Neighbourhood Built Environments and Child Body Size

An Exploratory Structural Equation Modelling Approach

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I am sooooo not a statistician!
Aim:

To assess the relationship between objectively-measured physical activity and nutrition built environments and child body size, adjusting for the potential mediating influences of physical activity and diet.

Philosophical underpinning: the socio-ecological model (Sallis et al., 2015)
Rationale: why we care

Aotearoa is ranked 3rd among OECD countries for children affected by overweight and obesity

*Environments matter*

&

*it’s not about individual responsibility*

We need: an understanding of the relationships between neighbourhood built environment factors and child body size to target public health interventions to the level of the environment
Neighbourhoods for Active Kids

Cross-sectional study in Tāmaki Makarau, Aotearoa
Participants: children years 5 -8 (7-13yrs)

19 Primary and Intermediate schools, selected through the use of a matrix (neighbourhood walkability and socio-economic deprivation)

Data included: body size, physical activity accelerometry, interactive mapping and a PPGIS survey (dietary behaviours, active transport to school etc.).

n=1029, descriptive statistics showed alignment with child population in Aotearoa
What is SEM?
A multivariate statistical analysis technique used to analyse relationships (association not causation)

Why is SEM so awesome?
1) it lets you analyse relationships between latent (observed) constructs
2) it can allow for clustering and multi-level analysis
3) it can deal with missing variables
4) can test for mediation and moderation
5) based on theory
6) starts and ends with a diagram

SEM loves complex data from multiple sources
Did the model fit the data?

RMSEA indicated the SEM supported good fit with the data (RMSEA = 0.014, 90% confidence interval 0.004 - 0.020) (Steiger, 1990).

BUT...

Due to the complexity of the full model (Kelloway, 2014) the CFI and TLI were close to, but not greater than, the value indicator of good model fit ≥ 0.95 (CFI = 0.871, TLI = 0.838) (Hu & Bentler, 1999).
Exploratory SEM

In posthoc analysis we took deprivation away... and got significant findings, in the expected directions.

But that isn’t good SEM practice 😞 SEM is theory based, so.....

*Do we collect data all over again? Or go to exploratory SEM and revisit the theory?*
Exploratory SEM Phase 2, N-model

Based on Phase 1, and recent work (adults, UK) from Hobbs et al., 2019 we moved deprivation.

Based on work from Mavoa et al., 2019, we took out residential density.

Do nutrition built environments matter for kids in Tāmaki Makarau?

Or, is neighbourhood deprivation a greater predictor of body size outcomes in children?

Or is it much of a muchness?

unhealthy food outlets

unhealthy diet behaviours

child body size

neighbourhood level deprivation
SEM results N-model

Did the model fit the data? Yes!

RMSEA =0.012 (90% confidence interval 0.000 - 0.023),
CFI was 0.950
TLI 0.920
N-model SEM results... a summary
“Other Stuff” is important too

Child body size is complex
The environment multi-faceted and complex
“Other stuff” matters (credit to M. Widener)
Deprivation - body size link can’t be explained solely by food outlets
What about Physical Activity?

neighbourhood built environment

health behaviours

child body size
Exploratory SEM phase 3: PA-model

- Physical activity
  - Neighbourhood physical activity built environment
  - Child body size
Exploratory SEM, PA-model

- Parent perceptions
- Physical activity
- Neighbourhood physical activity built environment
- Active transport to school
- Child body size
PA-model in progress

- Parental perceptions of active transport to school
- Active transport to school
- Physical activity
- Child body size

- Neighbourhood physical activity built environment
- Neighbourhood level deprivation
- Parental perceptions of neighbourhood safety

- Built environment
- Neighbourhood level deprivation
- Parental perceptions of neighbourhood safety
To conclude

SEM is awesome
Environments matter
Deprivation matters
Child body size is complex and “other stuff” is important too

Highlights the importance of multi-level interventions

Thank you

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