences

Participants from households with more children were significantly more likely to appreciate the meat and chickpea stew than their counterparts, whereas those from households with more adults expressed a greater willingness to try the *terrine*. HVMs revealed that traditional pulse dishes, particularly the stew and the soup, were perceived as heartier, more satiating, and more nutritious than novel dishes. Traditional dishes were also more frequently associated with maintaining children's eating habits, thereby reinforcing important personal values such as parenting, family care, and conformity. These findings underscore the persistent belief that the energy density of recipes is fundamentally linked to the ability to provide adequate nutrition to children and the transmission of food habits. Birch et al. (2007) characterised this as an evolutionary logic grounded in historic periods of scarcity and undernutrition. Such logic persists in the modern world, continuing to influence children's diets in both developing and developed countries. Meat-centric perceptions of a 'proper meal' have also been identified as an important socio-emotional barrier to sustainable transition initiatives in Portuguese school canteens (Graça et al., 2022).

4.2. Stimuli ACVs

The number of ACV constructs per dish was higher for the vegetable salad with chickpeas and the *terrine* than for other dishes, indicating broader and more heterogeneous cognitive structures for these dishes (Reynolds & Gutman, 2001). These stimuli were also more frequently associated with the attribute *light*, reflecting the common belief that meatless dishes are inherently lower in calories than their meat-based counterparts. The fact that both the salad and the *terrine* primarily consist of vegetables and are served cold likely reinforced this belief, alongside prior cognitions regarding the lower expected satiety of plant-based foods (Brunstrom et al., 2008). Nonetheless, these dishes were more frequently deemed appropriate substitutes for meat-centric main courses – reflecting the cognitive associations *no meat-light-no mains* – than either the traditional or novel soup. This is likely due to the soups' predominant classification as a *starter dish*, rather than a stand-alone main course.

The vegetable salad with chickpeas was associated with the widest variety of consumption contexts (e.g., *dinner*, *lunch*, *eat outdoors*, *eat on the go*, *summer meal*), highlighting its higher perceived versatility. Meanwhile, due to the general positive appreciation of its appearance, the *terrine* was the only dish linked to food safety, a reasoning reflected in the cognitive associations *colourful-looks nice-fresh-safe to eat-safety*. This MEC chain helps explain why participants' Food Disgust Sensitivity ratings were significantly and positively correlated with the acceptance of the *terrine*. In contrast, the meat-centric stew and patty generated the fewest ACV constructs and chains. This was likely because participants found them more acceptable and appropriate as a main dish than the meatless recipes (Elzerman et al., 2021). These dishes were also more frequently associated with the attribute *tasty* and less often with *healthy*, a logic grounded in the *unhealthy* = *tasty* intuition (Raghunathan et al., 2006).

4.3. Stimuli HVMs

4.3.1. Individual motivations

Participants' evaluations of the stimuli were driven primarily by three broad types of motivations, identified through the prevalent value orientations emerging from the analysis of the laddering interviews. Hedonic motivations centred on the composition of the dishes and their sensory properties, as well as the anticipated enjoyment and satiety derived from their consumption. Health and wellness motivations encompassed the expected nutritional and health benefits of a dish, its ability to help control weight and improve self-image, and its capacity to deliver the energy needed for an active lifestyle and improved performance. Finally, conformity motivations referred to the household's food habits, practices, and responsibilities enacted through the preparation and consumption of each dish, as well as to the dish's perceived familiarity and situational appropriateness. Similar cognitive dimensions were identified in a MEC study of the motivations of UK meat eaters, meat reducers, and vegetarians to consume meat substitutes (Apostolidis & McLeay, 2016), as well as in research on French and Spanish consumers' social representations of pulses (Melendrez-Ruiz et al., 2021).

Contrary to previous MEC studies (Apostolidis & McLeay, 2016; Baker et al., 2002), motivations linked to the values of Universalism or Benevolence (Schwartz et al., 2012) – such as promoting sustainability, protecting the environment, or upholding animal welfare – were not identified in this study. The main reasons for this absence were likely threefold: firstly, the study sample was composed exclusively of omnivorous consumers; secondly, the stimuli did not include processed meat analogues; and thirdly, the study description and task did not explicitly disclose the underlying purpose of exploring culinary strategies to reduce meat consumption. Furthermore, nutrition and health – rather than sustainability or animal welfare – remain the primary motivations for reducing meat intake among both omnivorous and flexitarian Portuguese consumers, a trend consistent with other Southern European countries (de Boer & Aiking, 2022). Indeed, sustainability and animal welfare are not currently among the dominant food choice motives in Portugal (Lantern, 2023; Truninger et al., 2020).

The cognitive chain *vegetables-no meat-light-no mains-eat less-dislike-don't eat* appeared in the hedonic HVMs of the traditional soup, the traditional salad, and the novel *terrine*. This result suggests an underlying belief that meatless dishes are lower in calories and less satisfying than meat-based alternatives. Moreover, the belief that the low energy value of meatless dishes is associated with health and psychological benefits was evident in the cognitive chains *vegetables-no meat-light* (*-starter*)*-eat less (-control weight*)-no *illness* or *-eat less-control weight-look good-self-esteem*, both of which emerged in the health and wellness HVM of the traditional soup. This logic extends to chains *vegetables-no meat-light-no mains-eat less-good diet-no illness* or *-eat less-control weight* (*-no illness*)*-look good-self-esteem*, and *vegetables-no meat-light-healthy-good diet-no illness* identified in the HVMs of the traditional salad, the novel soup and the *terrine*. Similar cognitions have been uncovered in studies of European consumers' perceptions of plant-based alternatives (Michel et al., 2021; Varela et al., 2022). Nevertheless, the *vegetables-light* cognitive link was absent from the hedonic map of the novel soup. The prevailing associations of this dish with attributes *high protein* and *chickpea sprout*, both part of its formal designation, likely explain this divergence. Indeed, consumers are also known to highly value the protein content of pulses, often ranking it just below that of meat and other foods of animal origin (Figueira et al., 2019; Melendrez-Ruiz, Buatois, et al., 2019).

Overall, participants deemed the consumption of meatless dishes to be enjoyable and beneficial for diet quality, provided they were served in specific roles: as a *side dish* or a *summer meal* (in the case of the salad or *terrine*) or a *starter* (in the case of both soups). Consumption habits reinforced beliefs about the appropriateness of meatless dishes only within these restricted contexts. This is evident in the cognitive chain *vegetables-no meat-light-starter-eat often-keep habits* found in the conformity HVMs of both soups, as well as in the chain *vegetables-no meat-(light)-side dish/summer meal-eat often-keep habits* identified for the traditional salad and the *terrine*. These findings align with earlier research suggesting that the appropriateness of replacing meat with plant-based alternatives is highly situation-dependent (Elzerman et al., 2021; Michel et al., 2021).

Interestingly, the combination of meat and chickpeas in both the stew and the patty was described as a *good protein-carb mix*. This reveals that the presence of meat in a dish often leads participants to relegate chickpeas to the role of a carbohydrate side dish rather than a primary

protein source. The use of meat and pulses together, as in the stew, is deeply rooted in Portuguese culinary tradition – a practice also observed in other Southern European countries. This culinary practice leads chickpeas to be used mostly to replace starches, particularly potatoes, in main courses, due to their high carbohydrate content (Andersen et al., 2022; Melendrez-Ruiz, Chambaron, et al., 2019). The cognitive chains *chickpeas/chickpea sprouts-no potato/no starchy carbs-low carb-light-eat less-control weight-look good-self-esteem* or *-control weight-no illness*, identified in the health and wellness HVMs of the traditional soup and salad, and the *terrine*, further reinforce this practice. Moreover, they reveal that participants see the use of chickpeas in meat-centric dishes, instead of potatoes or rice, as instrumental in controlling their food intake and weight, leading to valued gains in health and self-esteem. These results align with findings from a survey conducted in Finland, which found that motives related to weight control and health were stronger among individuals replacing part of their meat protein intake with pulses than among regular meat eaters (Vainio et al., 2016).

The cognitive chains *chickpeas-high protein-hearty-satiation-no mains-avoid meat-good diet-no illness* (or *-satiation-more stamina-active life* or *-no mains-eat less-control weight-look good-self-esteem* or *-no mains-eat less-good diet-no illness*) appeared in the health and wellness HVMs of all meatless stimuli. Notably, a direct association between *high protein* and *good diet* was observed in the HVM of the novel soup. Consumers are generally aware of the high protein content of pulses, viewing it as one of their main nutritional attributes (Figueira et al., 2019; Melendrez-Ruiz, Buatois, et al., 2019). Moreover, replacing meat with protein-rich legumes is an acceptable dietary practice for a large share of Portuguese consumers, particularly when compared to the use of processed meat analogues. Furthermore, most Portuguese view the regular consumption of plant-based whole foods as a key component in a healthy diet (Duarte et al., 2020; Schmidt et al., 2016).

The hedonic and health and wellness HVMs of the meat and chickpea stew and the hybrid patty underscore participants' belief that *meat* delivers *tasty* and *hearty* meals that are highly enjoyable and satiating. For some participants, the attribute *high protein* and the associated consequence of *satiation* were considered instrumental in supporting an *active lifestyle* and improving physical *performance*. Earlier research applying MEC theory to meat consumption among Australian middle-aged women uncovered similar associations (Le Page et al., 2005). More recently, a study of German consumers identified *tasty*, *healthy*, *high protein*, and *filling* as important attributes associated with meat (Michel et al., 2021).

Nevertheless, beliefs regarding the health benefits of meat consumption were less consensual. For some participants, the combination of *meat and chickpeas* was deemed to enhance the nutritional quality and healthiness of dishes, thereby promoting a *good diet*. Conversely, others felt that consuming *meat* (particularly pork and sausages) was overly *hearty* and *unhealthy*, whether on its own or combined with chickpeas, leading to a *poor diet*. These negative beliefs undermined the acceptance of the meat-centric dishes. In particular, the consumption of the meat and chickpea patty was considered by some to lead to an excessive intake of protein, consequently driving one to *eat more* and *gain weight*. A recent review underscores the ambiguous perceptions among European consumers regarding the health effects of meat consumption, especially red meat. These perceptions can be simultaneously used to justify the maintenance and the reduction of meat in the diet (van der Sluis et al., 2026).

Several cognitive chains in the conformity HVMs of the vegetable salad with chickpeas and the *terrine* stemmed from the perception that these dishes were meatless. This attribute implied they did not require cooking and could be consumed cold, which in turn rendered them quick and easy to prepare. Two relevant benefits participants derived from these attributes were practicality and portability. These outcomes aligned meatless dishes with contemporary demands for effortless integration of meals into busy lifestyles. Practicality implied greater suitability for times when minimising cooking and maximising time for other activities was desirable, such as during high-engagement periods (e.g., weekday evenings) or leisure (e.g., summer holidays at the beach). Similarly, portability made the salad and the *terrine* appear ideal for out-of-home consumption, a benefit relevant in both everyday (e.g., weekday lunch) and recreational contexts (e.g., picnicking on summer weekends or during holidays).

Meanwhile, the cognitive chain *mom's food-(hearty)-Sunday lunch-family meal-like-eat often/try-keep habits* appeared exclusively in the conformity HVMs of the meat and chickpeas stew and the hybrid patty. This suggest a deeply engrained association between meat-centric dishes and traditional family gatherings. These results align with studies on the situational appropriateness of red meat versus plant-based alternatives, which found that European consumers viewed plant-based meals as more appropriate for weekdays, solo dining, or when time for cooking was limited. In contrast, meat-centric meals were perceived to be more burdensome and time-consuming, rendering them more appropriate for weekends and special occasions (Elzerman et al., 2021; Michel et al., 2021).

4.3.2. Household-related motivations

Results indicate that perceived household preferences, particularly those of children, influenced some participants' motivations to consume both the traditional and the novel soup, and the salad. While the use of whole chickpeas created a barrier due to anticipated rejection by children, pureeing the chickpeas was identified as an effective strategy to improve the soups' acceptability. Soups are traditionally the first solid food introduced to infants in Portugal, establishing their consumption as a lifelong habit (Nazareth et al., 2024). Pureed soups, in particular, account for most of the daily vegetable intake among preschool children (Pereira-da-Silva et al., 2016). By masking strong flavours, homogenizing texture and easing ingestion, pureeing is known to increase the acceptability of vegetable soups among children (Donadini et al., 2021).

The use of chickpea sprouts in soups and salads was seen by some participants as a good means to expose children to new foods (albeit not entirely unfamiliar), and increase variety in their diet, thereby promoting healthy eating. This challenges the assumption that households with children are likely to avoid new foods due to their anticipated rejection (Pliner & Hobden, 1992). Dietary variety is known to facilitate fruit and vegetable acceptance, promote healthy eating and help establish appropriate dietary habits in early childhood (Blissett, 2011). Accordingly, the provision of food variety was identified as one of the motives driving parents' selection of foods for their children (Russell et al., 2015).

Many participants perceived traditional meatless dishes, such as the chickpea and spinach soup and vegetable salad, as healthy meal staples that facilitated a balanced diet. For parents, this outcome aligned with the goals of providing proper nutrition and fostering appropriate dietary habits in their households, helping them fulfil their perceived roles in promoting their children's long-term health. Mediterranean parents' perceptions of the healthiness of vegetable-based dishes like soups and salads for their children have been identified by previous research (Pereira-da-Silva et al., 2016; Varela et al., 2022). Parental perceptions have been reviewed by Adamo and Brett (2014), who identified parents' perceived responsibility for their children's diets as one of the factors shaping their dietary quality.

5. Contributions

Research on consumer preferences regarding meat reduction is extensive (Onwezen & Dagevos, 2024). However, most existing work relies on large-scale online surveys that examine associations between individual differences or psychological constructs and the acceptance of meat alternatives (Onwezen et al., 2021). In contrast, present research adopted a theory-driven, mixed-methods approach not previously applied to the study of consumer preferences for pulse-centric family meals. This approach employed in-person soft-laddering interviews and

the generation of hierarchical value maps to reveal the underlying cognitive structures of consumers regarding chickpeas as a plant-based meat replacement. Context-specific consumption motives and their underlying cognitive drivers were identified by mapping the perceived attributes of different chickpea recipes to the anticipated consequences of their consumption and individual life values (Grunert & Grunert, 1995). This approach ensures a high degree of ecological validity, capturing authentic cognitive structures within a realistic meal context that large-scale surveys, despite their breadth, cannot replicate.

Another substantial contribution of this study lies in the identification of behavioural levers for intervention design, enabled by the discovery of the hierarchical relationships existing between chickpea attributes and individual life values. This depth of understanding about why some reformulations achieve higher acceptance than others offers a replicable framework for promoting more plant-centric diets through both food innovation and public health policy. Notably, by examining meat substitution across three contextual levels – ingredient, dish and meal – this study offers a more detailed roadmap for intervention compared with broad consumer surveys. Therefore, it moves the field beyond general inquiries into what might make consumers reduce meat toward an understanding of how the architecture of the meal can facilitate or hinder that transition (de Boer & Aiking, 2019; Melendrez-Ruiz, Buatois, et al., 2019).

Furthermore, this research contributes to advancing the field by focusing on incremental recipe reformulation. Such strategic choice was made to address the well-documented intention-behaviour gap in sustainable food consumption (Vermeir & Verbeke, 2006). By examining hybrid concepts, such as the meat and chickpea patty, and novel formats of familiar foods like chickpea sprouts, present work offers evidence-based levers for a gradual dietary transition (Whittall, 2024). This approach is often more effective for long-term behaviour change than radical dietary shifts, which frequently trigger consumer resistance (Duarte et al., 2020; Spencer et al., 2021). As such, this study contributes to the field by identifying the cognitive structures that allow plant proteins to displace meat while maintaining the sensory and cultural familiarity necessary for widespread adoption.

Generic recommendations for the development of tastier and more convenient pulse products are insufficient to bridge the intention-behaviour gap without specific guidelines on how to design such products. While the primary aim of this research was to map consumers' cognitive structures rather than provide industry specifications, its findings revealed the specific sensory, compositional and functional attributes that act as the primary drivers of chickpea acceptance in different dishes. By establishing links between these attributes and anticipated consumption benefits, this research offers a framework for the food industry to define and optimize the features essential to increase consumer acceptance of pulse products. However, historically low commodity prices and stagnating demand disincentivise innovation in this category, posing a significant structural barrier to consumer market development (Schneider, 2002). This study suggests that for novel pulse products to succeed, a new business model is required that shifts the current low-cost commodity mindset toward a more value-driven innovation strategy. In this model, industry and consumers co-create value through products that prioritise desirable sensory and functional features over price.

Effectively promoting the meat transition requires moving from broad guidelines to the development of a toolkit of validated interventions—characterised by their effectiveness, impact and ease of implementation (Onwezen, 2022). However, a toolkit for the advancement of pulse-centric meals through recipe redesign is still lacking. Research on these interventions remains sparse, making it difficult to assess their effectiveness. Nevertheless, a systematic review of strategies to decrease the consumption of animal protein and/or increase the consumption of plant protein in food service settings identified a consistently positive effect of interventions involving recipe redesign (Stiles et al., 2022). In this context, the present study serves as critical formative research to ground future interventions by uncovering deep-seated consumption motives, assessing how different pulse recipes are perceived and ascertaining their fit to realistic meal contexts.

Research on the effectiveness of interventions providing novel pulse-based recipes and meal ideas offers critical insight into the potential impact of recipe redesign as a behavioural intervention. Introducing recipes for homemade plant-based meals can effectively reduce meat consumption and increase the intake of pulse-based alternatives (Bianchi et al., 2018), especially when integrated into multicomponent programs (Bianchi et al., 2022). Supporting this, findings from a recent survey of the Finnish adult population suggested that the availability of recipes and dish ideas were the primary enabler for pulse consumption (Kuosmanen et al., 2025). Furthermore, research by Whittall et al. (2024) revealed the benefits of combining recipe provision with educational and sensory interventions, such as nutritional guidance, hands-on cooking classes and tasting sessions. Their work highlights how new recipes can improve both the perception and consumption of pulses by fostering the culinary confidence necessary for their preparation and motivating the exploration of diverse cuisines. Moreover, recipes can be redesigned to increase awareness of pulses within familiar contexts, promoting their gradual inclusion in traditional dishes to enhance acceptability. The present study corroborates these findings, suggesting that redesigning chickpea and other pulse-based recipes can play a foundational role in reducing meat-centric family meals as part of broader dietary interventions.

6. Practical implications

Persuading consumers to curtail or abandon meat consumption requires shifting their beliefs regarding the capacity of both meat and its alternatives to deliver desired benefits and align with core life values. Effective strategies must acknowledge that meat substitution can occur at different levels (ingredient, dish, meal), depending on the context in which meat is to be traded off against plant-based alternatives. Motivations are equally important determinants of food choices, providing insights into the barriers and levers of behaviour change (Michie, van Stralen et al., 2011). As such, this study proposes several strategies to promote the substitution of meat with pulses that combine consumers' primary motivations, level at which substitution takes place and consumption occasion (Fig. 8). Rather than attempting to change consumers' beliefs about the situational appropriateness of replacing meat on different occasions, these strategies advocate for leveraging the contexts deemed most appropriate for the consumption of pulse-based dishes in future interventions.

The ingredient-level strategy leverages hedonic and conformity motivations to reduce meat intake during weekday family dinners. It suggests the development of an assortment of innovative pulse products with a modern flair, high sensory appeal, and low energy density that are easy to store and quick to prepare. While some of these could replicate familiar meat formats (e.g., patties, meatballs, or cubes) – and may even include a small portion of meat to enhance sensory quality – others could be inspired by recipes from world cuisines (e.g., *kebab* or *teriyaki*) to broaden their appeal.

The dish-level strategy leverages hedonic and health motivations to reduce meat intake in home-cooked lunches consumed outdoors, such as at work or university during the week, or during leisure activities on weekends or holidays. This approach entails, among others: (1) reformulating traditional meat-and-pulse recipes to reduce or eliminate meat while lowering energy density; (2) creating novel vegetable-and-pulse dishes that place pulses at centre stage as the primary protein source; and (3) continually enhancing the sensory appeal of pulse-based meals to increase consumer acceptance.

Finally, the meal-level strategy leverages health and conformity motivations to reduce meat intake during family meals prepared on weekends or for special occasions. This strategy reinforces the nutritional value of including pulse-based soups, starters, and sides as meal

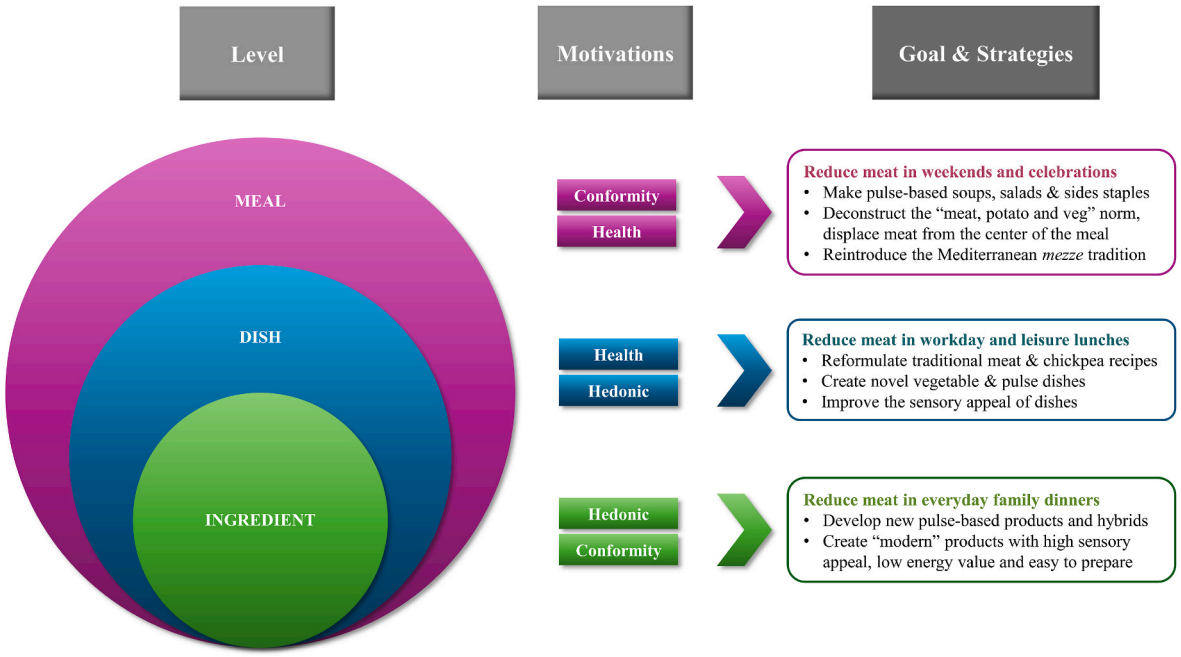

Fig. 8. Conceptual framework to promote meat substitution with pulses taking consumption level, consumer motivations and context into account.

staples. Such dishes can be prepared in advance and consumed throughout the week, increasing convenience and helping to minimise the reliance on meat-centric main courses. Importantly, this level also addresses the ritual of the meat-centric Sunday lunch by advocating the reintroduction of the Mediterranean *mezze*: a communal dining tradition featuring an abundance of small, diverse dishes to be shared with family and friends. This deconstruction of the traditional three-course meal paradigm could include bread, vegetarian dips, spreads, salads, and cooked vegetables alongside rice and a small selection of cheese- and meat-based items such as grilled meatballs and meat skewers. Notably, pulse-based dishes such as *hummus*, *falafel*, lentil salads and soups are an integral part of *mezze*, effectively placing plant protein at the heart of the social dining experience.

7. Limitations

MEC studies are essentially a form of mixed-methods research, in which the gathering of qualitative data is followed by quantification, aggregation across participants, and visualization (Olson & Reynolds, 2001). The present study applied soft-laddering techniques to elicit responses to a diverse array of food stimuli with varying degrees of complexity and novelty. Such an approach prioritised the qualitative depth of the research, which inherently constrained sample size. Consequently, this study remains exploratory in nature, with findings and practical implications requiring further research to establish their broader validity and representativeness.

Following MEC's mixed-methods approach and its specialised data analysis techniques, this study quantified qualitative data. This meant partially trading off breadth of information for the ability to synthesise and visualise data (Mulvey et al., 1994). Hard-laddering techniques, on the other hand, imply an even greater loss of consumer information (Phillips & Reynolds, 2009). Strictly qualitative methods can still produce individual ladders but will not generate aggregated maps. MEC theory applications with soft-laddering techniques therefore remain the gold standard in food studies (Costa et al., 2004; Jose et al., 2025).

Another noteworthy limitation is the potential for artificial consistency caused by the coding process itself (Kilwinger & van Dam, 2021). Utilizing a unified codebook to analyse interview excerpts across different stimuli – particularly those within the same category (e.g., soups) – may lead to the generation of similar ladders and, to an extent, relatively homogeneous HVMs. Nevertheless, such a standardised approach is essential for the meaningful aggregation and synthesis of interview content into interpretable HVMs. Furthermore, it provides the common lexicon necessary to compare cognitive structures across stimuli.

The participant sample consisted exclusively of omnivorous individuals with relatively homogeneous socioeconomic and behavioural profiles. This homogeneity, combined with sample size, precluded subgroup analyses or segmentation to explore differences in preferences and motivations for consuming meat and meat alternatives (Le Page et al., 2005). Moreover, it raises the issue of the generalisability of findings to economically diverse populations, particularly low-income groups. Pulses are perceived as an accessible and affordable meat replacement (Duarte et al., 2020; Palmer et al., 2018; Whittall et al., 2024), which might partially mitigate this concern. For instance, one study participant identified cost-effectiveness as one of the main motivations to consume chickpeas. Nevertheless, future MEC studies should employ larger and more diversified samples as well as investigate the effects of gender, socioeconomic status or level of cooking skills on motivations. Such research could employ both soft- and hard-laddering techniques (Phillips & Reynolds, 2009); the ACV codebook created by the present study could be used to design standardised hard-laddering questionnaires.

Traditional and novel dishes were not matched for exact ingredient or nutritional composition, potentially introducing unintended influences in the study. For instance, the presence of spinach in the traditional chickpea soup is likely to have reinforced its perception as a nutritious and healthy dish. The stimuli did not include meat analogues, as the research focused specifically on home-cooked pulse dishes rather than processed ingredients or convenience foods. MEC studies on meat analogues have already been conducted (Apostolidis & McLeay, 2016), being complemented by several qualitative studies investigating the motivations driving their consumption (Groen et al., 2025; Pater et al., 2025; Varela et al., 2022; Volden, 2023; Weinrich, 2018).

8. Conclusions

Consumers require support to effectively reduce their meat intake.

Reformulating traditional meat-centric dishes and exploring the use of pulses are among the primary ways food and culinary sciences can address this need. Based on consumer preferences for novel and traditional chickpea dishes and their underlying motivations, this study proposes several practical strategies to provide a roadmap for the replacement of meat in family meals. Such strategies recognize that meat substitution can operate at different levels – ingredient, dish or meal – and that the acceptance of plant-based meat alternatives is highly dependent on context and situational appropriateness.

Ultimately, understanding household food practices and the broader nature of family meals is essential for developing effective dietary interventions. Using MEC theory and soft-laddering techniques, this study offers structured visual representations of consumer cognitions regarding chickpea dish attributes, associated consumption benefits, and the life values they fulfil. Together with the stimuli tested and their evaluations, these HVMs serve as a conceptual foundation for exploring consumer motivations to reduce meat in family meals and the design of targeted interventions centred on whole plant foods.

CRediT authorship contribution statement

José Filipe Pereira: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Ana Isabel de Almeida Costa:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Formal analysis, Conceptualization. **Luís Miguel Cunha:** Writing – review & editing, Supervision, Conceptualization.

Ethical approval

This research was approved by the Ethics Committee of University of Porto, Portugal (No. 59/CEUP/2019). Written informed consent, including consent to audio recording interviews, was obtained from all participants. The study was conducted ethically in accordance with the Declaration of Helsinki and the General Data Protection Regulation.

Declaration of use of Generative AI

The authors used Google's Gemini 3 during the preparation of this manuscript solely to support its writing, specifically to rephrase, shorten and optimize sentences and vocabulary use. After using these tools, the authors reviewed and edited the text as needed and take full responsibility for the content of the published article.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Not Applicable.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.appet.2026.108569.

Data availability

Additional data will be made available on request.

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