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Country and master maps
Deliverable 4.6

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Executive Summary

This report presents the results of work building on that reported in CO-CREATE Deliverable 4.1 – Obesity Systems maps, submitted in July 2019. The obesity systems mapping previously reported formed the initial stage of the primary research component of CO-CREATE, conducted as Work Package 4 led by The London School of Hygiene and Tropical Medicine. Mapping workshops were held in Poland, Portugal, the Netherlands, Norway and the United Kingdom. The results of the first stage the mapping were causal loop diagrams illustrating what adolescent participants perceived to be the drivers of obesity. For the next stage of the research, reported here, we used a novel map-merging protocol to combine the causal loop diagrams from each country into one country master map, then the five country maps into one 'master map'. The merged country maps show that adolescents in all five countries described a broadly similar experience and views of what drives obesity in adolescents. Though knowledge, education and skills around healthy eating were only mentioned in Netherlands, Poland and Portugal. Across all maps, it is notable that there are factors that have not previously been represented in research or policy related to obesity: the role of social media and mental/emotional health.

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List of acronyms / abbreviations

CLD	Causal loop diagram
FBL	Feedback loop
GMB	Group model building
STICKE	Systems thinking in community knowledge exchange [software]
UK	United Kingdom
WP	Work package

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Introduction

Deliverable description

In line with the European Commission Research Executive Agency/ Horizon 2020 Grant Agreement number 774210 — CO-CREATE, this report fulfils the requirement of Deliverable 4.6 from Work Package 4: *"Country specific system maps of the drivers of energy balance related behaviours and a master map that synthesizes the key elements of the other maps will be provided."*

Objective of deliverable

The objective of the deliverable is to present country summaries of the 'system maps', generated during CO-CREATE Work Package 4 workshops with adolescents in five countries plus a 'master map' that synthesises the five country maps. The maps are in effect, data resulting from the workshops, representing the views of the participants, on the determinants of adolescent obesity.

Background

The key task of CO-CREATE Work Package 4 (WP4) has been to generate, with adolescents, system maps of what they perceive to drive diet and physical activity in Poland, Portugal, the Netherlands, Norway and the United Kingdom. Deliverable 4.1, submitted in July 2019, contains the original maps from the workshops, which have now been merged for presentation in this report. Taking a systems approach to the challenge of adolescent obesity prevalence allows consideration of the multitude of determinants, the ways they are inter-related and of other characteristics of complex systems such as feedback loops and emergence. A system map in the form of a causal loop diagram (CLD) is a way of representing such a complex problem consisting of multiple, interacting factors and actors. Deliverable 4.1 also provides background introductions to systems thinking, to system mapping and its use in CO-CREATE and to group model building (GMB), the method used to generate the system maps.

Methods

Group model building was used to generate the systems maps in CO-CREATE. GMB is a scripted process that guides participants in a workshop setting through various stages to generate a causal loop diagram, which depicts the factors they believe contribute to adolescent obesity. We used a particular methodology developed by Professor Steve Allender and his team at Deakin University in Australia who are partners in CO-CREATE (Allender et al. 2015), who in turn based their method on work established by Professor Peter Hovmand (Brennan et al. 2015; Hovmand 2014). We used STICKE (Systems Thinking In Community Knowledge Exchange) software[1] to generate the maps in real time during the GMB sessions,

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[1] https://sticke2.deakin.edu.au/

The resulting causal loop diagrams show how the participants in the group model building sessions view the major drivers of youth obesity, and the relations between these factors. Using a novel protocol developed by researchers at Deakin University, we consolidated the maps from each country into one country map, and hence, merged the five country maps to create a 'master map' of the perceived drivers of adolescent obesity.

The map merging was a pragmatic process, broadly conducted as follows: each map was edited to remove exogenous variables (those not affected causally by another variable, depicted by having *only* arrows outwards in a causal loop diagram) and what are 'exclusively-in' variables i.e. those that are affected by others, but do not, themselves have any causal effect on others (depicted by having *only* arrows inwards in a causal loop diagram). That is not to say that these variables are *de facto* exogenous or 'exclusively-in', rather, they were portrayed as such by group model building participants.

The second step, in merging each country's maps, was to select the map with the most variables remaining as the 'base map' for that country. Subsequently, each variable on the other maps was examined in relation to the base map, and judged to be: discarded a duplicate, added to the base map, not fitting anywhere. Some that did not immediately fit, were discarded entirely if they did not fit the sense of any other part of any map, or were placed to the side on the base map for later deliberation. The rough 'base map' was then scoured to ensure links from the 'feeder maps' were correctly represented, and to check no variables had been unnecessarily discarded and to ensure the final map made sense.

The 'master map' which consists of the five merged country maps was created using the same steps. The country and master maps were created using the Deakin protocol by researchers at the London School of Hygiene and Tropical Medicine.

Results

The resulting, merged, country maps showed that adolescents in all five countries perceived broadly similar drivers of obesity, though there are some stark contrasts. The feedback loops are the features of the maps that best translate into a system dynamics computational model, which will be done as part of Work Package 7 (see Deliverable 4.5). Solid lines on the maps illustrate positive correlation while dotted lines between variables demonstrate negative correlation. The variables on the maps were roughly colour coded as shown in Figure 1:

COLOUR	VARIABLE CLASS
PURPLE	Emotional/mental/pressure/time
RED	Online activity/influence
GREEN	Physical activity (or lack of)
ORANGE	Food and drink intake
FUSCHIA	Economic/commercial influence
LIGHT BLUE	Knowledge/information
DARK BLUE	Home life
BLACK	Body weight
WHITE	*Unclassified*

Figure 1: Colour coding on obesity system maps

Master map: Netherlands

All categories of variables are represented in the Dutch master map, with online activity and the role of social media influencers (both positive and negative) appearing quite central as drivers of unhealthy food consumption in young people. Unhealthy parental influence (home life / dark blue) was also mentioned as an important factor by Dutch participants, but not elsewhere. Variables relating to the availability, affordability and demand for unhealthy foods (economic/commercial environment - fuschia) are also quite important in the Dutch merged map, relating directly to consumption but indirectly via body positivity. Bigger body size acceptance and body positivity are reported as positive outcomes of overweight and unhealthy food consumption.

Master map: Norway

Like other countries, mental health, stress and body image pressure (purple) are a major component of the merged map for Norway, with social media and influencers equally dominating. Home life (dark blue) and knowledge/information (light blue) are not mentioned at all. Finally, one of the unique variables mentioned in Norway is mechanised transportation to school and to recreational activities, and equipment for physical activity.

Master map: Poland

A remarkable feature of the merged Polish map is the absence of any red variables i.e. those that represent online activity; this is a fair representation of the individual maps from Poland. There is, however, like all the other maps, a preponderance of variables representing emotional/mental pressures: of note are factors such as amount of sleep, desire to be fit, and social connectivity which were quite unique to Poland. Knowledge and information (light blue), such as knowledge about healthy eating, and the existence of education programs, played a larger part in the Polish maps than in those from other countries.

Master map: Portugal

The merged map for Portugal represents a balance of all categories of variables, with, at the heart of the map, a dominance of variables representing emotional/mental pressures, and linked use of social media and role of influencers. Physical activity (green) was not much discussed but unlike other countries, the use of parks and greenspaces was mentioned by young people in Portugal as an important variable affective adolescent overweight.

Master map: UK

As with other countries, mental health, stress and pressure on body image (purple) seems to dominate the story of weight gain among adolescents, with the online/influencers (red) and commercial (fuchsia) food environments playing an important role as well. Physical inactivity is not seen to be a major factor driving excess weight gain, and home life (dark blue) and knowledge/information (light blue) are not mentioned at all.

Master map: all countries

The colour-coding of variables helps vividly to demonstrate how important emotional/time and other pressures (purple) were considered by the young study participants as drivers of adolescent obesity. Centrally linked to this are social media and online influencers, driving many of these pressures (e.g. on body image). Most factors lead directly or indirectly to mental (ill)health (purple), which drives many of the behaviours leading to increased consumption of unhealthy foods, and weight gain. Though physical activity and related factors seem quite important in these master maps, at country level they appear to be relatively less dominant in the lives of young people, as reported by the study participants. Though the online food environment is clearly a central driver of obesity-relevant behaviours, the commercial environment (fuchsia) remains an important driver of adolescent obesity via ever-present marketing and low prices of unhealthy foods. Another common (though not central) feature to most countries is the issue of (the lack of) cooking skills and the family environment as drivers of unhealthy food consumption among young people.
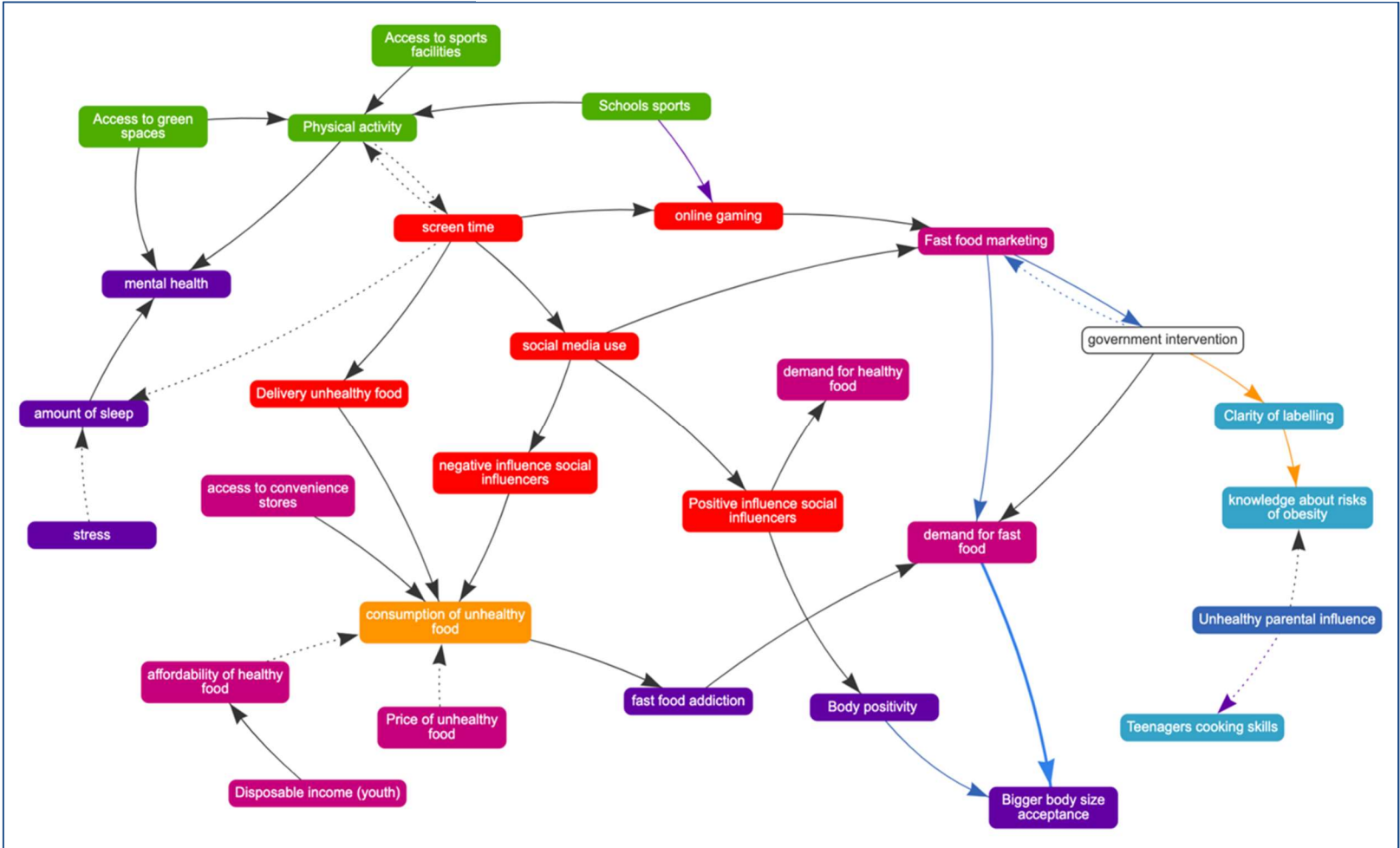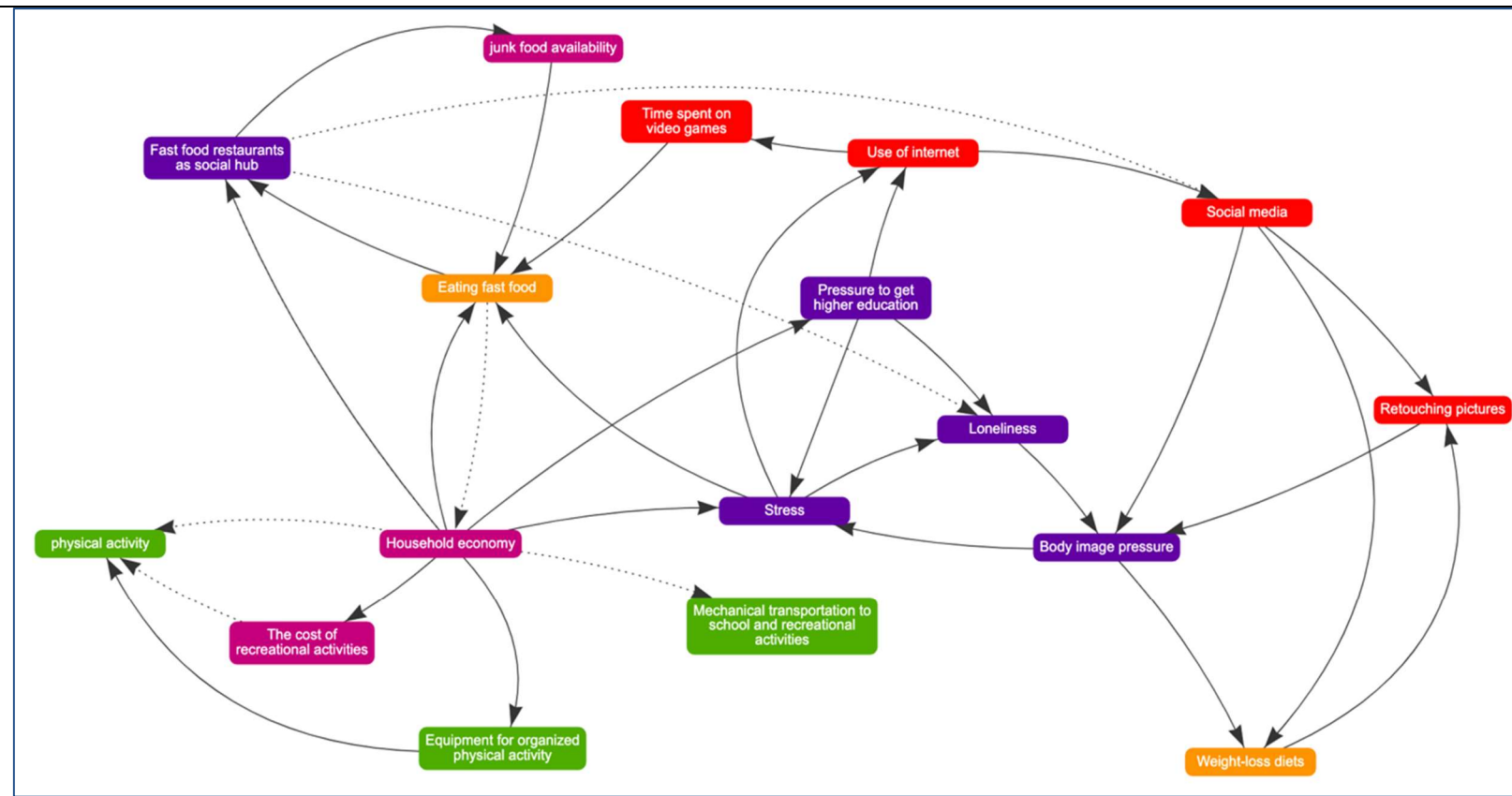
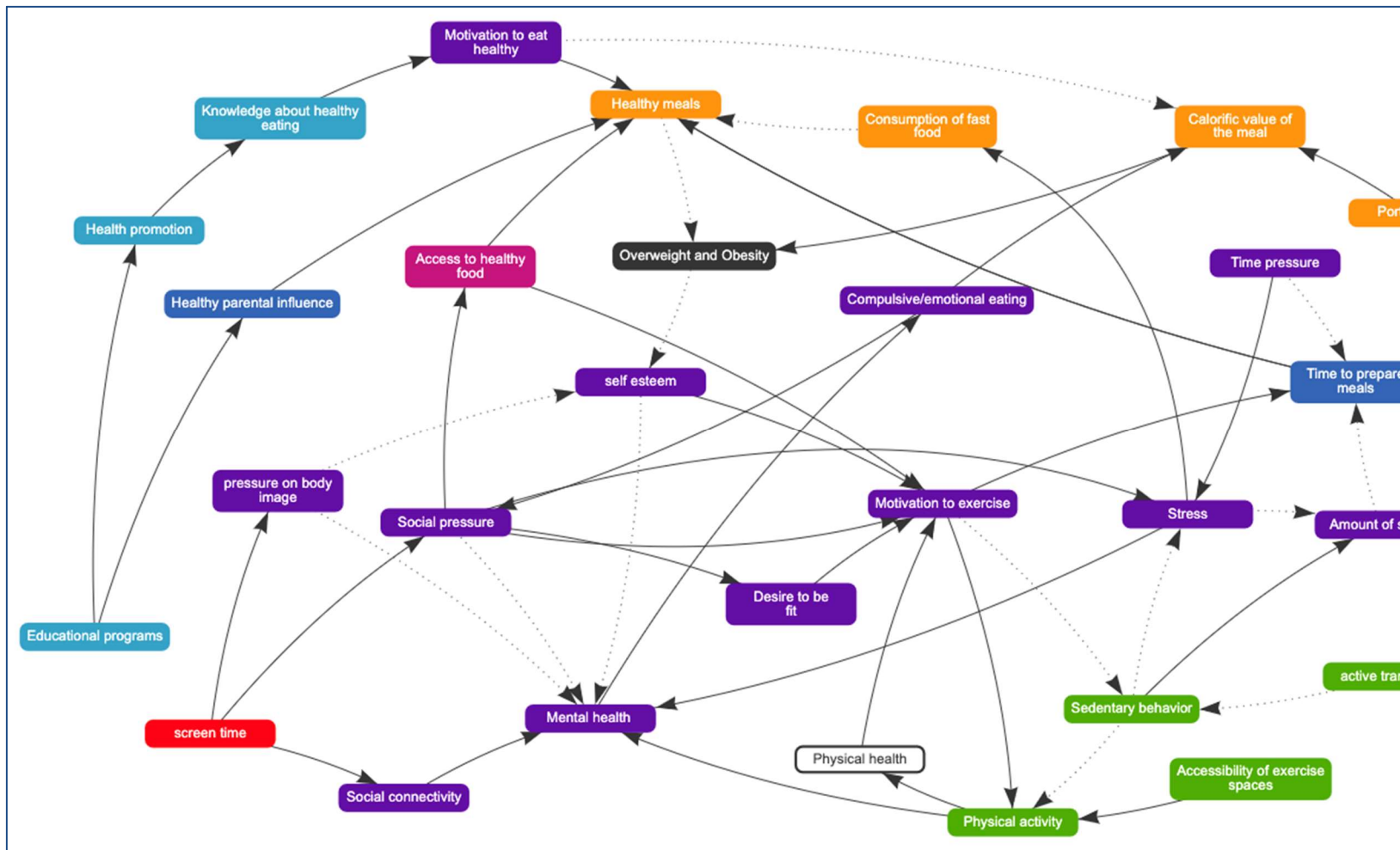**Figure 2: Netherlands consolidated map**

Figure 3: Norway consolidated map
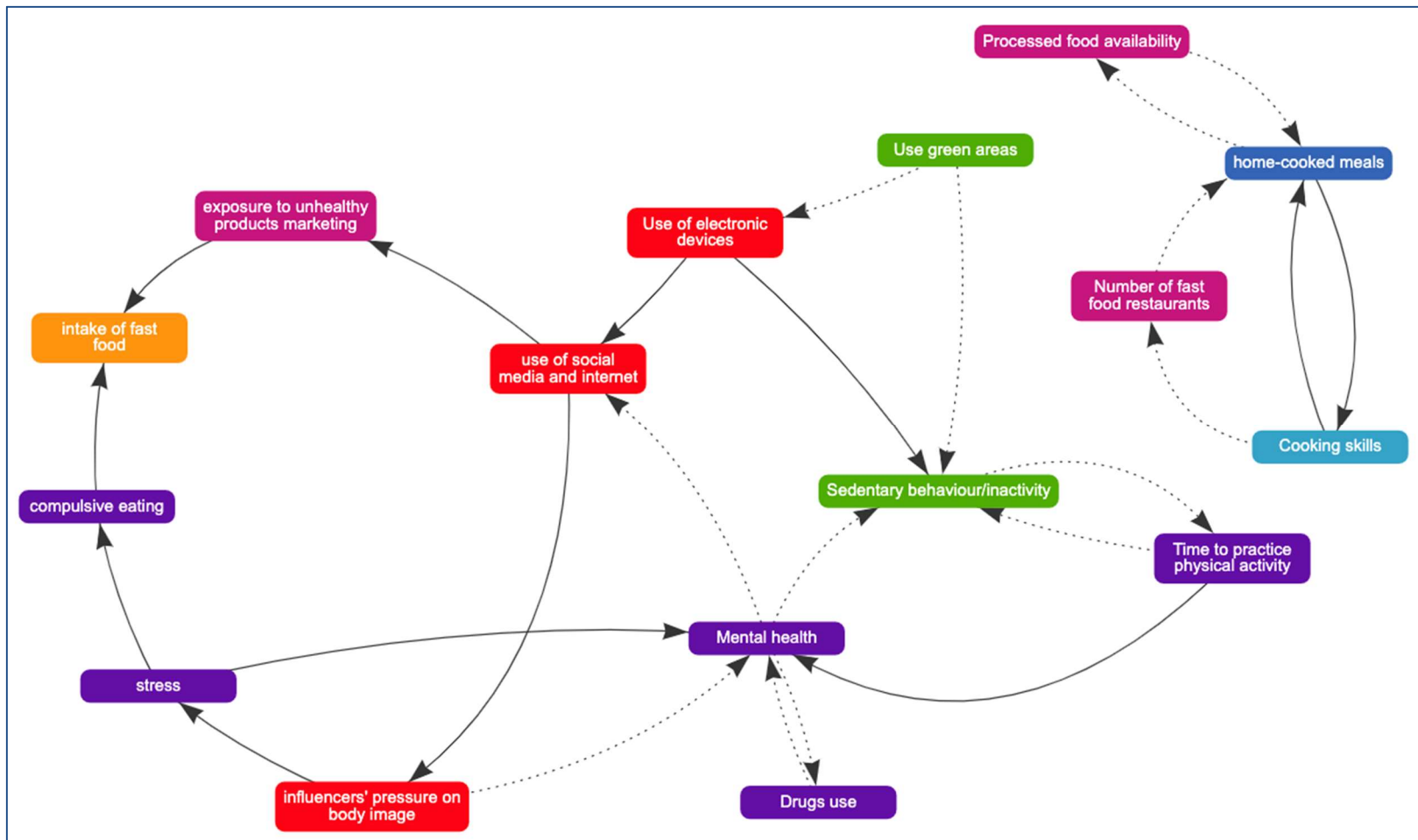
Figure 4: Poland consolidated map

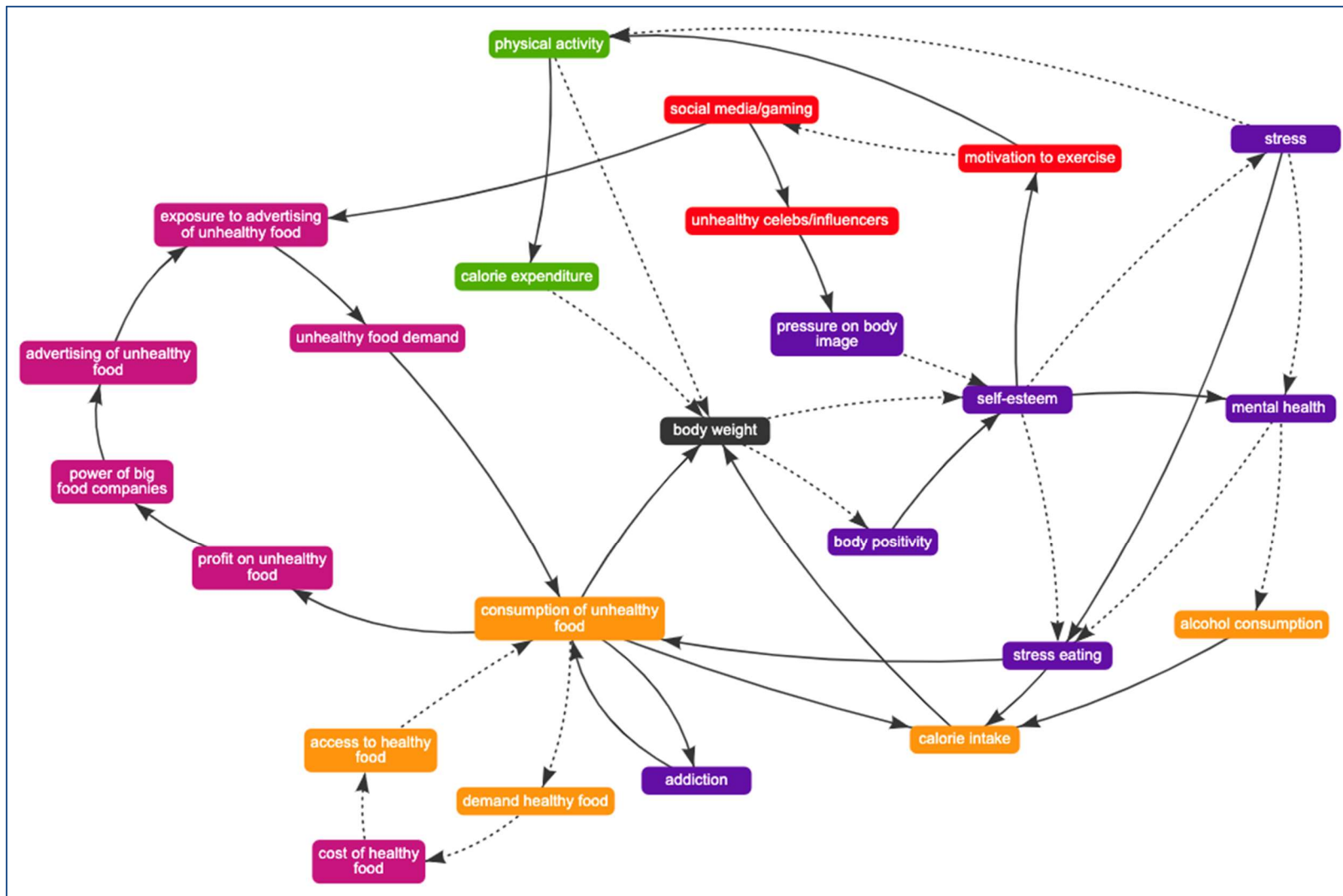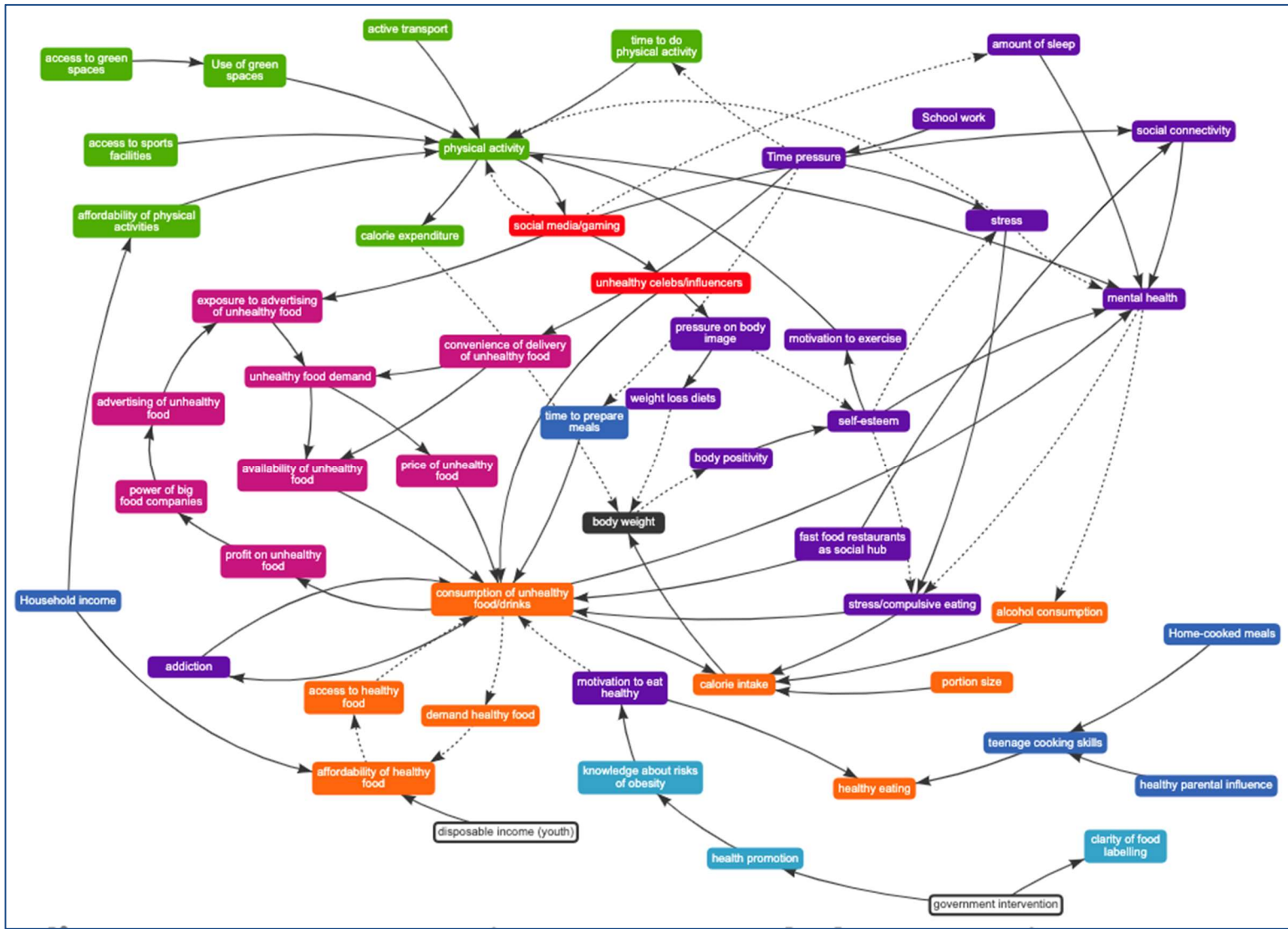**Figure 5: Portugal consolidated map**

Figure 6: UK consolidated map

**Figure 7: All countries consolidated map**

Limitations

It is essential to remember that this work represents the views of groups of young people in each of the countries, and is not representative of the populations of those countries. The group model building method is not designed to be representative in the typically epidemiological manner, rather to represent some views that are used to generate hypotheses, in this case, on what are drivers of diet and physical activity related to obesity, and where may there be potential levers for change. The maps provide insight into the experiences and views of young people, but it would be misleading to draw definitive conclusions from this work other than what is represented at face value in the maps. The consolidated map illustrates the range of variables discussed by young people across several European countries, but cannot be said to be representative of their views, given the relatively small sample of voices elicited, and the methodological challenges inherent to qualitative system mapping.

It should also be noted that the merged maps are a pragmatic representation of the country maps i.e. that due to the methodological approach requiring the maintenance of feedback loops (FBL), some variables were 'lost' in the process. This potential 'loss' of exogenous variables is justified in this project for practical reasons, and because feedback loops are the place in a CLD at which to identify the most fruitful levers for change.

Conclusion

The merged country maps show that adolescents in all five countries described a broadly similar experience and views of what drives obesity in adolescents. These maps, and the all-country master map, particularly highlight the importance of factors related to mental health and their relationship to social media and online influencers, driving many of pressures (e.g. on poor body image) and behaviours linked to obesity.

Despite the methodological challenges outlined above, the exercise of having young people map the systems illustrating the variables of importance in adolescent obesity, and how they relate to one another in feedback loops, is novel and innovative in the field of public health, and useful in illustrating the policy relevance of related actions. These feedback loops are the place in a system map at which to identify the most fruitful levers for change: this will be the work of Work Package 7 where in the feedback loops will be translated into a system dynamics computational model (see Deliverable 4.5).
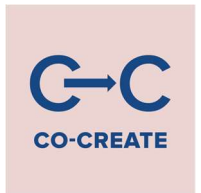
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Hovmand, Peter S. 2014. *Community Based System Dynamics*. Springer New York.

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