African Journal of Hospitality, Tourism and Leisure. ISSN: 2223-814X

June 2022, Vol 11, No 3, pp. 955-974

Eating Behaviour During Confinement: An Application of the Phenomenological Variant Ecological Systems Theory

Hennie Fisher*
Department of Consumer and Food Sciences, University of Pretoria, South Africa, Email hennie.fisher@up.ac.za, https://orcid.org/0000-0003-4849-8971

Ina Louw
Office of the Dean, Faculty of Natural and Agricultural Sciences, University of Pretoria, South Africa, https://orcid.org/0000-0001-5198-997X

Gerrie du Rand
Department of Consumer and Food Sciences, University of Pretoria, South Africa
https://orcid.org/0000-0002-6689-7100

Charmaigne Sehoole
Department of Consumer and Food Sciences, University of Pretoria, South Africa
https://orcid.org/0000-0001-7040-7357

Corresponding Author

How to cite this article: Fisher, H., Louw, I., du Rand, G. & Sehoole, C. (2022). Eating Behaviour During Confinement: An Application of the Phenomenological Variant Ecological Systems Theory. African Journal of Hospitality, Tourism and Leisure, 11(3):955-974. DOI: **https://doi.org/10.46222/ajhtl.19770720.268**

Abstract

Consumers often express reasons for not preparing meals from scratch at home. The phenomenological variant of ecological systems theory (PVEST) is utilised in this study to analyse consumers' self-reported eating behaviour during compulsory at-home confinement that affects health and wellbeing. The model offers a framework to investigate normative human development, such as risk and resilience, through characteristics of identity and context interactions, for example, individual or household difference and their experience, perception, and negotiations of stress. This study aimed to establish if, during a period of compulsory confinement when consumers had time, but limited access to convenience foods, changed their eating behaviour. The case study was conducted in an urban setting in South Africa, using a questionnaire with structured and unstructured questions. Participants were obtained through convenience and snowball sampling. The results showed that whether a strategy is adaptive or maladaptive is not always conclusive, since context often plays a part. More participants prepared food from scratch when food establishments were locked, but many fell back into their old habits once they re-opened. Females remained primarily responsible for food preparation, and they were also the largest portion of our sample. The value of the study is that we could see that education regarding healthy eating should be done more aggressively. In conclusion, the usefulness of applying the PVEST model to understand modern consumers' behaviour towards food and eating during confinement was shown, and the application of this model showed that normative eating behaviour can probably not be changed in a matter of weeks, as consumers may well return to less optimal eating behaviour soon after.

Keywords: Eating behaviour; confinement; urban consumers; Phenomenological variant of ecological systems theory; maladaptive eating behaviour

Introduction

Globally, noticeable increases in preventable chronic non-communicable diseases (NCDs) have been linked to Westernised eating behaviour and dietary patterns. Also referred to as the nutrition transition (de Ridder et al., 2017; Singh et al., 2020; Van Kesteren & Evans, 2020),

this eating behaviour is characterised by the consumption of high levels of refined carbohydrates and grains, fatty and processed meats, saturated fats, salt, and added sugars, along with lower intakes of fresh fruits, vegetables, nuts, and whole grains.

South African health and wellness statistics (prior to COVID-19) may exceed global correlations drawn between unhealthy diet and associated health risks such as NCDs (Mills et al., 2020). NCDs "disproportionately affect more people in developing countries, accounting for 80% of all NCD-related deaths" (Shetty, 2013: S21). While an overall increase in prevalence of obesity over time (1994-2014) was observed for males and females in both rural and urban settings, urbanites presented even higher obesity levels (Pisa & Pisa, 2017). A recent report (Otterbach et al., 2021) claims that as much as 55% of the South African population could be classified as overweight/obese and that NCDs account for 43% of recorded deaths (Spires et al., 2016). In a country in the midst of far-reaching socio-economic changes, many South Africans follow unhealthy Westernised or Industrial diets (Haggblade et al., 2016). Much like the rest of sub-Saharan Africa, increased urbanization and changes in the food systems contribute to dietary or nutrition transitions, with consequent NCD risks (Kroll et al., 2019).

The World Health Organization (WHO) declared the novel coronavirus (2019-nCoV) outbreak a public health emergency of international concern on 30 January 2020 (ECDC, 2020), later changing the name of the viral outbreak to COVID-19. On 11 March 2020, the WHO declared the COVID-19 outbreak a "pandemic public health menace" (Jebril, 2020: 2784). On 15 March 2020 the South African president announced broad measures to combat the spread of COVID-19. South Africa went into hard lockdown for 21 days on 26 March 2020 (Carlitz & Makhura, 2020), later extended to the end of April 2020. Its initial level-5 hard lockdown restrictions meant the closure of bars, restaurants, and fast-food establishments, and a ban on the sale of hot ready-to-eat convenience foods from supermarkets and alcoholic beverages. Although consumers could purchase frozen convenience meals, they were largely dependent on consuming food prepared from scratch at home. In this study, the aim was to investigate if and how urban consumers' eating behaviours changed during the period of confinement in 2020. The Phenomenological Variant of Ecological Systems Theory (PVEST) was used to understand and report the results from the study and will be explained in detail.

Literature review

Eating behaviour and changing lifestyle

Frequent home cooking using basic ingredients has been linked to better dietary quality (Van Kesteren & Evans, 2020). Meals prepared at home "provide fewer calories per eating occasion and, on a per-calorie basis, provide less total and saturated fat, cholesterol, and sodium, and more fibre, calcium, and iron" (Reicks et al., 2014: 259) than meals eaten outside the home. Families frequently consuming home-cooked meals are more likely to exhibit a normal body mass index (BMI) and normal percentage body fat (Hart, 2019; Mills et al., 2017). In-home eating behaviour may not, however, necessarily guarantee the consumption of healthy food prepared from scratch, as consumers can purchase convenience food or take-outs and report it as in-home eating behaviour. Today's urban consumers lead complex, fast-paced lifestyles, which, coupled with high workloads, stress, and other deterrents, do not encourage healthy eating (Steel, 2020). Basic food knowledge and cooking skills are no longer passed down from one generation to the next and many households embrace ready-prepared foods (Gustafsson et al., 2006).

Many urban consumers are prevented from preparing healthy meals from scratch at home, owing to various rationales. These include lack of time to plan and prepare meals; lack of access to affordable, high-quality, fresh ingredients/healthy food options; the ubiquity and inexpensiveness of energy-dense foods; lack of cooking equipment; financial ability; number

of people to feed in the household; and lack of cooking proficiency (LaCaille et al., 2011; Reicks et al., 2014). Furthermore, pervasive food marketing, easy access to fast food outlets, sleep deprivation, too much television, over-consumption of alcohol, personal taste preferences, and emotions such as stress, anger, and boredom contribute to the current disassociation with healthy eating behaviour (Chansukree & Rungjindarat, 2017; Chapman et al., 2012).

This study therefore assumed that a period of confinement imposed by COVID-19 regulations may render some of the obstacles to healthier home-eating behaviour obsolete. People should have had more time to prepare healthy food from scratch; they may have been more confident to try out home cooking; they may have utilised boredom positively to try home cooking, and their altered lifestyle situations could have impacted positively on their eating behaviour. Eating behaviour during social isolation for extended periods may, however, also have led to boredom, stress, and overeating of high-calory comfort foods (Kumari et al., 2020). Consumers may have been tempted to give in to food cravings, defined as a "multidimensional concept including emotional (intense desire to eat), behavioural (seeking food), cognitive (thoughts about food), and physiological (salivation) processes" (Muscogiuri et al., 2020). Furthermore, Bhutani and Cooper (2020) and Schoeller (2014) indicate that small changes in body weight over relatively short periods can become permanent and lead to substantial weight gain over time. These researchers cautiously draw parallels confirming weight gain during vacations and the COVID-19 lockdown confinement. In South Africa, hard lockdown also restricted physical activity outside the home, which would have exacerbated sedentarism.

Recent results indicated positive improvements in eating behaviour during the COVID-19 lockdown in Spain (Haddad et al., 2020); personal weight and body-shape concerns and eating restraint (Rodríguez-Pérez et al., 2020); and increased snacking and consumption of ultra-processed food (Romeo-Arroyo et al., 2020). Overweight and obese Dutch citizens indulged in even more unhealthy eating than usual during confinement, in contrast with individuals with normal body weight who indicated hardly any changes in eating behaviour (83%) (Poelman et al., 2021).

The PVEST model as theoretical framework

PVEST (Figure 1) helps to explain the influence of context on developmental processes, risk, and protective factors. In this study PVEST was used to synthesise how settings (here, confinement) influenced household processes and functioning such as eating behaviour. Even though many frameworks connect context to well-being, PVEST demonstrates how stressful or negative life events, such as compulsory confinement during a pandemic, shape developmental processes. It also elucidates the process of developing adaptive strategies, such as changed eating behaviour. It uses an "identity-focused cultural-ecological perspective", which integrates social, historical and cultural contexts with normative development processes (Swanson et al., 2002).

The original PVEST model by Spencer (2006) combined a phenomenological perspective with Bronfenbrenner's ecological systems theory and linked context and perception (Swanson et al., 2003). Lately it has been applied in a variety of contexts, such as investigations of Cultural Responsive Perspectives (Miller-Cotto et al., 2021), Math Resiliency (Kendall-Brooks & Talley, 2020), friendship choices (Leath et al., 2021) and Black Magic (Adams-Bass & Bentley-Edwards, 2020). It has also been successfully applied in a health and wellbeing study (Belgrave & Brevard, 2015), as well as in regard to obesity (King & Murray, 2011).

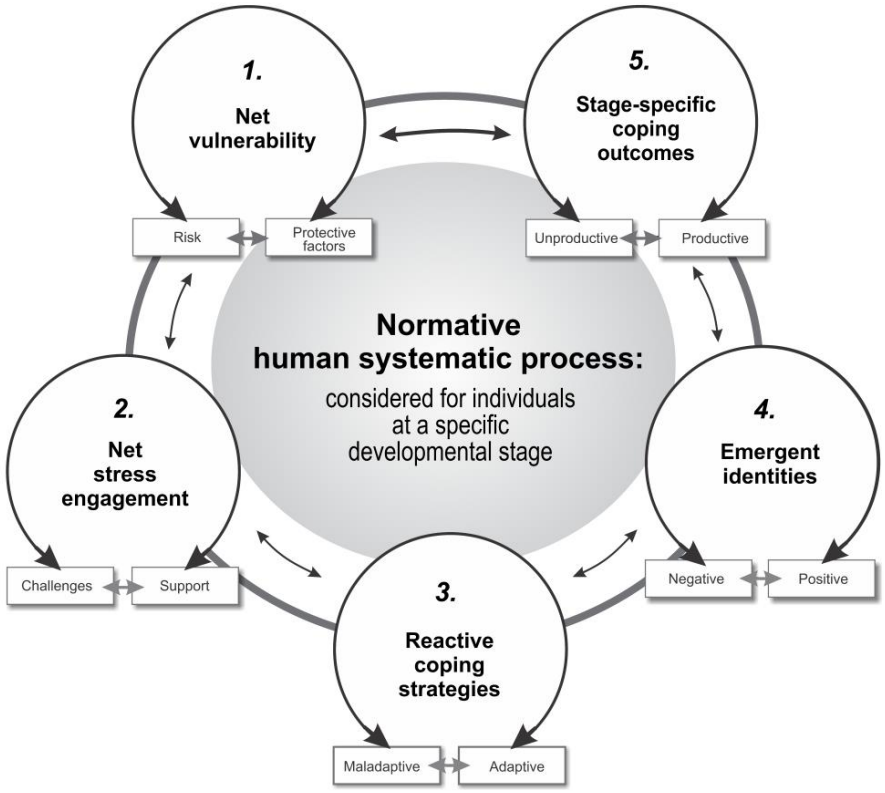

Figure 1: The Phenological Variant Ecological Systems Theory adapted from Spencer (2006).

The PVEST model argues that humans in a vulnerable social context are exposed to stressors at an ecological level (Barbarin et al., 2019), and that the impact of such threats depends on how people cope with the stressors (Spencer et al., 1997). Thus, it creates an understanding of how coping behaviour is tied to the availability of individual, family, cultural, and community resources (Barbarin et al., 2019). It allows the analysis of a self-appraised meaning-making process in a dynamic system. For example, identity development and life outcomes such as the evolution of eating behaviour are measured in a context (a household) over time (a period of confinement) (Swanson et al., 2002). The mechanisms that drive development relate to how an individual understands, copes with, and reacts to experiences. These processes function within an iterative cycle where they influence each other bidirectionally. The PVEST model alerts "that there are multiple contributing factors to the overall vulnerability of each person. A person's vulnerability influences how they experience stress, which in turn influences how they cope with stress in the moment (primary coping processes)" (Mucherah & Mbogori, n.d). As an adaptation of a systems theory, PVEST adopts the perspective that processes which drive an individual's development, such as eating behaviour, are embedded in the unavoidable experience of environmental contexts, such as confinement at home. Although PVEST is primarily used in life-course development research, it is here posited as a situational framework to investigate and explain eating behaviour within the context of a period of home confinement (Mucherah & Mbogori, n.d).

The present study assumed that, during a lockdown, the usual net stress conditions caused by situational confinement may not apply. Consumers may have more time to prepare meals from scratch at home since they were not commuting; they may be in a safe, nurturing environment with just the household members present; and they may have time to experiment with recipes. No access to convenience foods or take-outs left them with no other choice but to prepare their own meals.

We utilised four of the five PVEST components (Net vulnerability level; Net stress engagement level; Reactive coping methods; Emergent identities). The fifth component (Stage-specific coping outcomes) addresses stable pattern development in response to redundant reactive coping strategies. It was not included because some form of COVID-19 lockdown continues in South Africa. The data were collected during the first six months of the pandemic. Table 1 summarises variables that were investigated within each PVEST component.

Table 1: Specific Variables for the Eating Behaviour PVEST Adaptation

PVEST components	**Variables under investigation**
Component 1: Vulnerability Level	Protective factors: Urban living Gender - female Ethnic group Education level Employment Household income Food preparation/cooking ability Risk factors: Gender - male Age Household composition Food budget
Component 2: Net Environmental Challenges and Support (Net Stress Engagement)	Support: Food-purchasing behaviour Safe shopping Stockpiling of food Challenges: Cooking frequency Working from home, working hours, home work environment
Component 3: Reactive Coping Strategies	Maladaptive: Food choices such as snacking and purchasing of convenience foods Adaptive: Cooking/food preparation Sourcing of recipes from internet
Component 4: Emergent Identities	Positive: Improved eating behaviour Negative: Deteriorating (negative) eating behaviour

Net vulnerability component

Within this component, the contexts/characteristics that may pose a risk during an individual's development within a stage (situation, in this case) of their life are considered. Risk contributors may predispose a person to adverse outcomes during a particular development stage (Swanson et al., 2002). In this adapted use of the PVEST model, demographics (urban living, gender, age, ethnicity), educational level, socio-economic status, household composition, and employment status are viewed as both risk and protective factors.

Net stress engagement component

The experience of a situation that challenges a person's well-being is the second component of PVEST. In this adapted model, consumers' challenges caused by lockdown included experiencing financial stress as a result of unemployment or reduced work hours, having to adapt to working from home, and worrying about food availability.

Reactive coping strategies component

According to the PVEST model, in-the-moment coping, whether adaptive or maladaptive, will influence long-term coping and identity-formation processes. In this study, these coping behaviours translated into everyday eating behaviour patterns. The adaptive coping strategies

included searching for recipes to prepare meals from scratch at home, while maladaptive coping strategies included snacking excessively and purchasing frozen convenience meals.

Emergent identities component

Stable coping responses (positive or negative) are identified in the fourth component of the PVEST model. These are defined by how individuals view themselves within contexts of development. These identities are behaviourally stable over time and space, and lay the foundation for future life-coping outcomes (Component 5) (Swanson et al., 2003). For the adapted PVEST eating-behaviour model, we considered improved or deteriorating eating behaviour as emergent identities (Ullman, 2015).

Methodology

The study was designed as an exploratory case study consisting of two parts. We report on the in-house eating section, for which we identified the PVEST model as an appropriate framework for our data analysis. Quantitative data were collected from participants (n=785) sampled online through convenient and snowball sampling (Nieuwenhuis, 2007). In line with ethical considerations, none of the questions in the questionnaire had a forced answer function, hence the number of answers varies by question. The time needed to complete the questionnaire and the fact that the in-home eating behaviour section was placed last may have caused our respondents to become fatigued. A questionnaire link was sent out to email addresses from two databases maintained by the Department of Consumer and Food Sciences of the University of Pretoria. The emails consisted of an introductory cover page, along with a link to the Qualtrics-driven questionnaire , ethical considerations, and our contact details. The link was shared on Facebook and Instagram groups linked to the department. The study was initially aimed at urban Gauteng residents, but through the sharing of social media links a few responses from South African residents in other urban areas were also received. Some (n = 40) individuals resided outside the larger Gauteng province (Johannesburg and Tshwane), but on inspection of the data, none living in rural areas was identified and they were therefore included in the urban sample. Only urban adults were included, as they often cook less frequently at home, eat out more, and tend to snack between meals (Becker et al., 2021).

The questionnaire consisted of three main sections: a demographic section, a section on out-of-home eating (to be reported elsewhere), and a section on in-home eating. It had structured and open questions. The data were analysed using SPSS V27 software. The data were validated, filtered for completeness, and subjected to statistical analyses. Frequencies and means were calculated, and relationships between variables were sought by correlations and cross tabulations.

Results and discussion

The premise is that, in everyday situations, consumers' lifestyle conditions often prevent them from interacting healthily with what and how they eat. We proposed that in an enforced confinement period the influence of these lifestyle conditions may have lessened, resulting in improved eating behaviour.

Net vulnerability component

Results for the net vulnerability component, which poses potential challenges (risk contributors) or panacea (protective factors) that predispose consumers' eating behaviour during confinement, were obtained from a total of n=785 responses. These results after data clean-up are represented in Figure 2.

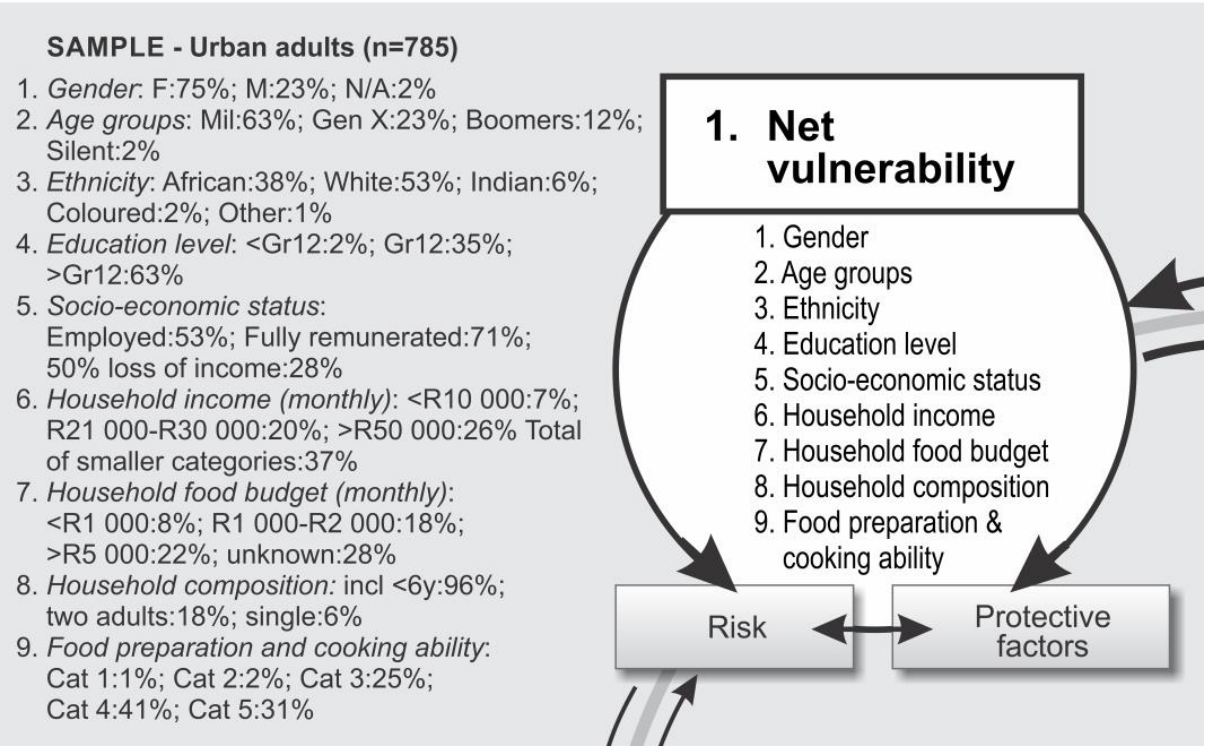

Figure 2: Net vulnerability component

The gender split (no. 1 in Figure 2) may influence the results, where only 16% of the overall sample believed they ate less healthy foods. Men (few in our sample) are often more expressive regarding their distaste for healthy food, citing poor taste and its not being satisfying (Gough & Conner, 2006). The large female representation in our sample may therefore be considered a protective factor, in contrast to health statistics for South African women that show the highest rural and urban prevalence of obesity in the sub-Saharan African region (Gradidge et al., 2020). As the majority of the sample are from ages who may not yet fully associate health with eating behaviour, age may be considered a risk factor, supported by other health statistics regarding age (Izydorczyk et al., 2019). Since the majority of respondents were African and white, we will report only their results (91%). Considering poor correlation between some sub-populations and their diets (Kirkpatrick et al., 2012), and keeping diet-related health statistics for South Africans in mind, ethnicity may be considered a protective factor in our sample. As almost the entire sample finished school, one may consider education level as a protective factor, as research by (Hearty et al., 2007) corroborated. Only 385 answered the question whether they received their full remuneration during lockdown, and of this group, 71% confirmed that they were fully remunerated. In a subsequent question, 28% indicated they lost more than 50% of their income during lockdown, similar to other global research (Janssen et al., 2021). The majority of our sample had a higher income than the mean HH income (Hundenborn et al., 2018), disqualifying income as a risk factor. The 8% who spent less than R 1,000 per month on food could be considered vulnerable. For the 26% who spent less than R 2,000 per month, food budget may be a net stress as they may opt for inexpensive convenience food. During the confinement period, 31% had a slightly decreased food budget, 14% said it decreased a lot, 33% said it increased slightly, and 22% said it increased a lot. Of those people who prepared food daily, 28% had a slightly decreased budget, 16% said it decreased a lot, 32% said they had a slight increase, and 24% said their food budget increased a lot. Food budget could be viewed as a risk or protective factor during a confinement period.

Households with children could hold positive and negative vulnerabilities, as those with children may feel protectively compelled and responsible to cook healthy food at home. At the same time, those with children may experience additional stresses causing them to opt for stress-releasing responses, such as reaching for a box of fish-fingers.

Our sample had to report their food preparation and cooking ability on a pre-formulated scale (1=I can barely make coffee, 2=between 1 and 3, 3=I can do basic cooking, 4=between 3 and 5 and 5=I can cook fancy food and bake very well). Based on cross tabulations, men typically (40%) placed themselves between basic and fancy cooking (category 4), with 30% in the basic and 26% in the fancy category. Of the female group, 42% were in category 4, and 32% in the fancy category. These results are substantiated by the cultural significance of foods that respondents had tried for the first time, such as a steamed bread called jeqe, idombolo, koeksisters, and mogodu, as well as other non-South African items such as Chinese pot-stickers, shakshuka, and cauliflower curry. An open question asked participants to list the most challenging recipes that they made. Their responses included items such as "Cloud" bread, gluten-free ramen, and home-made samosas. It is noteworthy that in the category "I can barely make coffee", the split between males and females was equal. In the age groups, categorised according to Lissitsa and Laor (2021), the Millennials (18-34 y) were 39% in category 4 with 30% in the experienced food-preparation category. Gen X (35-50 y) was 44% in category 4, Boomers (51-69 y) 46%, and Silent (70-87 y) 47%. The biggest group in category 4 was the Millennials (59%). An open question asked respondents why they hadn't tried new recipes before and the major reasons given were lack of time, long commutes to work and tiredness (39%). Other reasons were lack of interest/enthusiasm, or lack of resources. One respondent said: "I could buy something when needed, but couldn't during lockdown." Food preparation and cooking ability could therefore be considered either a risk or a protective factor, as those with higher ability levels would naturally be less vulnerable. In terms of our cross-tabulated results for age groups and food preparation/cooking ability, it appears that many younger participants concur with a student who said: "I used to dread the thought of cooking, yet now I look forward to it" (Stemen, 2021).

Net stress engagement component

The net stress engagement component is represented in Figure 3. South African urban consumers (n=785) appear to have prepared for the worst-case scenario when the lockdown was announced by adapting their regular food-purchasing behaviour (no. 1 in Figure 3). Consumers appear to have been cautious about visiting shops regularly and one respondent said, "I am scared of COVID and did not want to put myself at risk." This may be corroborated by similar results where consumers were "going to neighbourhood stores just once per week" (Romeo-Arroyo et al., 2020). Purchasing food may thus be considered a support as well as a challenge in terms of Net Stress Engagement of the PVEST, particularly as home food-delivery options in urban areas are abundant. This is corroborated by a global study reporting a 10% growth in online customers during the pandemic (Arora et al., 2020).

Safety in shops (no. 2 in Figure 3) may be considered a challenge when shopping, even though our results indicate that the sample did not considerably change their place of shopping (Desai & Aronoff, 2020). Consumers may have felt "supported" by shopping in their known territory.

Stockpiling food during confinement may be considered a support (or challenge, depending on personal perception) to net stress engagement, but the decrease in the number of shopping trips may well indicate a safety concern (no. 3 & 4 in Figure 3). Interestingly enough, the group who stockpiled food (38%) also indicated they used internet recipes (73%). It appears that having stockpiled food gave our respondents assurance in terms of food, which could

consequently be considered a support for net environmental challenges, if for no other reason than that they did not need to shop for food daily (Jafri et al., 2021).

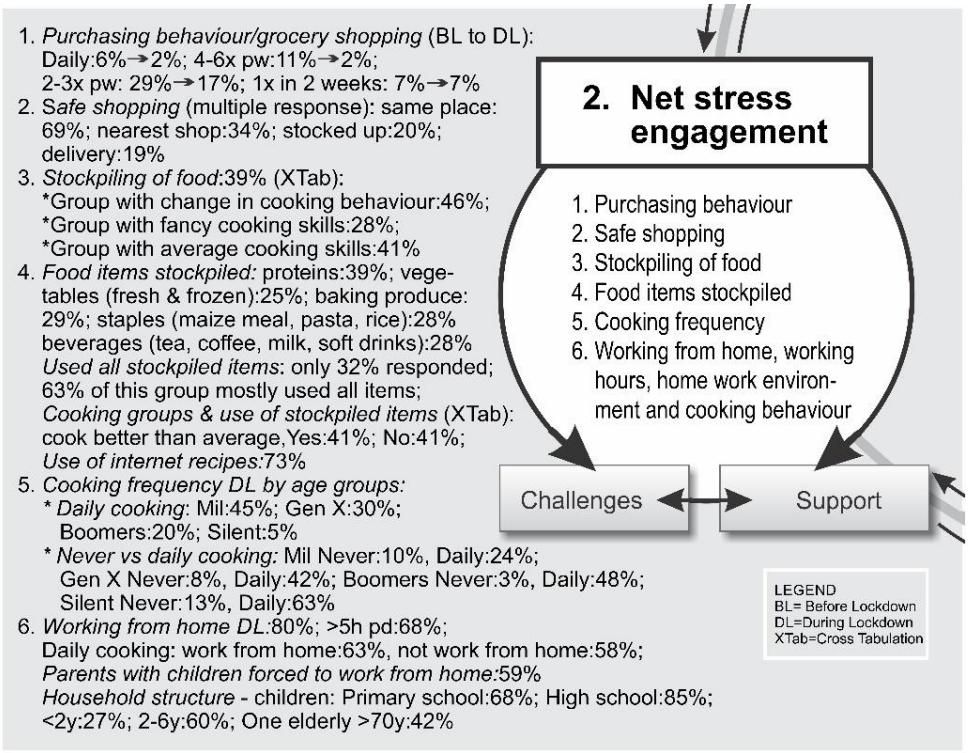

Figure 3: Net stress engagement component

The different age groups were cross-tabulated against cooking frequency (no. 5 in figure 3). If one is not used to daily cooking, doing so could pose a challenge. In urban areas, convenience foods are also easily available, so, if daily preparation of food is not possible, purchasing convenience foods will be very attractive.

Working from home could easily become a challenge in terms of net stress engagement, because of long hours, a lack of dedicated workspace, and the presence of children. However, a large proportion was Millennials and could be students who would not necessarily record study time as "work". Of those who did prepare food daily, 82% also worked from home. It is difficult to know whether the rest were in a frontline position and working outside of home, or if they were just at home and not working.

Since many parents were forced to work from home while their children's schooling continued, the home/work environment may be considered a challenge in terms of net stress engagement. Parents were expected to assist their children with schoolwork, and 59% of those who responded indicated they were doing just that. Cooking, cleaning, and caring for young children while working from home would also be a challenge. From our results and other studies, it could be surmised that having dependants at home may indicate higher frequency of cooking at home (Wolfson et al., 2021), which consequently could be viewed as a support and not a challenge in terms of net stress engagement.

Reactive coping strategies component

Similar to the previous two PVEST components, whether a strategy is adaptive or maladaptive is not always conclusive, since context often plays a part, as can be seen in Figure 4.

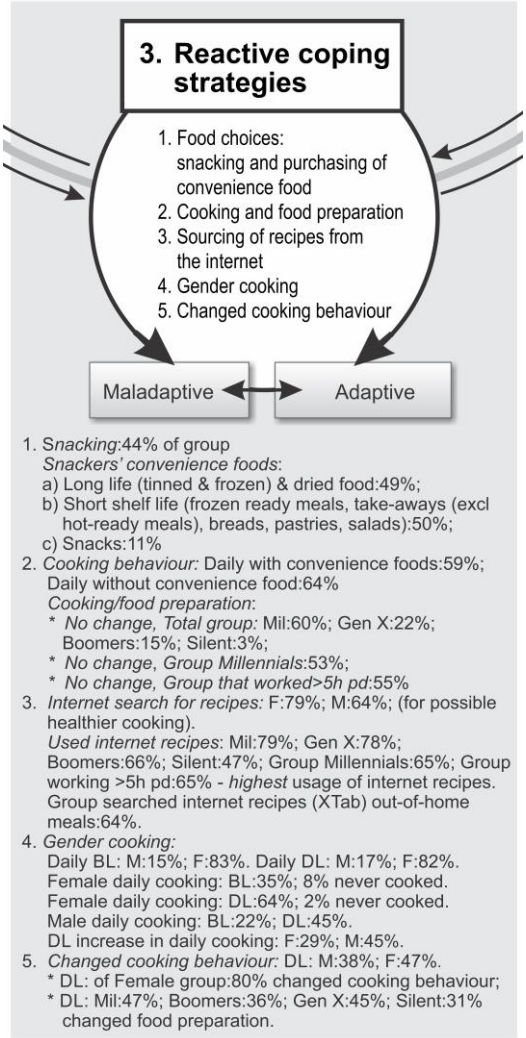

Figure 4: Reactive coping strategies

Respondents' answers clearly illustrated how consumers purchase food along cultural lines, listing tinned tuna, tinned tomato and onion, bread, rusks, boerewors, polony, chakalaka, and bully beef as popular items. Rusks are a comfort food and boerewors a sausage with deep roots in Afrikaner cuisine heritage, polony is a type of processed bologna, chakalaka is a vegetable and curry side dish, and bully beef a type of spam popular in many South African cultures.

From different cross tabulations between food preparation frequency and purchasing convenience foods, it emerged that of those who cooked at home daily, 59% also bought convenience foods, while those who did not buy convenience foods but cooked daily represented 64%. More than half of respondents continued to purchase convenience foods owing to accessibility, in contrast to preliminary results from a Spanish study where "shopping for non-perishable ready meals decreased, likely because of unhealthy related opinions and more time for cooking and preparing" (Laguna et al., 2020: 9).

Responding to the question if they changed their cooking/food preparation behaviour during confinement, 60% of Millennials, 22% of Generation X, 15% of Boomers and 3% of the Silent group selected "no change". Interestingly, the group who worked more than five hours per day indicated that their cooking behaviour did not change (55%). We wanted to know if they sought recipes on the internet and 64% of males and 79% of females said they did. Females used the internet most (79%), which makes sense, since they remain the main food preparers (Wolfson et al., 2021). Internet recipes were used by 79% of the Millennials, 78% of

Gen X, 66% of the Boomers, and 47% of the Silent group. In total, Millennials used internet recipes the most (65%).

We considered searching for recipes on the internet as an adaptive coping strategy to cook healthier, and cross tabulated that against a number of variables. In the group who searched for recipes, 64% also bought out-of-home food. It emerged that 82% of people working from home searched for recipes, and that the majority searching for recipes worked more than five hours per day (65%).

South Africa's lockdown regulations initially prohibited the sale of hot convenience food from supermarkets. It is therefore understandable that 84% of the sample in fact did prepare more food from scratch at home, confirmed by 82% indicating that it was not the first time they had done so. The question about whether they felt that they had more time was answered very poorly, but it seems to indicate that urban lifestyles may not be conducive to preparing food from scratch. Only 49% reported that they felt they had the time to prepare healthy food from scratch, in line with another Spanish study that reported that participants consumed 539 kcal more than the recommended diet, with a lower nutritional quality, during confinement (Batlle-Bayer et al., 2020).

In our cross tabulations between gender and cooking frequency we found that, before lockdown, 10% of men were never involved in cooking, compared to 8% during lockdown. An increase of 23% in males doing daily cooking could be seen, and even though this small adaptive reaction is observed, it remains primarily females who prepare food.

Changed cooking behaviour could be seen as an adaptive or maladaptive reactive coping strategy (unhealthy foods). In our sample we asked if respondents changed their cooking/food preparation behaviour, to which 38% of males and 47% of females said yes. Of those who changed their cooking behaviour, 80% were female, which corresponds with earlier findings about women still being the primary food preparers. The cross tabulation with the age groups can be seen in Table 2, but in essence we found that Millennials' cooking behaviour changed most.

Table 2: Cross tabulation between age groups and changed cooking behaviour

	Did you change food preparation behaviour		
Age groups	**Yes**	**No**	**Total**
Millennial	204	230	434
GenX	70	87	157
Boomers	34	60	94
Silent	5	11	16
Total	313	388	701

The data show that 36% of the Boomer generation reported changed behaviour, while a larger portion of younger generations reported changed behaviour (Gen X at 45% and Millennials at 47%). This could be explained by the modern lifestyles of younger generations.

We asked respondents to indicate how many of their meals consisted of convenience meals during lockdown. The results can be seen in Figure 5, where convenience meals for lunch and supper by far outweigh those for breakfast, apart from those who had breakfast convenience food (possibly cereals) seven days per week.

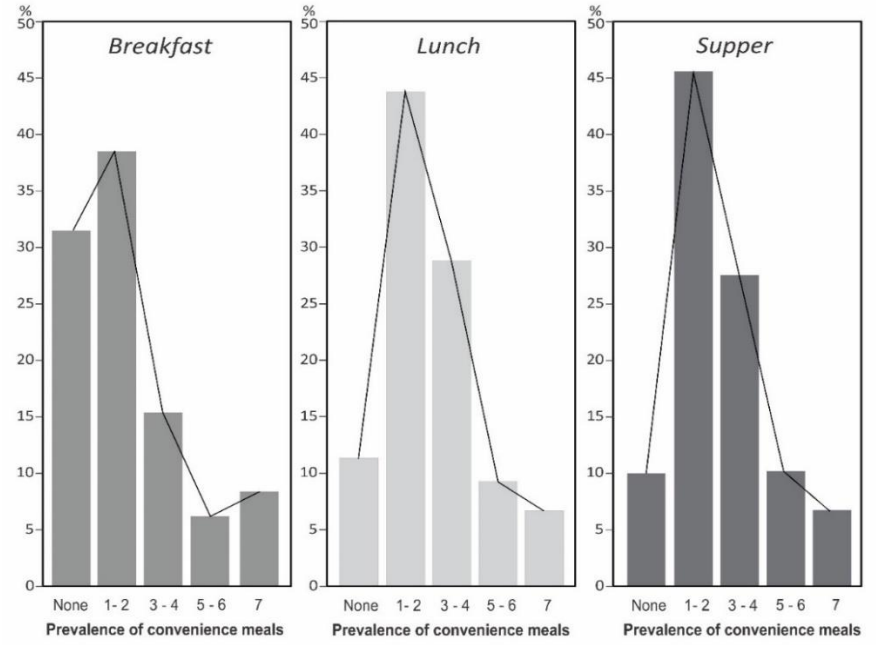

Figure 5: Prevalence of convenience meals at different meals per week

Emergent identities

We adopted the confinement period as a development cycle to investigate if urban South Africans' eating behaviour would improve because the constraints of everyday unhealthy eating behaviour had been altered. Consequently, taking the inputs of the previous three components of the PVEST model into account, we suggest either positive, improved eating behaviour or negative, deteriorating eating behaviour for our sample. Some of our results were obtained from how respondents viewed themselves in this development context, which allows for life stage coping outcomes during component 5, as shown in Figure 6.

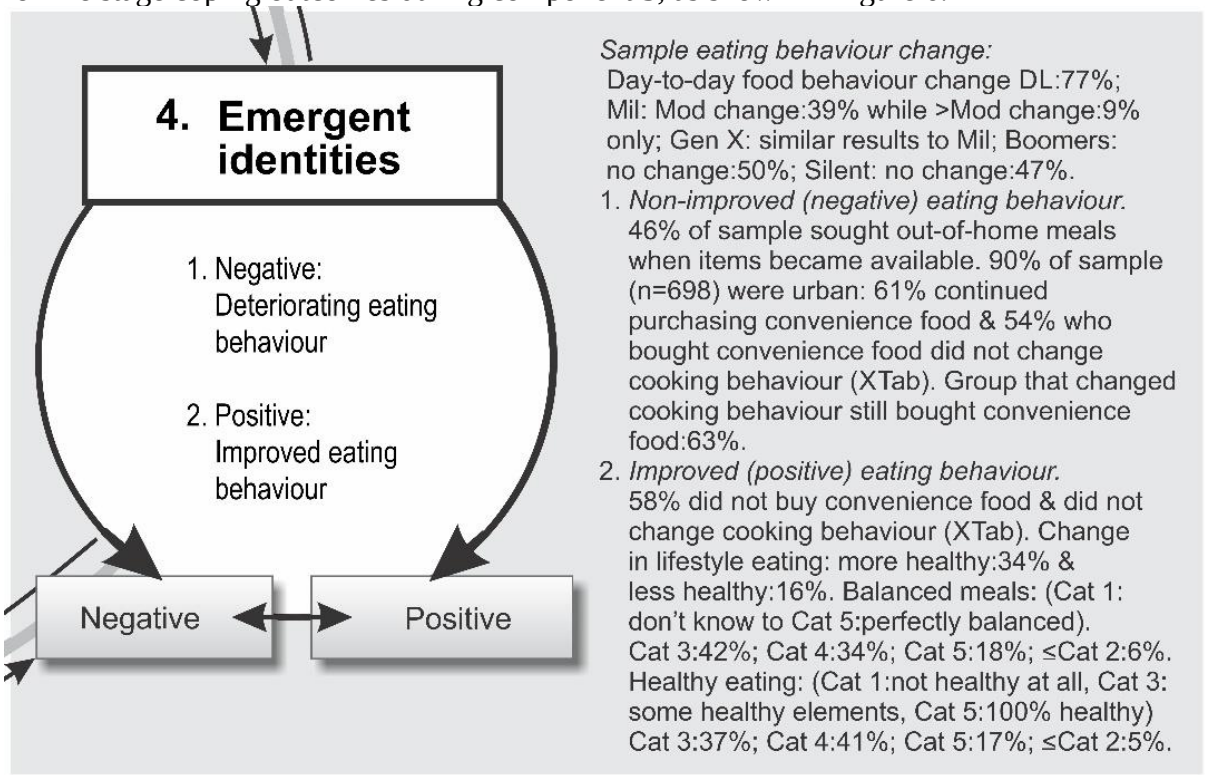

Figure 6: Emergent identities

Non-improved (negative) eating behaviour is considered to be one where people have not developed better eating behaviour during their development context (confinement). Most non-essential workers' lifestyles changed dramatically as a result of the enforced home confinement, similar to research reporting changes to consumers' day-to-day lifestyle patterns, eating behaviour, and nutritional choices in other contexts (Mayasari et al., 2020; Park et al., 2020; Rothe et al., 2021).

Positive emergent identities in our study are considered those with improved eating behaviour, determined as healthy, balanced, and tasty meals despite the unnatural confinement conditions. We asked about balanced meals, and the options were (1) I am not even sure what balance means, (3) there were different food groups on the plate and (5) it was perfectly balanced (with 2 and 4 in between). We asked if their families enjoyed their meals and found that 88% said yes, 0.3% no, and 12% sometimes. Not being able to eat out or purchase convenience foods may have positively influenced people's eating behaviour by leaving them no alternative than preparing food at home, such as in studies stating that during lockdowns people relied on food that they prepare from scratch (Laguna et al., 2020). We asked how people's lifestyles changed in a structured question where our respondents could select multiple options, and 34% selected the change towards "more healthy" eating, opposed to 16% who chose the "less healthy" option. Furthermore, we asked them why they ate more/less healthily, and the responses in favour of reasons for healthier eating indicated that 25% felt they usually do not have time to prepare healthy food; 21% had to cook for their households; 13% wanted to lose weight while they had time, and 12% couldn't buy hot convenience foods. The reasons for eating less healthily were followed by a structured question and the majority marked "other" (41%), listing reasons such as frustration, anxiety, and emotional eating (41%); laziness/boredom (17%); and availability of healthy/unhealthy food and financial reasons (7%) each.

Interestingly, the group who indicated that they changed their cooking behaviour still bought out-of-home meals (63%). Of those who said they did not change their food preparation behaviour, most (58%) did not buy out-of-home meals. Of those respondents working from home, 56% did not change their cooking behaviour. Similarly, among those who worked five or more hours per day, 55% indicated that they did not change their cooking behaviour. Changed cooking behaviour and food budget were also cross tabulated, and the only measure that differed substantially was those who indicated their budget decreased slightly – in this group 61% did not change their cooking behaviour.

Conclusions

We sought to understand contextual and cultural aspects that may have influenced individual lifestyles and the impact of these aspects on eating behaviour during the first six months of lockdown. We proposed that differences in lifestyle that normally negatively affect eating behaviour may be minimised during such a period of confinement. We applied the PVEST model to guide the research and present results, which drew attention to the links between human vulnerability (lifestyle) and stage-specific (i.e., coping) outcomes (eating behaviour).

In terms of net vulnerability, our entire sample live in urban contexts and mostly belong to an age group considered vulnerable; we position these as risk factors to their overall vulnerability level. Although the availability of food in an urban setting may be considered a protective factor, the aforementioned groups show a possible disconnect with their food behaviour, perhaps through food policies (Battersby & Watson, 2019) or because of the overabundance and accessibility of low-quality fast foods. Such risk-contributing factors in the PVEST model predispose a person to adverse outcomes, such as unhealthy eating behaviour. The sample consisted largely of females and participants who had finished high school. These

groups are known to have healthier relationships with food (Hearty et al., 2007), and are consequently considered as protective factors for net vulnerability. Most households recorded a fair number of dependants, which may be concerning in terms of the food budgets declared, indicating that socio-economic status may be a risk factor to net vulnerability. Food preparation/cooking ability could be considered a protective factor of net vulnerability, as most respondents indicated fair to good ability in the kitchen, particularly when contextualised in terms of what they prepared, which was mostly within their own culture and comprised dishes prepared from scratch.

In terms of the second PVEST component, net stress engagement, we propose that the confinement influenced our sample's food behaviour, as they purchased food less frequently than before, used delivery services more often, and stockpiled food. These food behaviours are positioned as support factors towards net stress engagement. Having no other option than cooking one's own food meant that cooking frequency is considered a challenge for net stress engagement, as people may not have made their own food prior to confinement. Recent research shows that, at an individual level, higher cooking frequency is associated with greater age, married individuals, presence of children in the home, higher employment status, and higher Positive Experience Index scores, while less frequent cooking is related to higher education, higher income, and living in a more urban environment (Wolfson et al., 2021). Working from home, which was the case for most of our sample, may be considered a support factor for net stress engagement, as people would have had time to prepare food, but could also be a challenge, as they could be maintaining their work hours, had to assist with their children's schooling, and faced other challenges.

The reactive coping strategies are less encouraging. Maladaptively, not a large percentage of the sample indicated that they changed their cooking/food behaviour, and many continued to purchase long-shelf-life convenience foods. Adaptively, they also searched for new recipes. It may be that a fixed period of confinement could be too short to have an immediate influence on everyday eating behaviour patterns; however, indications are that consumers are making some attempts to improve their eating behaviour.

It appears that normative eating behaviour can probably not be changed in a matter of weeks, as consumers may well return to less optimal eating behaviour soon after. However, there are encouraging signs that, for productive stage-specific coping outcomes (in our research, improved eating behaviour) to emerge in the final PVEST component (five), behaviouralists and policy makers should more specifically consider the lifestyle barriers that prevent healthy eating behaviour. Even though some positive emergent identities appear in component four, our results mainly indicate continued unhealthier behaviour towards food, and more so in light of the fact that the influencing net vulnerability and net stress factors lean towards a sample that should be more positively influenced by these factors.

In conclusion, our findings suggest that the PVEST is useful in understanding modern consumers' behaviour towards food and eating. In using an adaptation of the PVEST model, we showed that consumers self-reported improved eating behaviour when normal lifestyle conditions (identified as barriers to healthy eating behaviour) were rendered inactive. Similar results were found by Caso et al. (2022), stating that "people's food consumption patterns can easily improve when the situation is favourable (e.g., more time and opportunities for cooking healthy meals)…". Understanding these insights could assist in furthering the design and implementation of authentic strategies in the global fight against NCDs. It could help in implementing problem-solving solutions to maintain long-term improved diets, in taking further preventative action in the case of negatively impacted diets, and in improving supportive social policy. Food behaviouralists may in future refine this advanced use of the

proposed eating behaviour PVEST model. The PVEST model may successfully be applied in furture research to investigate consumers' continuously deteriorating eating behaviour.

Furthermore, the results from this research may be used to develop focused intervention strategies, taking into consideration that changed eating behaviour in normal contemporary lifestyle conditions may require a longer timeframe than previously anticipated. Consistent with a PVEST-based analysis, the results from this study contribute to understanding risk factor negations that could be used to customise necessary supports, develop adaptive coping strategies, foster productive identities, and promote greater resilience.

The results were limited by the use of self-report measures, which may lead to social desirability bias, with the possibility that consumers may over- or underestimate eating behaviour in terms of volume levels, regularity, and types of food. Recall bias may cast doubt on self-reported results (Chansukree & Rungjindarat, 2017). Finally, the sample consisted mostly of females, which may have resulted in some selection bias. Future research could apply the PVEST to other demographic groups. The model could be used in intervention studies to document eating behaviour changes.

Declaration of competing interest

The authors report no affiliation or involvement in an organisation or entity with a financial or non-financial interest in the subject matter or materials discussed in this manuscript. The authors like to express their gratitude towards Prof Hely Tuorila (University of Helsinki) who acted as critical reader.

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