

# Economic evaluation of the OPAL programme

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# What is economic evaluation?

- Economic evaluation is designed to promote 'efficiency' i.e. to determine whether resources are being used to get the best value for money
- Not about cutting costs
- Efficiency is concerned with the relation between resource inputs (costs) and health outcomes (lives saved, life years gained, quality adjusted life years (QALYs))

# Economic evaluation

- Weighing up costs and benefits
- Systematic and transparent
- Aims to inform decision-making



# Economic evaluation of public health interventions

- Raises additional methodological challenges in comparison with economic evaluations of clinical interventions
- Public health interventions generate broad costs and benefits
- Often directed at communities or populations rather than specific patient groups
- A QALY is a QALY is a QALY but for public health programmes the distribution of health gains (equity) may be more important than the max of health gains (efficiency)

# Economic evaluation of public health interventions –methodological challenges

## 1. Attribution of effects

- RCTs are gold standard for evaluation of medical interventions but may not be practical for many public health interventions
- Economic evaluation alongside a clinical trial is often limited to time horizon of the trial whereas public health programmes may impact on longer term health outcomes

# Economic evaluation of public health interventions –methodological challenges

## 2. Measuring and valuing outcomes

- Outcomes beyond the QALY may be important e.g. reassurance, creation of an informed public, education outcomes

## 3. Identifying inter-sectoral costs and consequences

- Costs and benefits associated with an intervention may fall on many parts of the public sector

# BMI, Health Behaviors, and Quality of Life in Children and Adolescents: A School-Based Study

**WHAT'S KNOWN ON THIS SUBJECT:** Existing literature indicates relationships between BMI, physical activity, sleep patterns, eating behavior, and health-related quality of life in children and adolescents. However, many previous studies have used non-preference-based instruments, which are not suitable for application within economic evaluation.

**WHAT THIS STUDY ADDS:** The Child Health Utility 9D, a new preference-based health-related quality of life instrument for application in economic evaluation in children and adolescents, revealed stronger associations between utilities and sleep patterns or eating behavior than with BMI, physical activity, or sedentary behavior.

## abstract

**OBJECTIVE:** To explore the relationship between weight status (BMI) and health-related quality of life in children and adolescents through application of the Child Health Utility 9D, a new generic preference-based instrument.

**METHODS:** Data were collected from primary and high school students in rural and metropolitan regions of South Australia. Consenting participants (2588 in grades 4–6 and 765 in grades 9–10) were weighed and measured and categorized as underweight, healthy weight, overweight, or obese according to International Obesity Taskforce BMI cutoff points (primary outcome). Participants also completed a questionnaire including the Child Health Utility 9D and standardized measures of physical activity, sedentary behavior, sleep patterns, and eating behavior (secondary outcomes). Descriptive and multivariate linear regression analyses were undertaken to calculate mean utility differences.

**RESULTS:** In comparison with healthy-weight primary school students, adjusted mean utilities were lower for overweight ( $-0.016$ ,  $P = .02$ ) or obese ( $-0.039$ ,  $P = .001$ ) students. For high school students, the adjusted mean utilities were also lower for overweight and obese students but were nonsignificant ( $-0.018$ ,  $P > .10$ ). Physical activity, sedentary behavior, sleep patterns, and eating behavior were all found to be significantly associated with utilities.

**CONCLUSIONS:** Irrespective of BMI, young people engaging in more physical activities or less sedentary behavior, and having healthier sleep patterns or eating behavior exhibited higher utilities. Associations between utilities and sleep patterns or eating behavior were stronger than the associations with BMI. Future economic evaluations for obesity interventions should more formally investigate the relationship between changes over time in weight status and health-related quality of life for children and adolescents. *Pediatrics* 2014;133:e868–e874

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### KEY WORDS

health-related quality of life, utility, BMI, adolescent, children, Australia

### ABBREVIATIONS

CHU9D—Child Health Utility 9D

HRQoL—health-related quality of life

ICSEA—Index of Community Socio-Educational Advantage

MCD—minimum clinically importance difference

NONPAS—National Children's Nutrition and Physical Activity Survey

OPAL—Obesity Prevention and Lifestyle

Dr Chen carried out the initial analyses, drafted the initial manuscript, and revised the manuscript; Professor Rataliffe conceptualized and designed the study, designed the data collection instruments, and reviewed and revised the manuscript; Professor Olds and Associate Professor Magarey designed the data collection instruments and reviewed and revised the manuscript; Dr Jones coordinated ethics applications, selection of Obesity Prevention and Lifestyle intervention program intervention and comparison communities, and data collection and reviewed and revised the manuscript; Dr Leslie prepared ethics applications, coordinated and supervised data collection and data management, and reviewed and revised the manuscript; and all authors approved the final manuscript as submitted.

www.pediatrics.org/cgi/doi/10.1542/peds.2013-0622

doi:10.1542/peds.2013-0622

Accepted for publication Jan 3, 2014

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# HrQOL – Child Health Utility 9D (CHU9D)

- Generic preference based measure of HrQoL for young people, developed from its inception with young people
- Originally for younger children aged 7 to 11 years
- Recent studies have demonstrated the practicality, face and construct validity of the CHU9D in 11-17 year olds (Ratcliffe *et al.*, 2011; Stevens and Ratcliffe, 2011; Ratcliffe *et al.*, 2012)
- Adolescent specific scoring algorithm (Ratcliffe *et al.*, 2012).



### 1. Worried

I don't feel worried today  
I feel a little bit worried today  
I feel a bit worried today  
I feel quite worried today  
I feel very worried today

### 2. Sad

I don't feel sad today  
I feel a little bit sad today  
I feel a bit sad today  
I feel quite sad today  
I feel very sad today

### 3. Pain

I don't have any pain today  
I have a little bit of pain today  
I have a bit of pain today  
I have quite a lot of pain today  
I have a lot of pain today

### 4. Tired

I don't feel tired today  
I feel a little bit tired today  
I feel a bit tired today  
I feel quite tired today  
I feel very tired today

### 5. Annoyed

I don't feel annoyed today  
I feel a little bit annoyed today  
I feel a bit annoyed today  
I feel quite annoyed today  
I feel very annoyed today

### 6. Schoolwork/homework

I have no problems with my schoolwork/homework today  
I have a few problems with my schoolwork/homework today  
I have some problems with my schoolwork/homework today  
I have many problems with my schoolwork/homework today  
I can't do my schoolwork/homework today

### 7. Sleep

Last night, I had no problems sleeping  
Last night, I had a few problems sleeping  
Last night, I had some problems sleeping  
Last night, I had many problems sleeping  
Last night, I couldn't sleep at all

### 8. Daily routine

I have no problems with my daily routine today  
I have a few problems with my daily routine today  
I have some problems with my daily routine today  
I have many problems with my daily routine today  
I can't do my daily routine today

### 9. Able to join in activities

I can join in with any activities today  
I can join in with most activities today  
I can join in with some activities today  
I can join in with a few activities today  
I can join in with no activities today

Child Health Utility 9D domains and levels  
(Source: Ratcliffe *et al.*, 2012, page. 715)

# Baseline HrQOL Study Methods

- Data: OPAL baseline survey phase 1/2 only

3,386 students (77.1% were primary school students) consented to participate in the survey → 3,011 students (88.9%) have sufficient data to calculate BMI → 2,995 students (88.5%) also reported HRQoL

- Anthropometry measures and classification

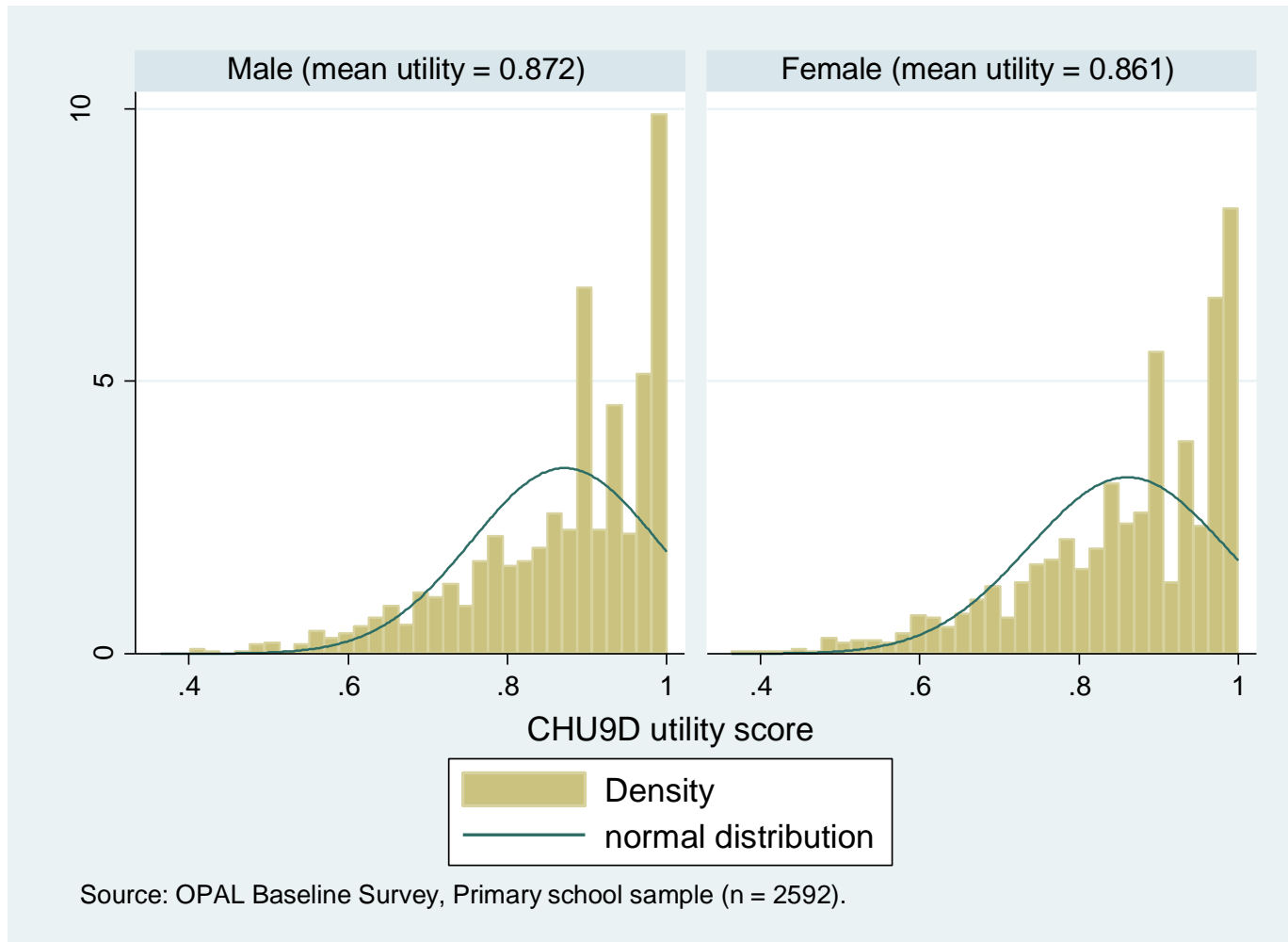
Each consenting student was measured in a private and screened area out of view of other students by a trained researcher

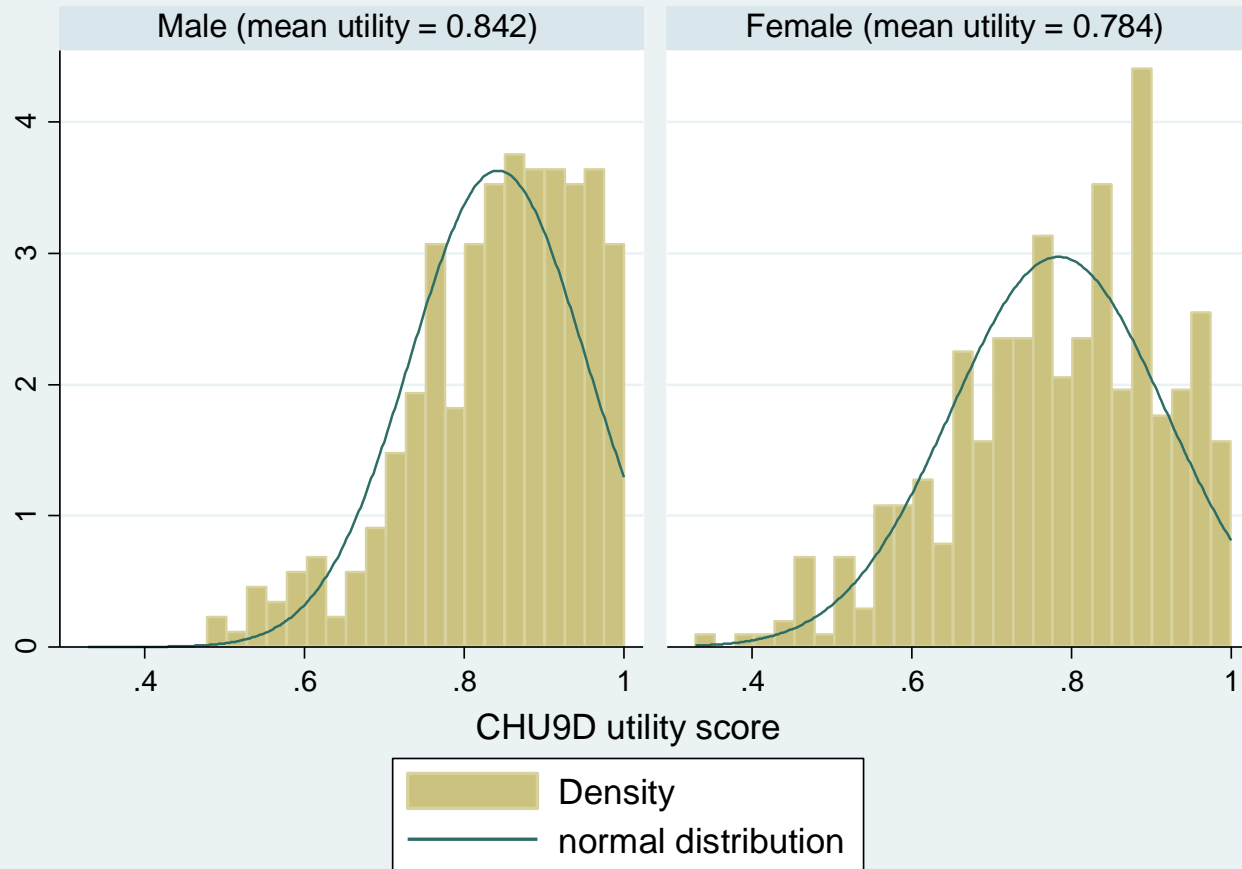
Participants were categorised as underweight, normal weight, overweight or obese using the International Obesity Taskforce cut-points (Cole *et al.*, 2000, Cole *et al.*, 2007)

# Behaviour measurements

- Self-reported on-line questionnaire:
- demographics, eating behaviour, body image, **health related quality of life (CHU-9D)**, physical activity, sedentary behaviour, perceptions of the environment (school, neighbourhood and family) and sleeping patterns
- Physically active days
- Sedentary days
- Average screen hours
- Average bedtime on school and non-school days
- Sleep duration
- Frequency of eating fast food or takeaway

# Results





Source: OPAL Baseline Survey, Secondary school sample (n = 765).

**Table 3A - Mean scores of CHU9D utility by weight status and gender  
(Primary school sample)**

	N	Mean	SD	P value <sup>†</sup>
All sample				0.06
Underweight	154	0.867	0.127	
Normal	1674	0.872	0.114	
Overweight	396	0.858	0.122	
Obese	107	0.832	0.157	
Male				0.33
Underweight	69	0.863	0.139	
Normal	845	0.875	0.113	
Overweight	197	0.873	0.117	
Obese	49	0.829	0.144	
Female				0.03
Underweight	85	0.871	0.118	
Normal	829	0.870	0.115	
Overweight	199	0.842	0.126	
Obese	58	0.834	0.168	

† Kruskal Wallis test.

**Table 3B - Mean scores of CHU9D utility by weight status and gender  
(Secondary school sample)**

	N	Mean	SD	P value <sup>†</sup>
All sample				0.39
Underweight	43	0.812	0.154	
Normal	520	0.817	0.120	
Overweight/ Obese	101	0.806	0.117	
Male				0.28
Underweight	13	0.878	0.126	
Normal	257	0.843	0.107	
Overweight/ Obese	49	0.840	0.108	
Female				0.41
Underweight	30	0.783	0.158	
Normal	263	0.792	0.127	
Overweight/ Obese	52	0.773	0.117	

† Kruskal Wallis test.

**Table 4A - Mean scores of CHU9D utility by behaviour domains and gender  
(Primary school sample)**

	Full	Boys	Girls
<b>Physical activity for at least 1 hr in the last 7 days</b>			
6 - 7 days	0.873	0.882	0.863
3 - 5 days	0.869	0.874	0.865
0 - 2 days	0.851	0.851	0.851
<b>Screen hour for at least 2 hrs in the last 7 days</b>			
0 day	0.888	0.897	0.881
1 - 2 days	0.867	0.876	0.858
3 - 7 days	0.856	0.860	0.851
<b>Average bedtime</b>			
≤ median time	0.876	0.880	0.873
> median time	0.859	0.872	0.847
<b>Eat fastfood or takeaway</b>			
Never/sometimes	0.870	0.875	0.865
Often/a lot	0.830	0.844	0.812



**Table 4B - Mean scores of CHU9D utility by behaviour domains and gender  
(Secondary school sample)**

	Full	Boys	Girls
<b>Physical activity in the last 7 days</b>			
6 - 7 days	0.814	0.840	0.775
3 - 5 days	0.819	0.848	0.797
0 - 2 days	0.775	0.821	0.756
<b>Screen hour for at least 2 hrs in the last 7 days</b>			
0 day	0.838	0.873	0.819
1 - 2 days	0.821	0.849	0.797
3 - 7 days	0.802	0.834	0.770
<b>Average bedtime</b>			
≤ median time	0.834	0.861	0.815
> median time	0.799	0.840	0.765
<b>Eat fastfood or takeaway</b>			
Never/sometimes	0.816	0.847	0.789
Often/a lot	0.780	0.812	0.754

# Baseline HrQOL Study Findings

- In general, students within the healthy weight range, engaging in more physical activities or less sedentary behaviours, and maintaining more healthy sleep pattern or eating behaviour had higher CHU-9D scores reflecting higher levels of HrQoL

# Current related research

- CHU9D incorporated into latest wave of LSAC (Longitudinal study of Australian children) self-report iPads N=4983 K cohort
- CHU9D incorporated into the second Australian child and adolescent survey of mental health and wellbeing N=2967 tablet computer
- Evaluation of physical activity intervention in Nanjing province China (funded by the International Olympic Committee), environments for healthy living (China)
- RCTs in preventive health interventions nutrition and physical activity (Australia and UK)

# Future potential research

- Upscaling to incorporate systems evaluation
- Monitoring of child and adolescent quality of life (LSAC demonstrates feasibility)
- Assessment of cost effectiveness of prevention activity including e.g. Regional Public Health Planning
- Main challenges include attribution of effects where quality of life improvement are found, also capturing wider potential benefits e.g. reassurance, creation of an informed public, education outcomes
- Adequately capturing costs and benefits of prevention activities especially for assessment of longer term impacts

# Acknowledgements [1]

- The work presented in this paper was commissioned by SA Health from Flinders University. The OPAL by EPODE is a joint program of the Australian, State and Local governments. The views expressed are solely those of the authors and do not necessarily reflect those of the South Australian Government, or any other Australian, State, Territory or Local government.
- The authors are grateful to all the students (and their parents), principals, and schools for consenting to be involved in the OPAL Evaluation Project. The authors acknowledge the Flinders University OPAL Evaluation Project team and relevant groups for their contributions to data collections, cleaning and management.

# Acknowledgements [2]

- Source of financial support: Financial support from the Obesity Prevention and Lifestyle (OPAL) intervention program funded by the South Australian Department of Health and an Australian NHMRC Project Grant 1021899 entitled 'Adolescent values for the economic evaluation of adolescent health care treatment and preventive programs' is gratefully acknowledged.
- The usual disclaimer applies. There are no conflicts of interests for any of the authors.



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Thank you