



On the construction of a Health Wellbeing Index for 9-month old infants

A Progress Report



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Broad picture

- Part of a bigger research project having as starting point the WHO holistic definition of health as the state of overall wellbeing
- The aim of this project is to use data recorded in the Growing- Up in Ireland study to develop an age specific overall *Wellbeing Index* for Irish children as a predictor of short and long-range developmental outcomes.

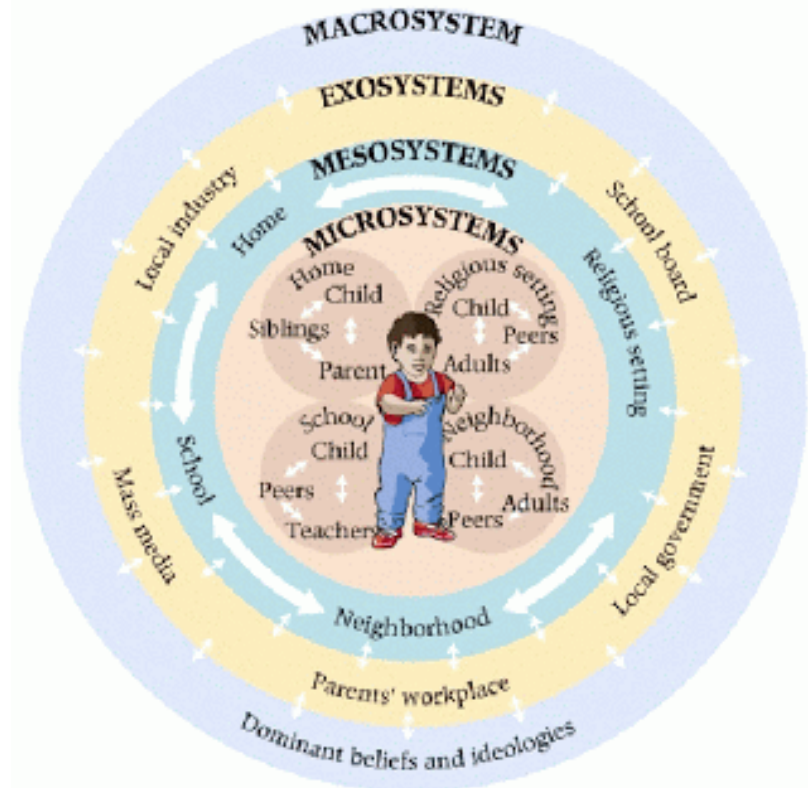


**World Health
Organization**

Conceptual framework

Bio-ecological model of child development
(Bronfrenbrenner & Morris 2006)

Barker hypothesis





Growing up in Ireland

- **Infant Cohort** : 11,534 at Wave 1 (9 months)
10,789 at Wave2 (3 years)
- **Child Cohort:** 8,857 at Wave 1 (9 years)
8,657 at Wave 2 (13 years)
- Investigates factors associated with the development of children: health, social/emotional/behavioral background, educational achievements and intellectual capacities.
- Will assist in understanding developmental patterns and predict short and long-range outcomes.



Methodological framework

At each time point

1. Conceptual framework
2. International literature



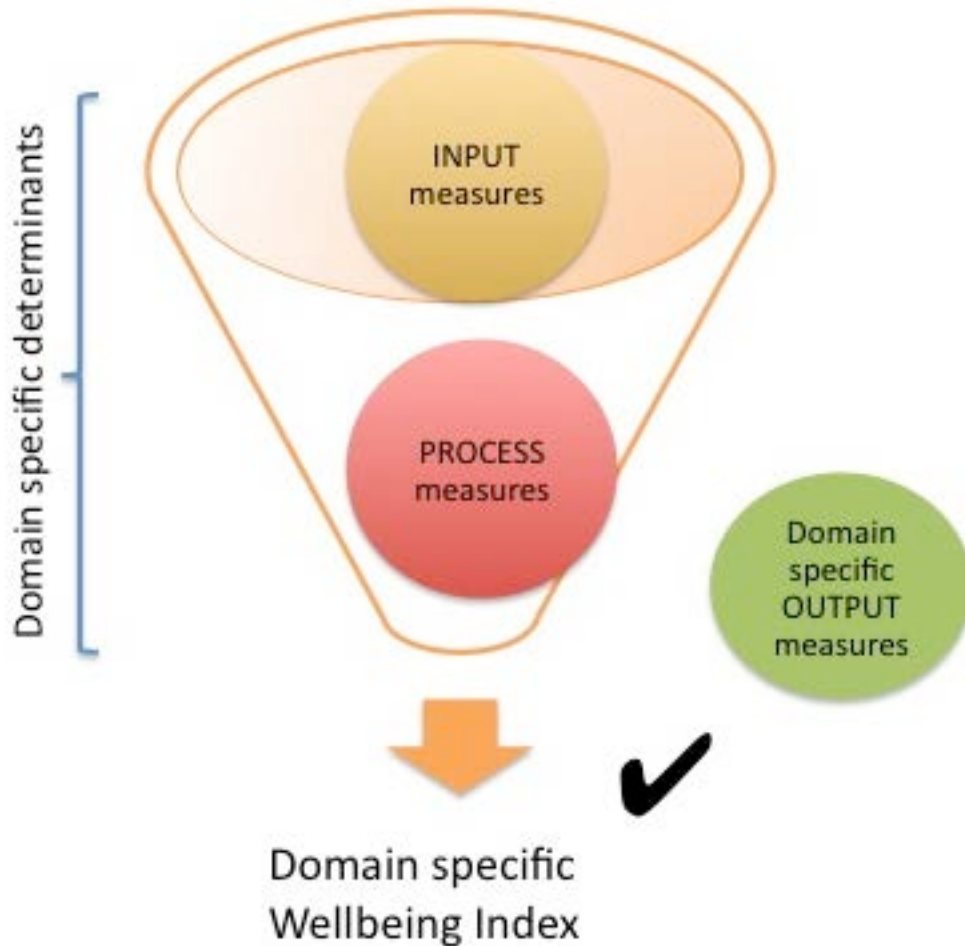
→ 8 domains relevant for children's life



All 8 domains are investigated in the GUI, however not all domains can be applied to all age-groups.

Methodological framework

At each time point



→ for each domain we identify domain specific determinants (INPUT and PROCESS measures)

→ we construct 8 *Domain Specific Indexes* recorded as single scores

→ the predictive ability of these is tested against outcomes recorded for each domain (OUTPUT measures);

→ these are then used to generate an age specific *Wellbeing Index* recorded as single scores for each individual child



Relevance

- “Healthy Ireland- a framework for improved health and well-being 2013-2025” – government document published in 2013
- “State of Nation’s Children”- biennial report- The Department of Children and Youth Affairs
- Researchers



Existing knowledge

Other Children's Quality of Life Indexes

- The vast majority use country-level statistic measures as opposed to individual level data

Examples: UNICEF Children's Wellbeing Index, The Child and Youth Wellbeing Index (USA), Children Outcome Index (Canada)

- The Infant Outcome Index developed from the Longitudinal Study for Australian Children- using individual level data, but it is a measure of children's outcomes and not a predictor of this



The Wellbeing Index

1. is data driven
2. it will provide understanding of what determines developmental outcomes
3. it will be computed at pivotal developmental time points in children's life
4. signaling element that could flag children with poor wellbeing
5. can be decomposed into domain specific indexes
6. will scale the children in terms of their wellbeing
7. national relevance



Currently working on..

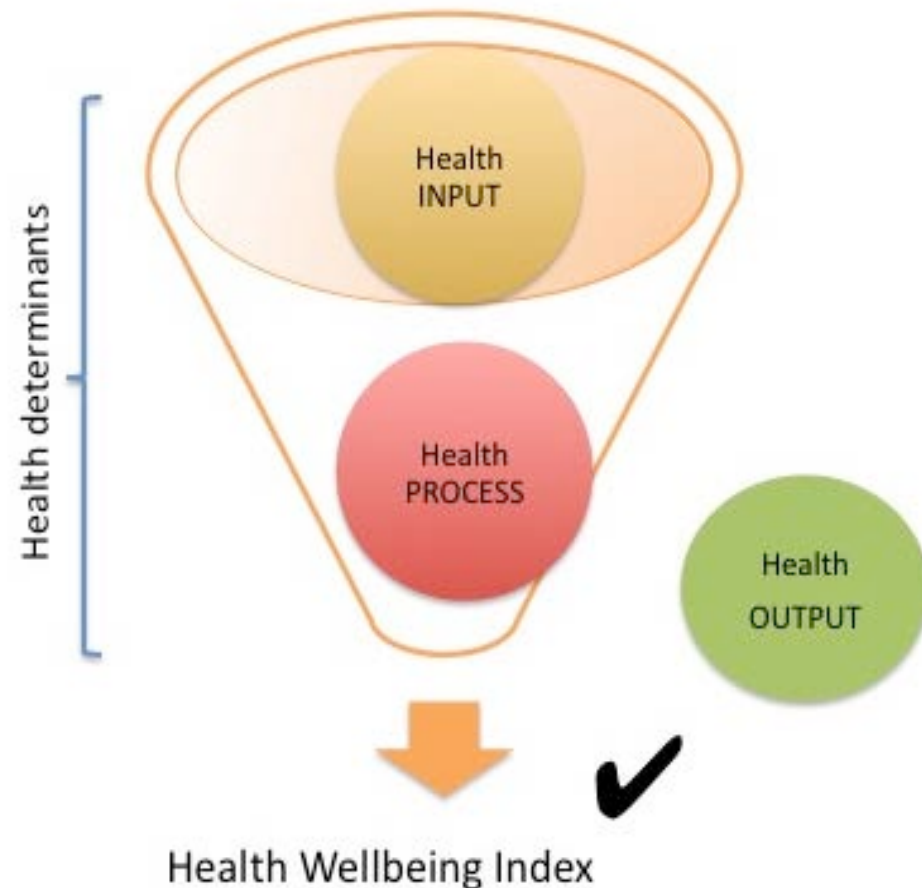
- *Health Wellbeing Index* for the 9-month old infants investigated in the GUI
- Two complementary statistical approaches:
 1. Graphical model (Bayesian network)
 2. Latent trait analysis
- This is the *Stepping Stone* in generating the Wellbeing index



9-month old infants Health Wellbeing Index

Steps in index development:

1. sound conceptual framework and literature review ✓
2. identify physical *health determinants* relevant for the 9-month old infant ✓
3. group these into INPUT and PROCESS measures ✓
4. identify variables relevant to infant physical *health outcomes*- OUTPUT measures ✓
5. THE FUN BEGINS HERE...

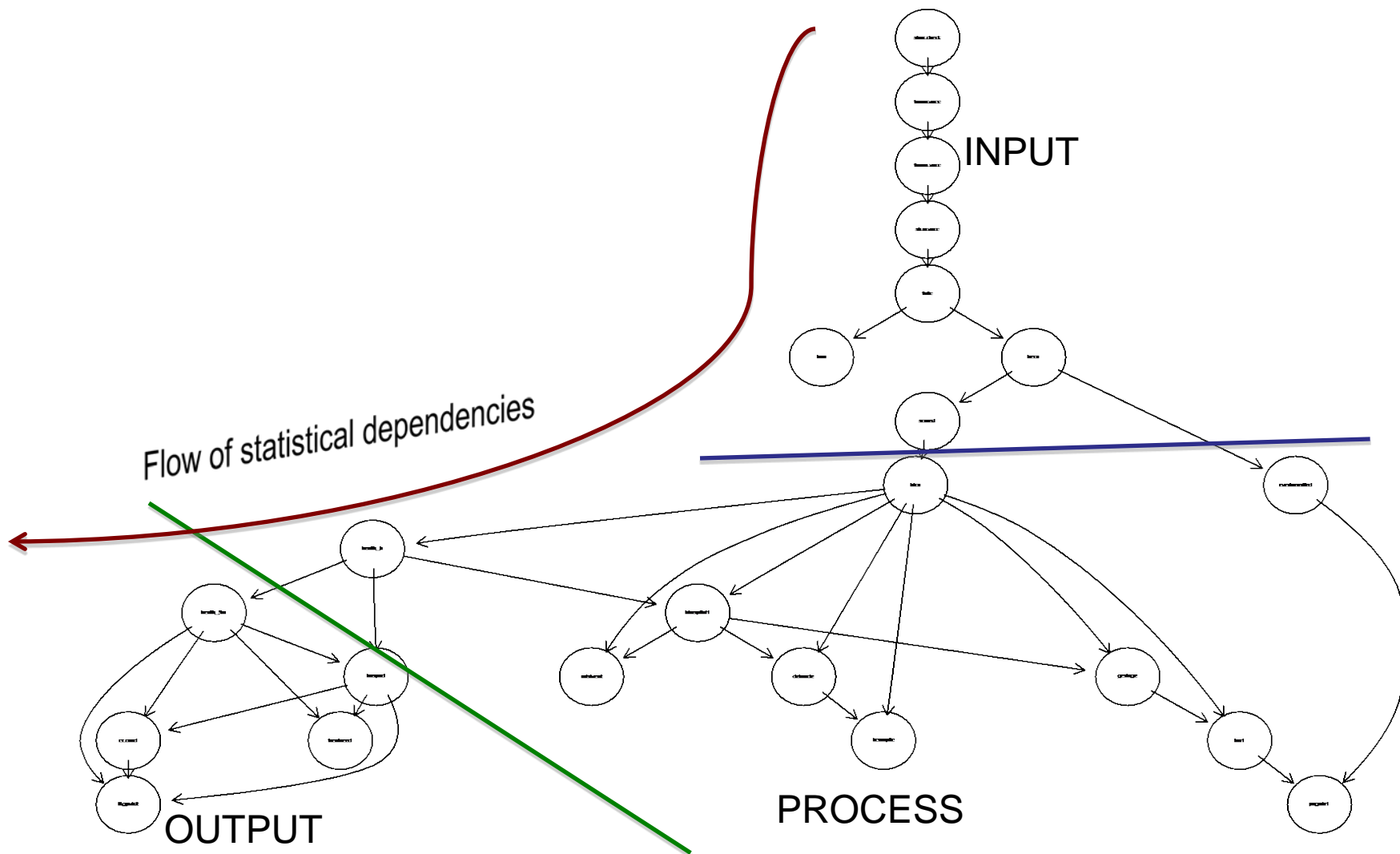


Health at 9 months

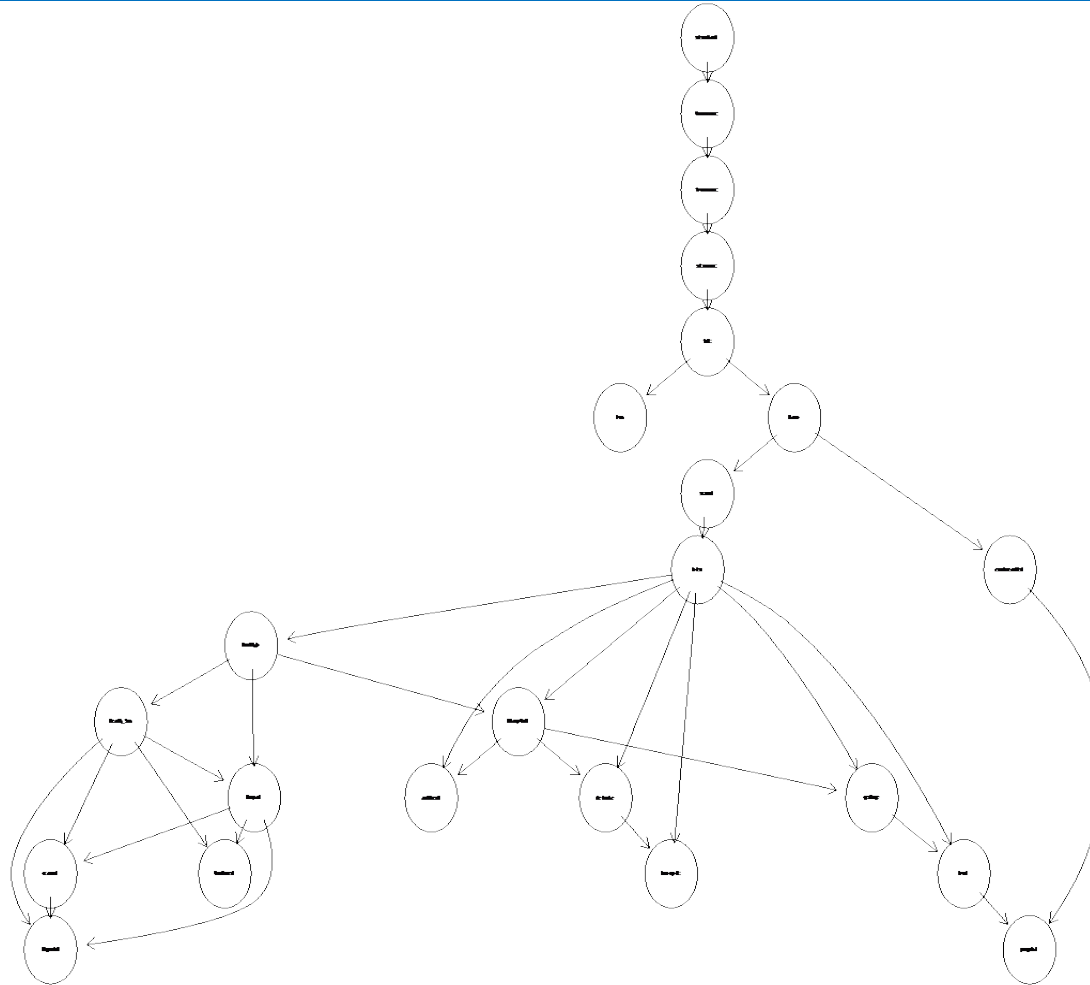
	INPUT MEASURES	PROCESS MEASURES	OUTPUT MEASURES
PRENATAL	1. Maternal intake of Folic acid	1. Weight gain during pregnancy	1. Health at 9 months 2. Hospital admissions during the first 9 months 3. Number of GP visits 4. Diagnosed chronic conditions 5. Nights spent in hospital 6. In need of treatment
	2. Maternal intake of Iron	2. Gestational age	
	3. Recommended number of Ultrasound scans during pregnancy	3. Delivery mode	
NATAL		4. Birth complications	
		5. ICU	
		6. Assisted ventilation needed	
POSTNATAL	4. Six weeks check-up with GP	7. Birth weight	
	5. Two months vaccination	8. Health at birth	
	6. Four months vaccination	9. Place of birth	
	7. Six months vaccination	10. Nights spent in hospital after birth	
	8. Financial aspects of health	11. Breastfeeding	



5. THE FUN BEGINS HERE: Bayesian Network- Health domain 9 month-old infants



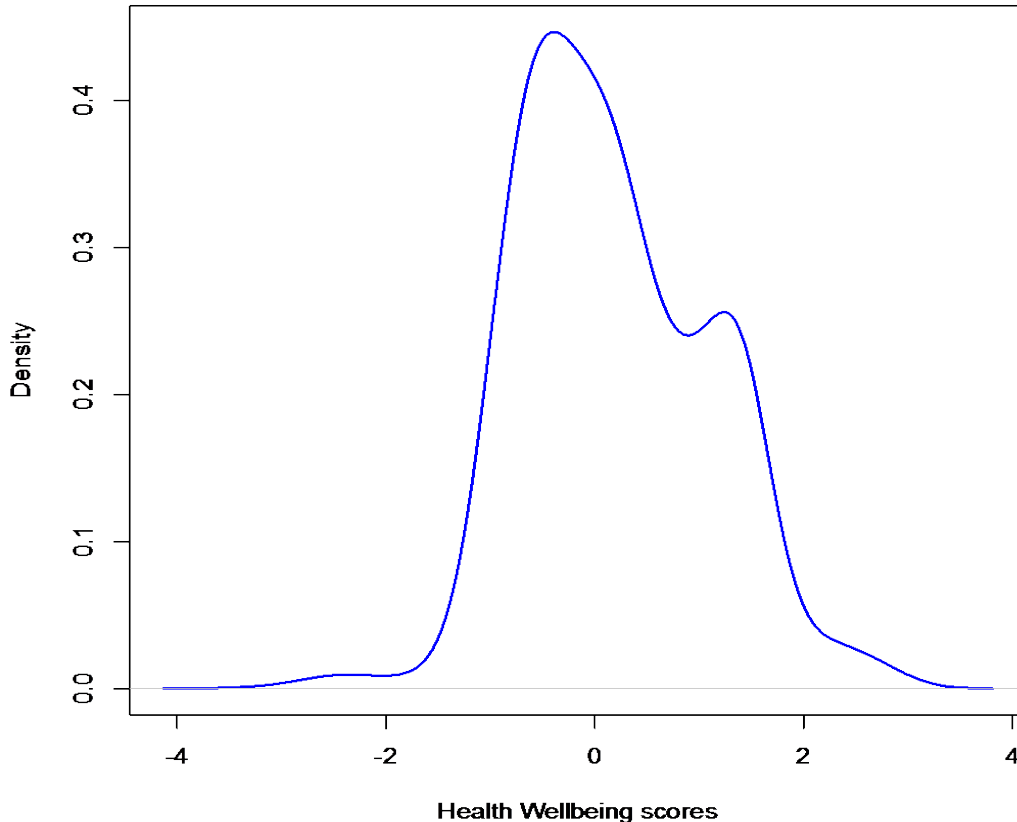
Bayesian Network- OUTPUT





Factor Analysis: Latent Trait Model Health Wellbeing Index at 9 months

Distribution of Health Well-being scores for Irish 9 month-old infants



Summary statistics for Health Wellbeing scores at 9 months

Min. : -3.23
1st Qu.: -0.51
Median: 0.06
Mean: 0.181
3rd Qu.: 0.92
Max. : 2.91

Better
Outcomes





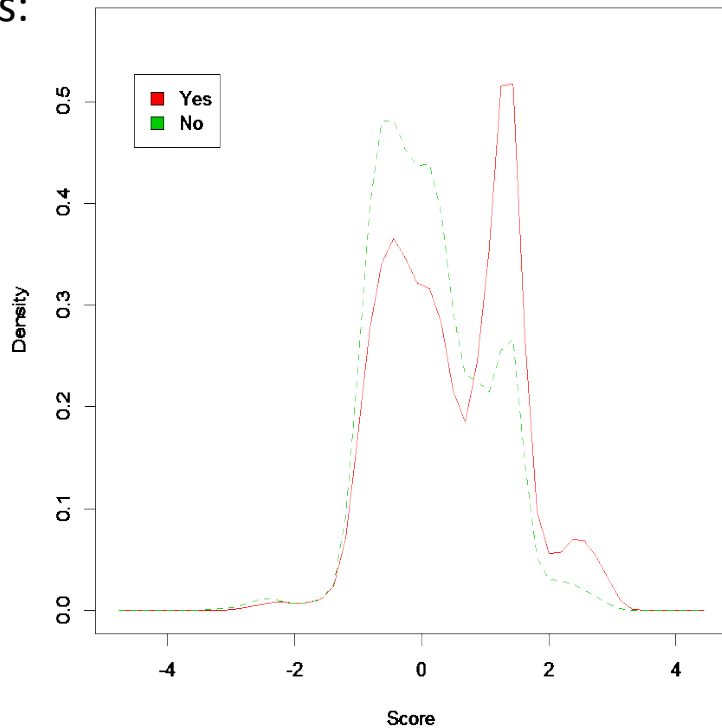
Health Wellbeing scores and OUTCOME measures

Hospital admission during the first 9 months

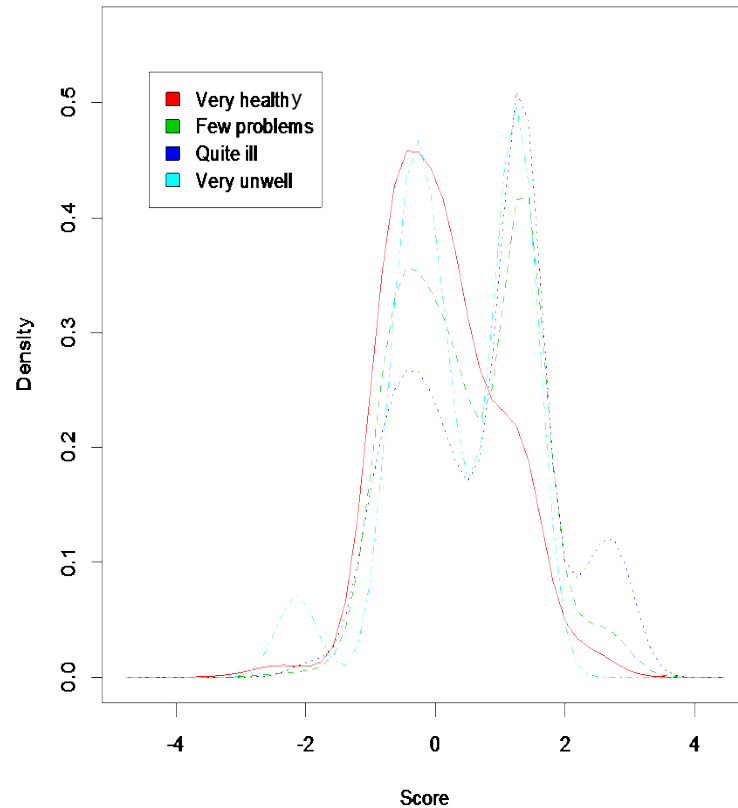
Health at 9 months as perceived by the mother

Group Medians:
 ■ 0.43
 ■ 0.21

Latent Trait by Hospital Admission



Group Medians:
 ■ 0.007
 ■ 0.38
 ■ 1.14
 ■ 0.17



Better Outcomes





Health well-being scores and OUTCOME measures

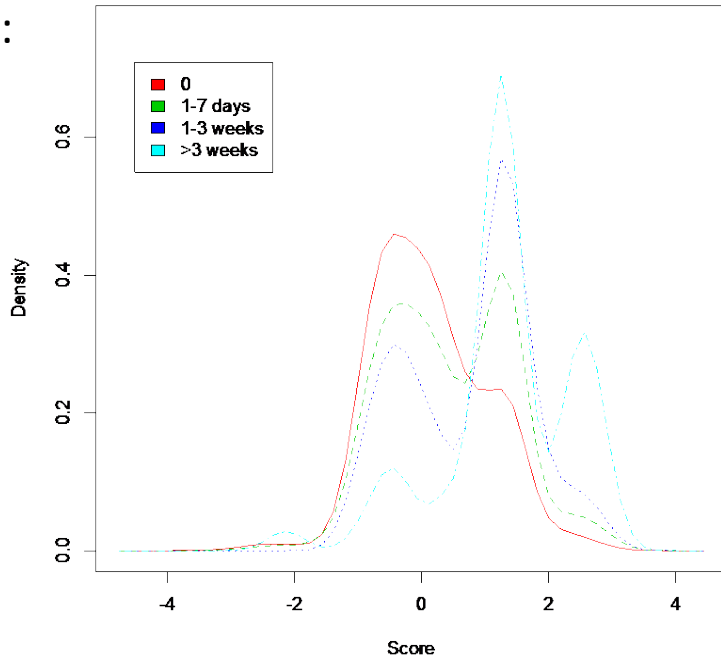
Nights spent in hospital during the 9 months

Diagnosed chronic conditions during the 9 months

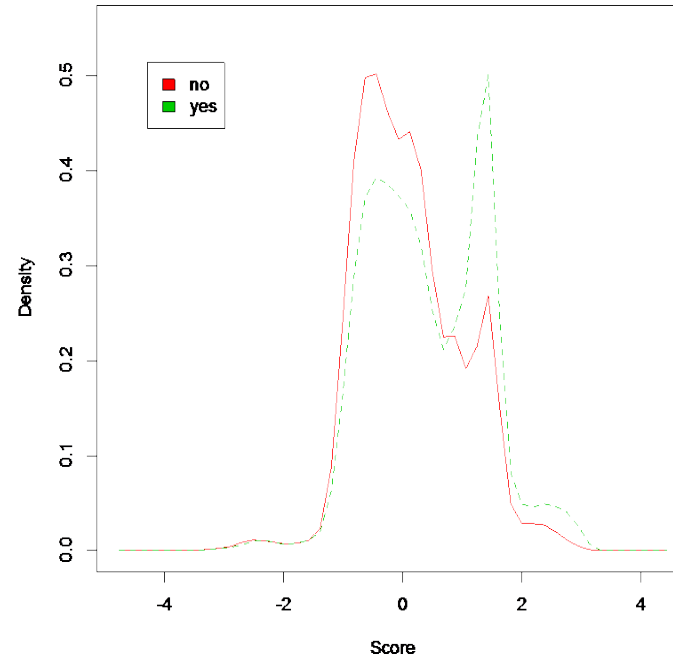
Group Medians:

- 0.021
- 0.34
- 1.12
- 1.25

Latent Trait for numbers of hospital admissions



Latent Trait for presence or absence of chronic conditions



Group Medians:

- 0.005
- 2.87

Better Outcomes





Where to from here..

- Improve on both statistical approaches investigated so far
- As a logical extension to the latent trait model, explore the merit of Structure Equation Models in Index development
- Establish the most appropriate methodology
- Apply this to other domains and develop the Wellbeing Index at 9 months
- Apply methodology to subsequent data waves



Health Wellbeing Index for the 9-month old infants

- *Predictor of outcomes*; not a measure of these
- *Representative* for the *individual* child
- Most *sensitive to the age* band derived for (9 months old)

Still to determine

- *Dynamic*- predictive of the health trajectory of the child at follow-up stages



Why are we doing this?

- Good use of the GUI data
- Novel way to summarize a large data set into a score and allows for classification
- Good indication of the past and present wellbeing for Irish children
- The children of today are the society of tomorrow
- Well children, will become well adults and this will transfer into a well society
- We would like to grow old in a society that is doing well



Acknowledgements

- GUI team
- Prof. Alan Kelly¹
- Dr Lina Zgaga¹

¹Department of Public Health and Primary Care, TCD



Thank you

