

## An economic method for making better policies for our children's future.

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## Overview of Presentation

- Evidence of what works – Summary of outcomes of a meta-analytic review
- Policy decisions using unstructured protocols – evidence base (where it exists) evaluates programs on a range of different outcomes, making comparison across programs difficult
- Results from a study using an *analytic hierarchy process* (from operations research) as a method for making structured decisions with respect to early-in-life intervention programs
- AHP method allows measurement of *relative utility values* for salient adolescent outcomes resulting from various early-in-life intervention programs
- This in turn allows for calculation of *relative priority rankings for alternative early-in-life interventions* with respect to their perceived enhancement of quality of life by key stakeholders
- Concluding remarks

## What our method does that is new

- Conventional cost-benefit analyses focus on:
  - » savings to the government (e.g., criminal justice costs avoided)
  - » or to the community (e.g., savings to potential crime victims)
- Conventional methods:
  - » can only assign value to long-term outcomes
  - » assign limited (if any) value to improvements in quality of life to the children involved, or their families, teachers etc.
- Our method:
  - » calculates rankings of key stakeholders for alternative early-in-life interventions
  - » with respect to their *perceptions of associated improvements in quality of life outcomes during adolescence*, and in so doing
  - » *elicits utility values* for various adolescent outcomes (e.g. cognitive development, social-emotional development)
  - » thus *creating a common metric of value and a decision process* that permit the benefits to key stakeholders of a variety of intervention approaches to be compared

## Importance of Early-in-Life Interventions on Life Trajectories

- Early childhood (0-5) is important because *it comes first*: life foundations are laid
- The first in a series of important life phases
- Early-in-life interventions aim to boost a child's positive development, especially in *disadvantaged populations*
- Early childhood intervention programs (birth to five years) that employ a risk-focused approach can achieve positive effects on outcomes of children who are considered at-risk at an early age (Homel, 2005).
- "...initial gains in intellectual and achievement scores, and longer-term outcomes reflecting more successful school experiences...reduction of behavioural problems and delinquency" (Brooks-Gunn, Fuligni, & Berlin, 2003, p.5-9).

## Previous Cost Comparison Findings

- Pathways to Prevention Intervention in disadvantaged urban community in Brisbane
- Preschool Intervention – both literacy/numeracy and family support in partnership with Mission Australia and Education QLD
- Cost Comparison with Interventions when Problems Arise (Behaviour Modification Units, Special School, Reading Recovery, etc) demonstrated Early Intervention costs were lower by a 20:1 ratio (Manning, Smith and Homel 2006)
- But limited evidence available re: effectiveness of these alternatives partly because this early intervention in place for a limited number of years
- Early Interventions overseas have longer histories and systematic follow-ups

## Summary of Evidence: Meta-Analysis

- 11 interventions in early childhood (0-5) - 17 follow-up studies into the adolescent years
- Prospective design with control groups - usually randomised designs
- At least one outcome measure from 7 domains
- Effect sizes calculated
  - Cohen's *d*, corrected for small sample bias
  - combined into a weighted effect size  $\underline{d}$  for each domain
  - Heterogeneity of effect sizes computed (*Q*)
- Focus on disadvantaged children, or those living in disadvantaged areas

### Types of interventions (note frequent overlaps)

- Structured preschool program (e.g., Abecedarian Project)
- Centre-based developmental day care (e.g. Parent-Child Development Centres)
- Home visitation: linking parents to services, promoting parent-child attachment etc - Olds' programs
- Family support services (e.g., Syracuse Family Research Development Program)
- Parent education (e.g., Triple-P - although this program has as yet no adolescent follow-ups in Australian context)

### Outcome domains and mean effect sizes

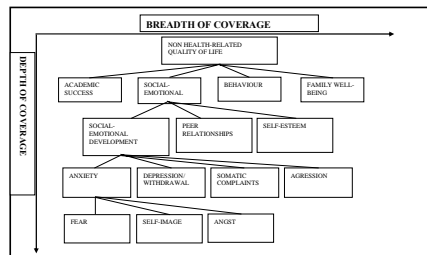
- *Educational success* (e.g., feeling of belonging, graduation, long-term suspension).  $d = 0.53$
- *Cognitive development* (e.g., achievement, failure)  $d = 0.34$
- *Social-emotional development* (social skills, self-esteem)  $d = 0.16$
- *Self-reported deviance* (e.g., drug use, running away)  $d = 0.48$
- *Social participation* (casual employment, makes active responses to problems etc)  $d = 0.37$
- *Criminal justice* (juvenile arrest, incarceration etc)  $d = 0.24$
- *Family wellbeing* (child maltreatment, parent-adolescent attachment etc)  $d = 0.18$

### Conclusions

- Preschool interventions can have important positive benefits in adolescence: *overall mean effect size = 0.31, corresponding to a 62% higher mean score than in the control*
- Longer duration and greater intensity produced additional benefits
- Programs with "follow through" had slightly greater effects

### Problems faced by Policy-Makers

Policy decisions which have the potential to have significant impact on individuals' quality of life are not limited to single elements...rather they are complex multi-criteria problems, which incorporate a number of elements which are hierarchically nested (Manning, 2008).



### Decision Problem

- Which early childhood intervention is the most preferred option with respect to its contribution to non health-related quality of life?
- Funding issues – what programs and how much?
- Structured process needed for making complex multi-criteria decisions incorporating all salient elements of a decision

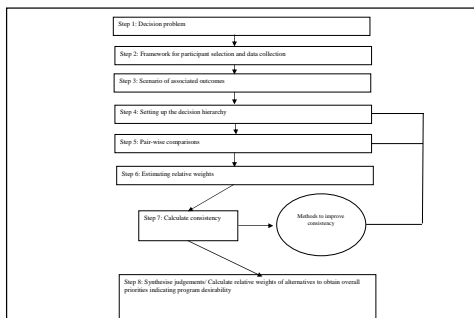
## The AHP process

- Saaty's (1977) analytic hierarchy approach provides a systematic procedure for representing the elements of a problem, rationally disaggregating the elements into smaller constituent parts, and introducing simple pair-wise comparison judgements for use in developing preference weights for priority ranking alternatives

## AHP

- Attaining preference/relative utility values - Decisions regarding alternative early childhood intervention program options and their contribution to increasing non-health related quality of life during the adolescent life phase (goal).
- Through the use of a backward process - determine the actions that are needed to achieve the desired outcome (Alexander & Saaty, 1977b).
- Two assumptions are made in the formation of the hierarchy: (1) each element of a level in a hierarchy is related to other elements in adjacent levels, and (2) no relationship exists between elements on the same level (Cheng & Li, 2001a; Saaty, 1990b).

## Method used in study



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- Detailed outline of method (including axiomatic foundations) provided in Manning's PhD thesis (2008)
- The individuals who make up the study and control groups of early childhood intervention programs described in longitudinal research (meta-analysis) are considered those most at-risk.

## Decision Problem

- Determine, among the alternatives available, the most preferred early childhood intervention program that is considered, by a series of experts, to have the most potential to enhance non health-related quality of life outcomes (e.g. cognitive development, social-emotional development) during adolescence.

## Pilot Survey Participants

- Participants ( $n = 25$ )
- Four distinct stakeholder groups:
  1. Policy development group ( $n=5$ ) (e.g. representatives of Queensland Department of Communities, Department of Child Safety, Queensland Health, Department of Education, Training and the Arts);
  2. School level group ( $n=8$ ) (e.g. school teachers and principals, co-ordinators of childcare centres, and co-ordinators of crèche and kindergartens);
  3. Community agencies group ( $n=7$ ) (e.g. management and senior staff of private community organisations involved in the delivery of community-based developmental intervention programs);
  4. Academic group ( $n=5$ ) (e.g. academic researchers – e.g. developmental prevention and early education).

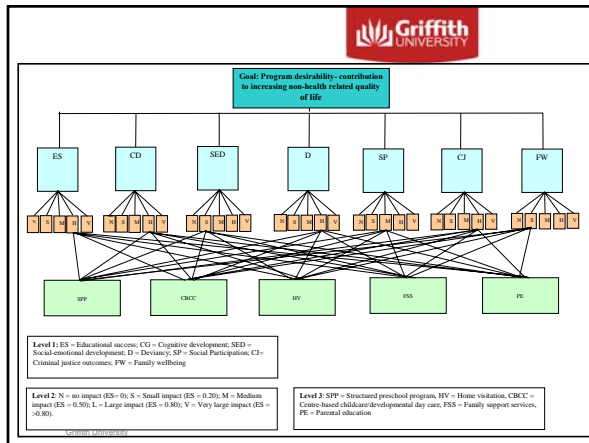
## Data Collection

Two surveys:

- Survey 1 (policy development group and the academic group) related to the strength of the various outcomes (educational success, cognitive development, social-emotional development, deviancy, social participation, criminal justice outcomes, and family wellbeing) with respect to their potential contribution to increased non-health-related quality of life during the adolescent life years.
- Participants asked to express preferences among the intensities of the attributes by developing seven matrices that compare outcome levels of success (no effect, small effect, medium effect, high effect, and very high effect) in pairs with respect to each attribute.

## Data Collection

- Survey 2 (school-level group and the community agencies group) aimed to determine perceived program standings (structured preschool program, home visitation, centre-based childcare/developmental day care, family support services, and parental education) in pairs with respect to the most desired attribute intensities derived from the first survey.



## Hierarchy

- Top of hierarchy: Represents the overall goal (program desirability based on contribution to increasing non-health related quality of life during the adolescent life phase).
- Level 1: Represents attributes considered most relevant to achieving improvements in non-health related quality of life (attributes derived from objective research (meta-analysis)).
- Level 2: Highlights five possible outcomes (no impact, small impact, medium impact, large impact and very large impact), which may result from the various attributes or domains in level 1 of the hierarchy.
- Level 3: Provides the various preschool program options (structured preschool program, centre-based childcare/developmental day care, home visitation, family support services, and parental education) that potentially contribute to an increase in non health-related quality of life during adolescence.

## Matrix of outcome domains – Level 1

Goal	ES	CD	SED	D	SP	CJO
ES	1	1/4	1/5	1/4	5	1/6
CD	4	1	1/3	3	6	1/2
SED	5	3	1	4	7	3
D	4	1/3	1/4	1	5	1/5
SP	1/5	1/6	1/7	1/5	1	1/7
CJO	6	2	1/3	5	7	1
	20.20	6.75	2.25	13.45	31	5.01

## Saaty's comparison scale

Intensity of Importance	Definition	Explanation
1	Equal importance	Two elements are of equal importance
3	Weak importance	Experience and judgement slightly favour one element over another
5	Essential or strong importance	Experience and judgement strongly favour one element over another
7	Demonstrated or very strong importance	An element is strongly favoured and its dominance is demonstrated in practice
9	Absolute importance	The evidence favouring one element over another is of the highest possible affirmation
2,4,6,8	Intermediate values	When compromise is needed

### Estimating relative weights

- Estimating relative weights, calculating consistency of responses, synthesis of judgements, and calculating relative weights of alternatives to obtain overall priorities indicating program desirability were achieved by using method proposed by Saaty (1980).
- We contribute to the AHP method by employing a well established method (meta-analysis) for summarising outcomes of longitudinal research. Results of the meta-analysis are then used to develop the hierarchy and also provide respondents with a summary of empirical research to assist them in making decisions that are objective in nature.

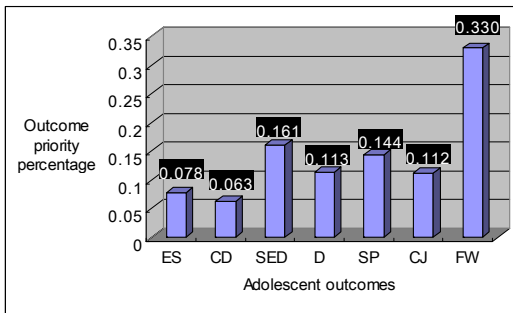
### Results

	ES	CD	SED	D	SP	CJ	FW
ES	1.00	0.79	0.30	0.52	1.08	0.89	0.28
CD	(1.27)	1.00	0.28	0.42	0.58	0.39	0.26
SED	3.33 (2.36)	3.55 (2.43)	1.00	0.84	0.70	1.02	0.78
D	1.92 (2.44)	2.36 (3.10)	1.19 (1.90)	1.00	0.37	0.99	0.23
SP	0.93 (1.46)	1.73 (1.90)	1.43 (1.73)	2.71 (2.38)	1.00	1.19	0.28
CJ	1.12 (1.92)	2.54 (2.50)	0.98 (1.20)	1.01 (1.11)	1.01 (1.14)	1.00	0.29
FW	3.63 (2.63)	3.90 (1.60)	1.27 (1.05)	4.43 (2.09)	3.46 (2.34)	3.46 (2.42)	1.00

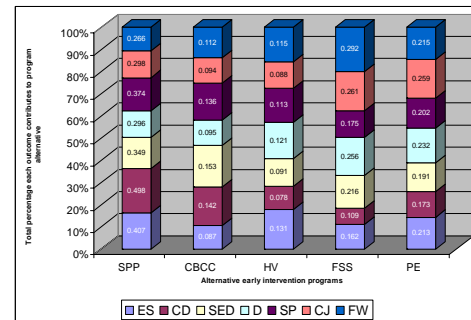
Priority  
0.078  
0.063  
0.161  
0.113  
0.144  
0.112  
0.330

$\lambda_{max} = 7.48$ ; C.I = 0.08; C.R = 0.06  
Note: figures in brackets represent the standard deviation across 10 respondents; Shaded figures represent the reciprocal of average responses

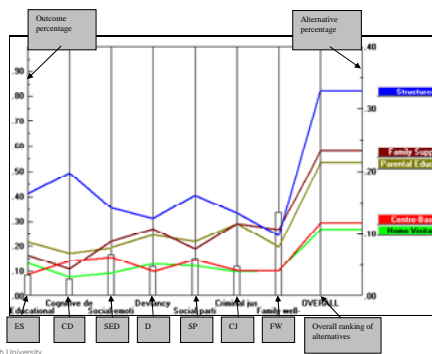
### Results



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### Limitations

- Pilot Study
  - Not all stakeholders included in study
- Not all elements included into the hierarchy – Further research can construct more detailed hierarchies that incorporated the most relevant indicators of our seven outcome domains (ES, CD, SED, D, CJ, SP, and FW).
- Small number of survey respondents
- Survey limited to constructing priority ranking and relative utility values for early childhood interventions using a survey participant base limited to Brisbane, Australia.

## Summary and Conclusion

- Evaluation of Early Childhood Interventions need to take into account effectiveness in terms of quality of life outcomes
- Can draw upon published evaluations of similar programs in other jurisdictions using meta analysis – especially where looking at impacts of a particular pre-school intervention (for example) on outcomes a number of years post intervention (eg. impact on a range of outcomes in adolescence)
- Do not have to wait for the 8-10 years post intervention to elapse in the current jurisdiction before performing the evaluation needed to obtain ongoing funding for the intervention
- Such published evaluations typically report on a large array of possible outcomes, and the outcomes are measured on a number of different scales such that it is difficult to compare alternative interventions – one performing better on one outcome and worse on another for example

## Summary and Conclusion (continued)

- The method highlighted in this paper allows for such differential outcomes to be traded off using relative utility analysis
- This method allows for input from various stakeholders associated with the intervention when deriving relative utility values
- It can be further extended into cost-utility analysis – since programs of intervention that score well in terms of the relative utility scales used may only achieve this higher score with a higher level of inputs and associated costs
- This extension of our method will be the subject of future research