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# Empirical Comparison of Subjective Well-Being and Health-Related Quality of Life Measures in Australian Adolescents

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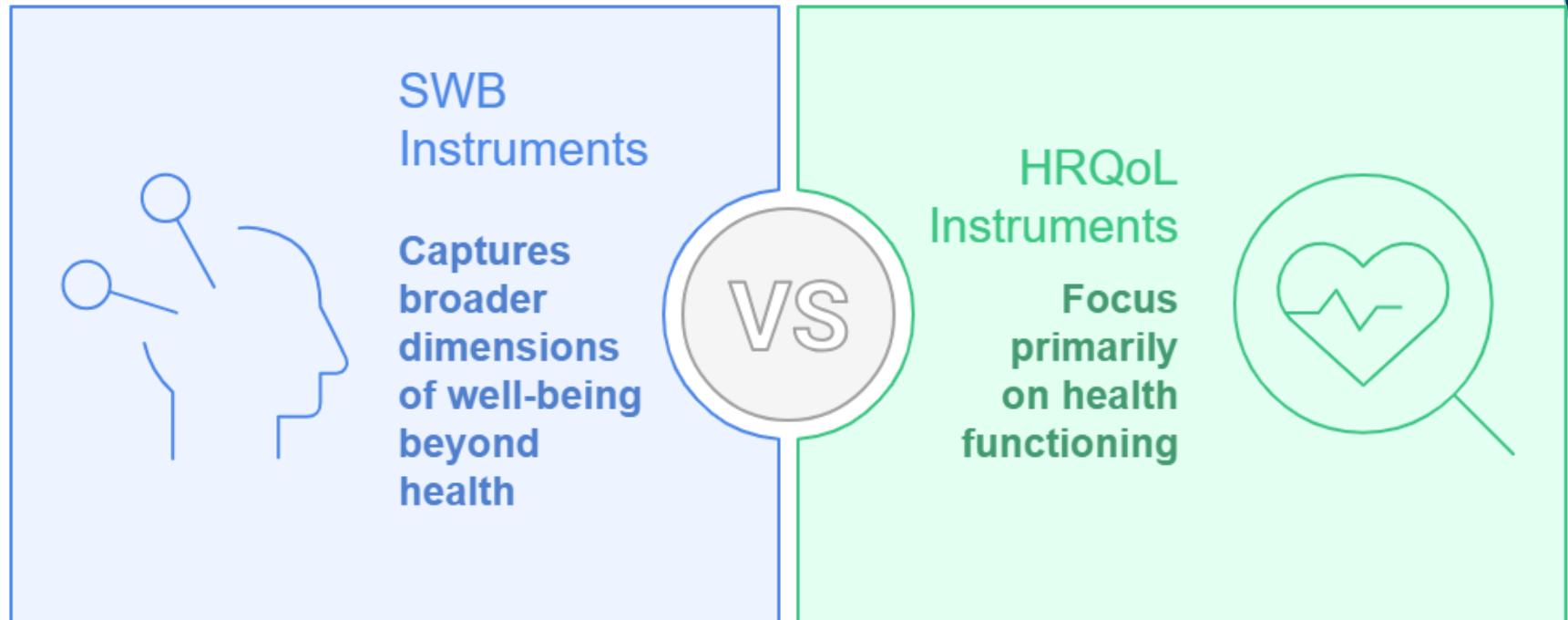
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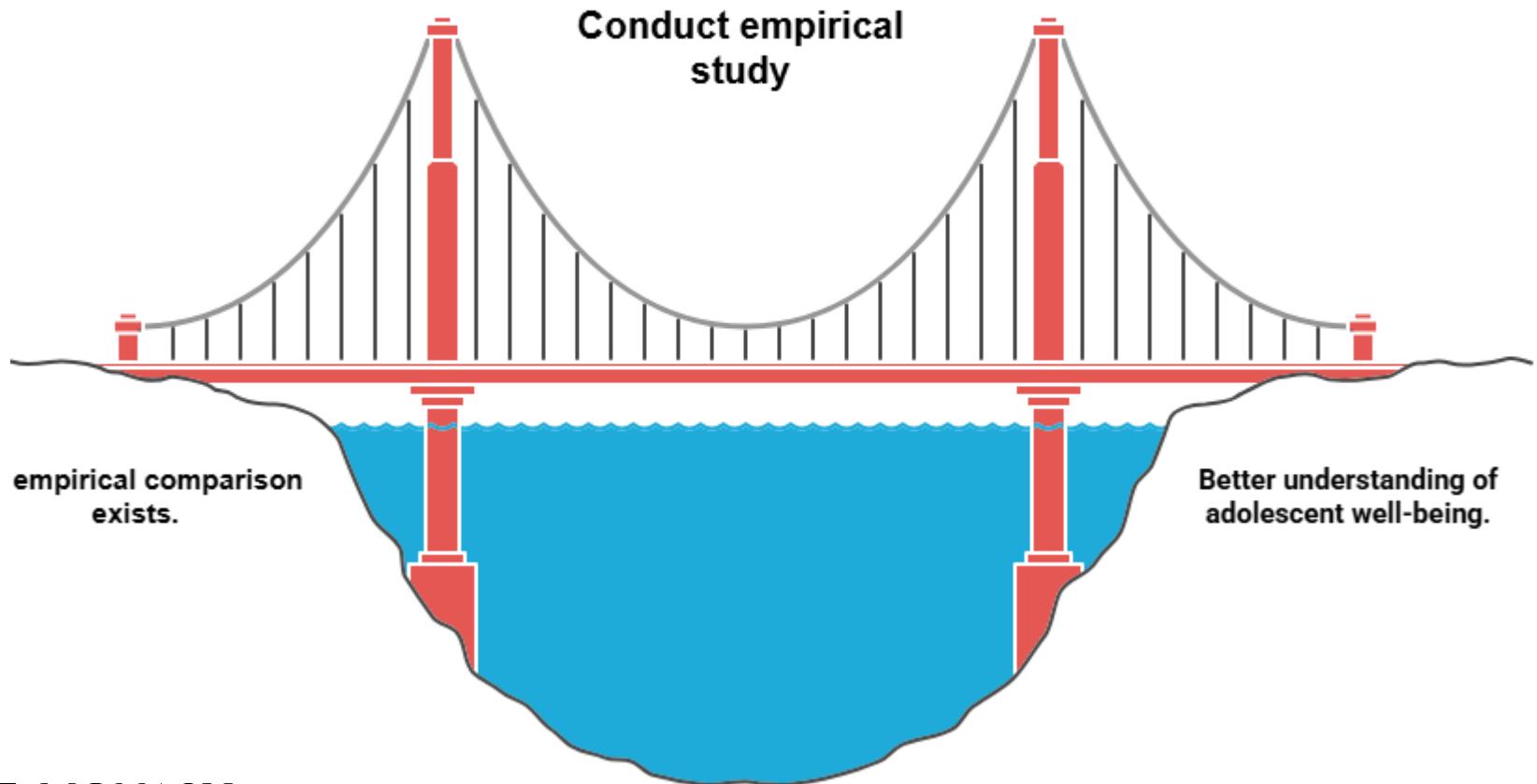


# How should Subjective Well-Being (SWB) and Health-Related Quality of Life (HRQoL) be conceptualised?



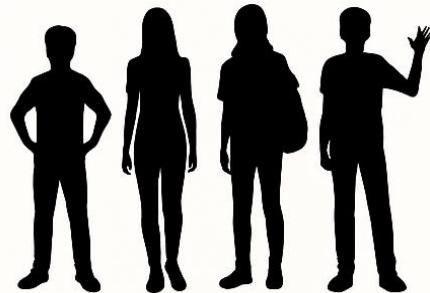
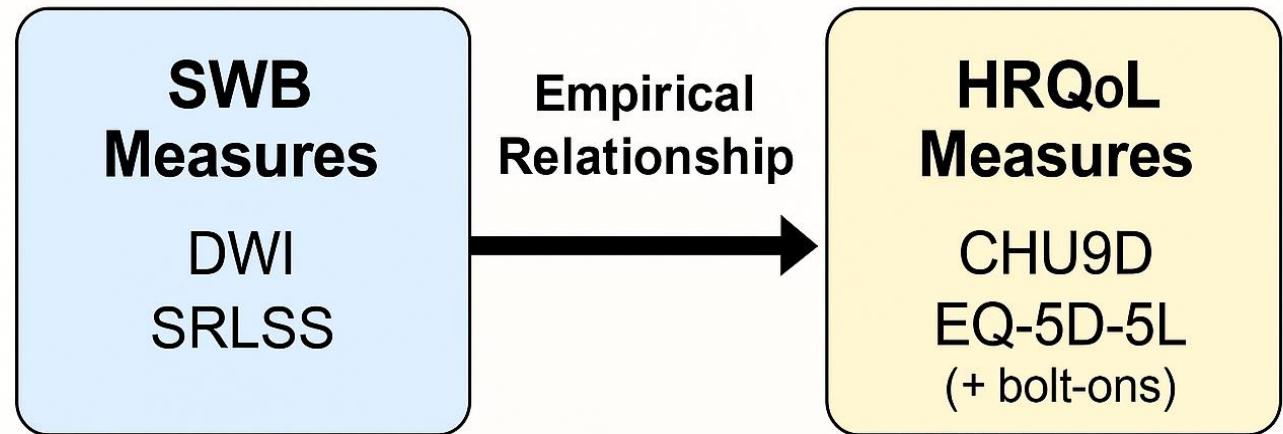
# Research Gap

**Bridging the gap: Comparing SWB instruments and HRQoL instruments in adolescents**



# Study Aim

This study aims to examine the empirical **relationship between subjective well-being and health-related quality of life** in Australian Adolescents.



**Australian adolescents (ages 15–19)**

Examining empirical relationship between SWB–HRQoL

# Methods: Data Collection and Survey Instruments

## Data Collection

- Nationwide **quota-based online survey** of Australian adolescents aged **15–19 years**.

## Survey Instruments

- **Two Subjective Well-Being (SWB)** – completed by **100% of the respondents**
  - ❖ 14-item *Disability Wellbeing Index (DWI)*
  - ❖ 12-item *Self-Reported Life Satisfaction Scale (SRLSS)*
- **Two Health-Related Quality of Life (HRQoL)** – each completed by **half of the respondents**
  - ❖ *EQ-5D-5L* (with **psychological bolt-on dimensions**)
  - ❖ *Child Health Utility–9D (CHU-9D)*



# Instruments' Dimensions

	Subjective Well-Being Measures		Health-Related Quality of Life Measures	
	DWI	SRLSS	EQ-5D-5L	CHU-9D
Dimensions Included	1. Mental health 2. Physical health 3. Family 4. Friends 5. Learning new things 6. Living situation 7. Daily activities 8. Safety 9. Things important to you 10. Personal care 11. How people treat you 12. People who support you 13. Enough money 14. Work situation	1. Mental health 2. Physical health 3. Family 4. Friends 5. Life at school 6. Neighbourhood 7. Time use 8. Safety 9. Things you have 10. Appearance 11. Future 12. Choice	1. Anxiety/depression 2. Mobility 3. Pain/discomfort 4. Usual activities 5. Self-care  <b>Psychosocial Bolt-ons*:</b> i. Sleep ii. Vitality iii. Community connectedness iv. Social relationships	1. Worried 2. Annoyed 3. Sad 4. Sleep 5. Tired 6. Pain 7. Schoolwork/homework 8. Daily routine 9. Activities

Note: \* *Psychosocial Bolt-ons dimensions are not the original dimensions of EQ-5D-5L, but the research communities have recommended incorporating them into EQ-5D-5L*

# Instruments' Dimensions

	Subjective Well-Being Measures		Health-Related Quality of Life Measures	
	DWI	SRLSS	EQ-5D-5L	Health-Related Quality of Life Measures
Dimensions Included	<ol style="list-style-type: none"> <li>1. Mental health</li> <li>2. Physical health</li> <li>3. Family</li> <li>4. Friends</li> <li>5. Learning new things</li> <li>6. Living situation</li> <li>7. Daily activities</li> <li>8. Safety</li> <li>9. Things important to you</li> <li>10. Personal care</li> <li>11. How people treat you</li> <li>12. People who support you</li> <li>13. Enough money</li> <li>14. Work situation</li> </ol>	<ol style="list-style-type: none"> <li>1. Mental health</li> <li>2. Physical health</li> <li>3. Family</li> <li>4. Friends</li> <li>5. Life at school</li> <li>6. Neighbourhood</li> <li>7. Time use</li> <li>8. Safety</li> <li>9. Things you have</li> <li>10. Appearance</li> <li>11. Future</li> <li>12. Choice</li> </ol>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <ol style="list-style-type: none"> <li>1. Anxiety/depression</li> <li>2. Mobility</li> <li>3. Pain/discomfort</li> <li>4. Usual activities</li> <li>5. Self-care</li> </ol> </div> <p><b>Psychosocial Bolt-ons*:</b></p> <ol style="list-style-type: none"> <li>i. Sleep</li> <li>ii. Vitality</li> <li>iii. Community connectedness</li> <li>iv. Social relationships</li> </ol>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <ol style="list-style-type: none"> <li>1. Worried</li> <li>2. Annoyed</li> <li>3. Sad</li> </ol> </div> <div style="border: 1px solid black; border-radius: 50%; padding: 10px; text-align: center; width: 40px; height: 40px; margin-top: 10px;"> <b>Physical Health</b> </div> <ol style="list-style-type: none"> <li>4. Tired</li> <li>5. Pain</li> <li>6. Schoolwork/homework</li> <li>7. Daily routine</li> <li>8. Activities</li> </ol>

Note: \* Psychosocial Bolt-ons dimensions are not the original dimensions of EQ-5D-5L, but the research communities have recommended incorporating them into EQ-5D-5L

# Scoring of SWB Measures

The overall raw scores of the SWB measures are calculated in two steps:

**Step 1: Two types of mean scores (*arithmetic* and *harmonic* mean scores) were computed;**

$$\text{Arithmetic Mean Score} = \sum_{i=1}^N \frac{x_i}{N}$$

$$\text{Harmonic Mean Score} = \frac{N}{\sum_{i=1}^N \frac{1}{x_i}}$$

where  $i$  denotes each dimension,  $x_i$  represents the raw score of dimension  $i$ , and  $N$  is the total number of items or dimensions in the respective instruments.

*Reference: Gang, C., Dennis, P., Gwynnyth, L., Julie, R., Kim, B., Samia, B., Esi, W. M., Rae, W., Keran, H., Monique, H., Abel, O. J., Bernice, M. H., Gozde, A., & Anthony, H. (2024). Disability Wellbeing Index - Items Development and Scoring Algorithms. Prepared for the National Disability Insurance Agency.*

# Scoring of SWB Measures

The overall raw scores of the SWB measures are calculated in two steps:

**Step 2: All the mean scores were rescaled to a 0–1 range:**

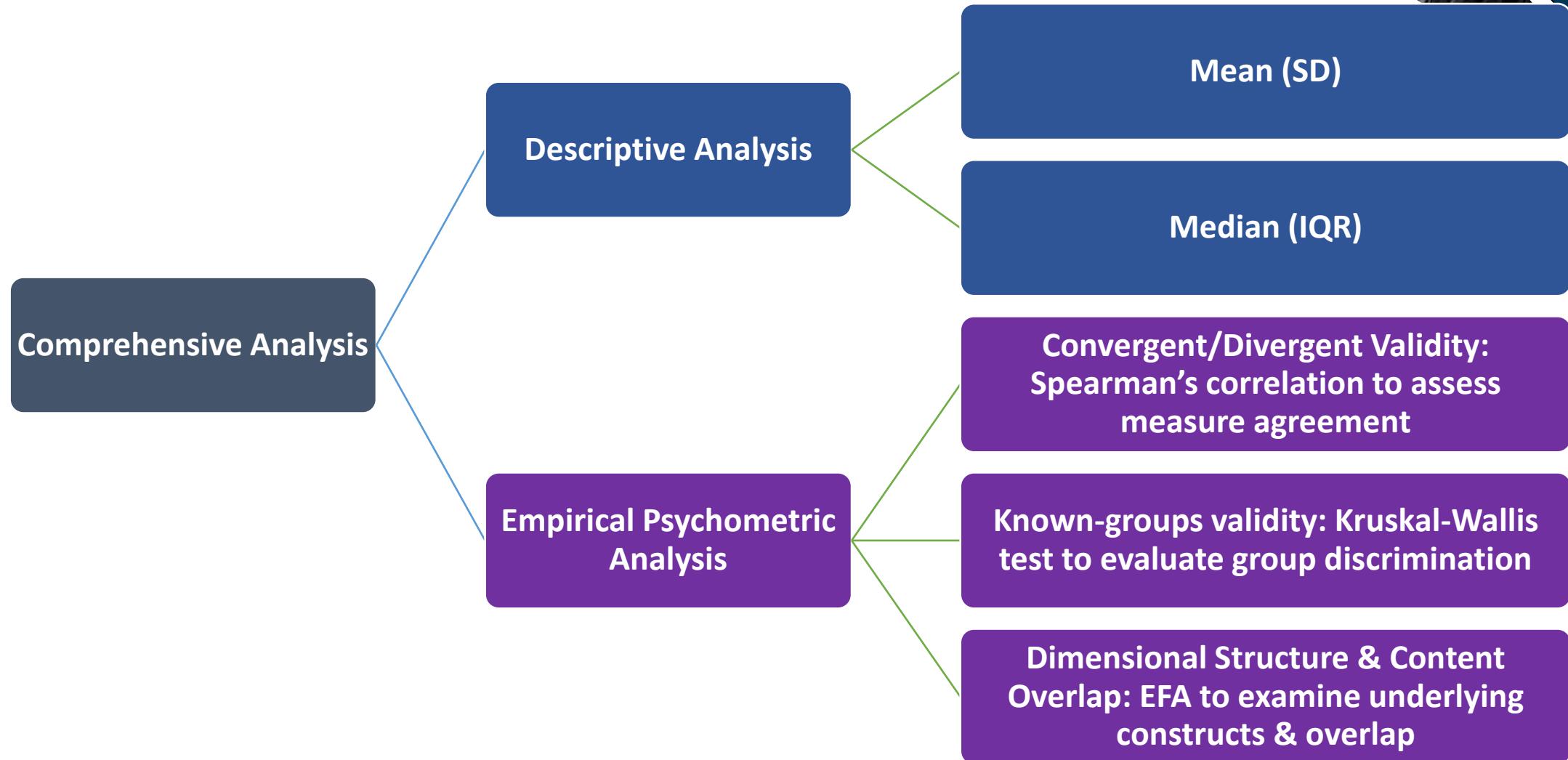
$$Scores \text{ (rescaled)} = \frac{Score_{Maximum} - Score_{Raw}}{Score_{Maximum} - Score_{Minimum}}$$

where  $Score_{Raw}$  refers to the raw scores of the arithmetic or harmonic mean scores, and  $Score_{Maximum}$  and  $Score_{Minimum}$  present to the maximum and minimum scores of the instruments in theory.

# Instrument Descriptions

	Disability Wellbeing Index	Self-Reported Life Satisfaction Scale	EQ-5D-5L	EQ-5D-5L + Psychosocial Bolt-ons	CHU-9D
<b>I. Descriptive System</b>					
<b>Conceptual type</b>	Subjective Well-being	Subjective Well-being	Health-related Quality of Life	Health-related Quality of Life	Health-related Quality of Life
<b>Targeted populations</b>	People with disability, including young people with disability	Adolescents aged 15-19 years	General population, including young people	General population	Children and adolescents aged 7-17 years
<b>No. of Dimensions</b>	14	12	5	9	9
<b>No. of Items</b>	14	12	5	9	9
<b>Response levels</b>	5	4	5	5	5
<b>Well-being or health states defined</b>	6,103,515,625	16,777,216	3,125	1,953,125	1,953,125
<b>Recall period</b>	Current	Not specified	Today	Today	Today
<b>II. Scoring System</b>					
<b>Scoring algorithms</b>	Summative scores	Summative scores	Utility scores	Utility scores	Utility scores
<b>Score range (Minimum - Maximum)</b>	0-1	0-1	(-0.301) - 1 (Australian General Population)	0.047 - 1 (Australian General Population)	(-0.106) - 1 (Australian Adolescents)

# Comprehensive Analysis of SWB and HRQoL Measures



# Findings

## Descriptive Analysis: Sociodemographic Characteristics

Participant Characteristics	Full Sample	CHU-9D Sample	EQ-5D-5L Sample
	N (%)	N (%)	N (%)
<b>Sample Size</b>	1026 (100.00)	510 (49.71)	516 (50.29)
<b>Age Groups</b>			
15 years	170 (16.57)	84 (16.47)	86 (16.67)
16 years	213 (20.76)	109 (21.37)	104 (20.16)
17 years	209 (20.37)	98 (19.22)	111 (21.51)
18 years	231 (22.51)	119 (23.33)	112 (21.71)
19 years	203 (19.79)	100 (19.61)	103 (19.96)
<b>Gender</b>			
Girl	457 (44.54)	229 (44.90)	228 (44.19)
Boy	548 (53.41)	271 (53.14)	277 (53.68)
Unknown / Others	21 (2.05)	10 (1.96)	11 (2.13)
<b>Education</b>			
Secondary education	760 (74.07)	370 (72.55)	390 (75.58)
Tertiary education	266 (25.93)	140 (27.45)	126 (24.42)
<b>Disability Status</b>			
No	812 (79.14)	405 (79.41)	407 (78.88)
Yes	214 (20.86)	105 (20.59)	109 (21.12)

# Findings

## Descriptive Analysis: Scorings of the Measures

Participant Characteristics	DWI		SRLSS		EQ-5D-5L	EQ-5D-5L with Psychosocial Bolt-ons	CHU-9D
	Summary Scores (Arithmetic Mean)	Summary Scores (Harmonic Mean)	Summary Scores (Arithmetic Mean)	Summary Scores (Harmonic Mean)	Utility Scores		
<b>Overall Scores</b>							
Mean ± SD	<b>0.693 ± 0.159</b>	<b>0.756 ± 0.149</b>	<b>0.615 ± 0.177</b>	<b>0.692 ± 0.170</b>	<b>0.886 ± 0.161</b>	<b>0.663 ± 0.197</b>	<b>0.539 ± 0.239</b>
Median (IQR)	0.696 (0.589 - 0.804)	0.762 (0.658 - 0.868)	0.611 (0.500 - 0.722)	0.702 (0.583 - 0.812)	0.934 (0.887 - 1.000)	0.673 (0.517 - 0.820)	0.521 (0.348 - 0.719)
<b>Gender (Mean ± SD)</b>							
Girl	0.672 ± 0.153	0.736 ± 0.146	0.579 ± 0.157	0.658 ± 0.156	0.878 ± 0.159	0.623 ± 0.181	0.495 ± 0.235
Boy	<b>0.711 ± 0.163</b>	<b>0.774 ± 0.149</b>	<b>0.646 ± 0.186</b>	<b>0.721 ± 0.175</b>	<b>0.891 ± 0.163</b>	<b>0.699 ± 0.204</b>	<b>0.576 ± 0.236</b>
Unknown / Others	0.664 ± 0.164	0.734 ± 0.157	0.593 ± 0.195	0.675 ± 0.183	0.907 ± 0.114	0.597 ± 0.191	0.564 ± 0.253
<b>Disability Status (Mean ± SD)</b>							
No	<b>0.714 ± 0.149</b>	<b>0.777 ± 0.133</b>	<b>0.634 ± 0.172</b>	<b>0.702 ± 0.158</b>	<b>0.923 ± 0.108</b>	<b>0.698 ± 0.177</b>	<b>0.577 ± 0.229</b>
Yes	0.612 ± 0.171	0.722 ± 0.168	0.546 ± 0.178	0.674 ± 0.187	0.747 ± 0.234	0.534 ± 0.215	0.395 ± 0.225
<b>Self-reported Socioeconomic Status – Australia (Range: 1 – 10) (Mean ± SD)</b>							
Low (1-4)	0.566 ± 0.171	0.641 ± 0.167	0.489 ± 0.166	0.577 ± 0.173	0.820 ± 0.223	0.556 ± 0.185	0.438 ± 0.248
Middle (5-7)	0.683 ± 0.145	0.747 ± 0.138	0.597 ± 0.162	0.674 ± 0.161	0.887 ± 0.155	0.659 ± 0.190	0.510 ± 0.225
High (8-10)	<b>0.765 ± 0.143</b>	<b>0.824 ± 0.125</b>	<b>0.705 ± 0.165</b>	<b>0.775 ± 0.147</b>	<b>0.911 ± 0.130</b>	<b>0.720 ± 0.198</b>	<b>0.635 ± 0.231</b>
<b>Self-reported Socioeconomic Status – School (Range: 1 – 10) (Mean ± SD)</b>							
Low (1-4)	0.567 ± 0.170	0.648 ± 0.170	0.485 ± 0.166	0.582 ± 0.178	0.780 ± 0.207	0.515 ± 0.185	0.405 ± 0.234
Middle (5-7)	0.679 ± 0.143	0.742 ± 0.136	0.592 ± 0.154	0.666 ± 0.153	0.898 ± 0.150	0.660 ± 0.177	0.524 ± 0.230
High (8-10)	<b>0.772 ± 0.137</b>	<b>0.830 ± 0.120</b>	<b>0.715 ± 0.165</b>	<b>0.784 ± 0.148</b>	<b>0.920 ± 0.123</b>	<b>0.748 ± 0.190</b>	<b>0.615 ± 0.230</b>

# Findings

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# Findings: Convergent/Divergent Validity

## Empirical Analysis: Spearman's Correlations (DWI vs HRQoL Measures)

- Level of correlation: **Low to Moderate**
- ***Out of 252 correlations, only 17 correlations*** reached above the correlation ( $\rho$ ) value of 0.4
- Highest correlation:
  - ❖ DWI: Mental Health vs CHU-9D: Sad ( $\rho = 0.467$ )
  - ❖ DWI: Mental Health vs EQ-5D-5L: Anxiety ( $\rho = 0.564$ )
  - ❖ DWI: Mental Health vs Psychosocial Bolt-ons: Sleep ( $\rho = 0.500$ )



# Findings: Convergent/Divergent Validity

## Empirical Analysis: Spearman's Correlations (SRLSS vs HRQoL Measures)

- Level of correlation: Low to Moderate
- ***Out of 216 correlations, 14 correlations*** reached above the correlation ( $\rho$ ) value of 0.4
- Highest correlation:
  - ❖ SRLSS: Mental Health vs CHU-9D: Sad ( $\rho = 0.488$ )
  - ❖ SRLSS: Mental Health vs EQ-5D-5L: Anxiety ( $\rho = 0.595$ )
  - ❖ SRLSS: Mental Health vs Psychosocial Bolt-ons: Vitality ( $\rho = 0.526$ )

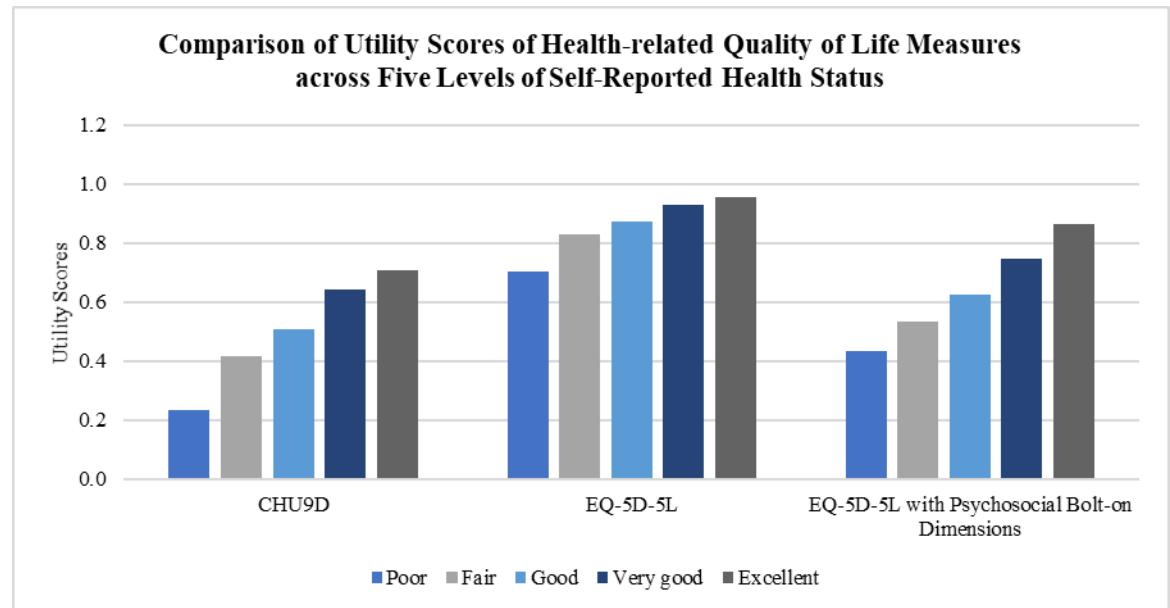


# Findings: Known-groups Validity

## Empirical Analysis: Kruskal-Wallis Test (Self-Reported Health Status)

The Kruskal-Wallis test revealed statistically significant differences in scores across

- Five levels of self-reported health status ( $p < 0.001$ )

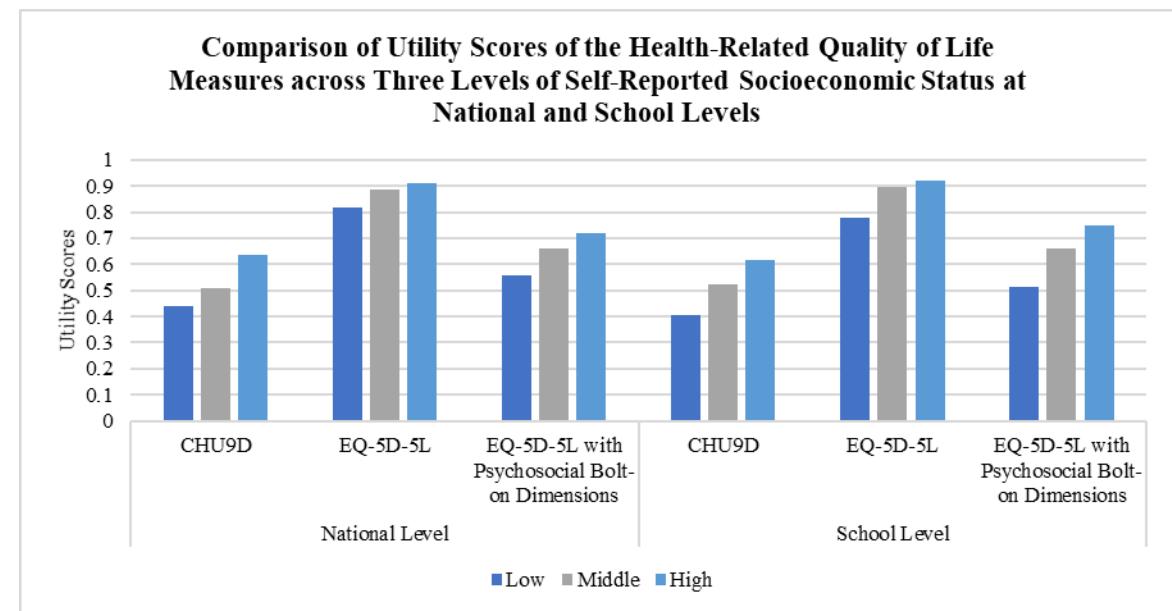
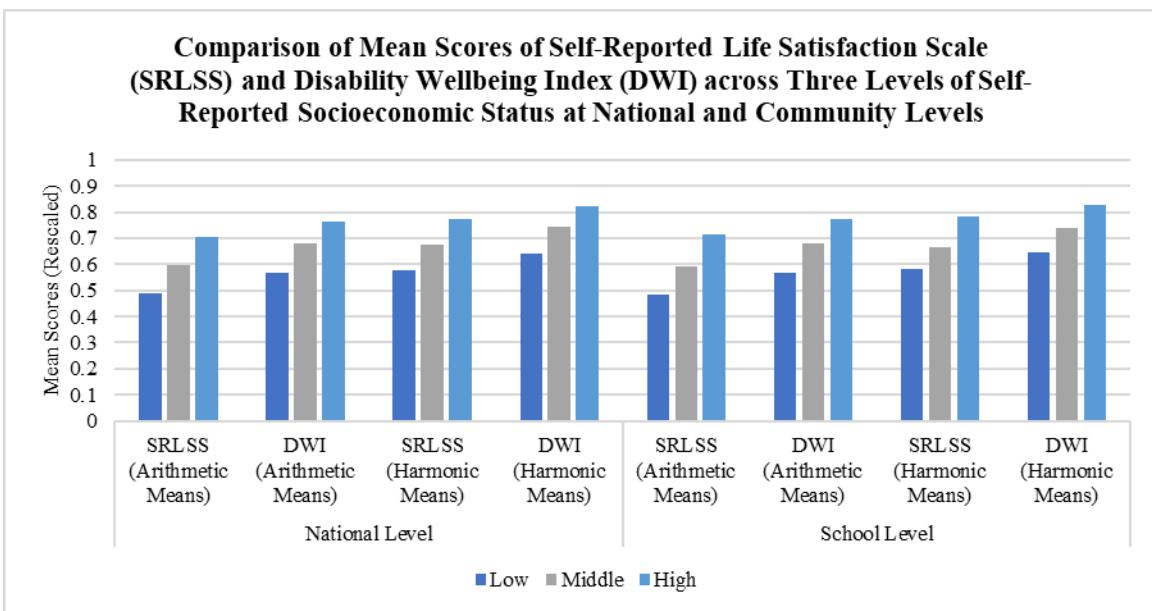


# Findings: Known-groups Validity

## Empirical Analysis: Kruskal-Wallis Test (Self-Reported Socio-Economic Status)

The Kruskal-Wallis test revealed statistically significant differences in scores across

- Three levels of self-reported socio-economic status at both national and school levels ( $p < 0.001$ )



# Findings: Dimensional Structure and Content Overlap

## Empirical Analysis: Exploratory Factor Analysis

### DWI vs HRQoL Measures

- DWI vs EQ-5D-5L with psychosocial bolt-ons → 3-factor solutions
- DWI vs CHU-9D or EQ-5D-5L standalone → 2-factor solutions
- *Main findings:*
  - **Partially overlapping but distinct latent structure between DWI and HRQoL measures**

*Exploratory factor analysis comparing the Disability Wellbeing Index and EQ-5D-5L with Psychosocial Bolt-ons*

Instruments	Items/Dimensions	Factor		
		1	2	3
EQ-5D-5L	Personal Care		0.78	
EQ-5D-5L	Mobility		0.73	
EQ-5D-5L	Usual Activities		0.58	
EQ-5D-5L	Pain		0.46	
EQ-5D-5L	Anxiety			0.71
Psychosocial Bolt-ons	Vitality			0.68
Psychosocial Bolt-ons	Social Isolation			0.67
Psychosocial Bolt-ons	Sleep			0.64
Psychosocial Bolt-ons	Close Relationships			0.61
DWI	Mental Health			0.61
DWI	Housing	0.76		
DWI	Everyday Activities	0.66		
DWI	Meaningful Life	0.65		
DWI	Personal Care	0.60		
DWI	Physical Health	0.59		
DWI	Support Team	0.58		
DWI	Finances	0.57		
DWI	Safety	0.57		
DWI	Learning	0.50		
DWI	Work	0.47		
DWI	Respect and Dignity	0.44		0.34
DWI	Family	0.41		0.32
DWI	Friendships	0.32		0.33

DWI – Disability Wellbeing Index; Extraction Method: maximum likelihood; Number of factors was determined by the minimum average partial method; Rotation Method: Oblique Promax; Root mean square residual (RMSR) = 0.035; Loadings smaller than 0.30 were suppressed.

# Findings: Dimensional Structure and Content Overlap

## Empirical Analysis: Exploratory Factor Analysis

### SRLSS vs HRQoL Measures

- SRLSS vs EQ-5D-5L Measures → 3-factor solutions
- SRLSS vs CHU-9D → 2-factor solutions
- *Main findings:*
  - **Limited structural overlap between SRLSS and HRQoL measures**

*Exploratory factor analysis comparing the Self-Reported Life Satisfaction Scale and Child Health Utility - 9D*

Instruments	Items/Dimensions	Factor	
		1	2
CHU-9D	Sad		0.67
CHU-9D	Annoyed		0.66
CHU-9D	Worried		0.60
CHU-9D	Sleep		0.59
CHU-9D	Tired		0.58
CHU-9D	School Work		0.56
CHU-9D	Daily Routines		0.52
CHU-9D	Pain		0.51
CHU-9D	Activities		0.39
SRLSS	Future	0.72	
SRLSS	Choice	0.70	
SRLSS	Family	0.61	
SRLSS	Appearance	0.58	
SRLSS	Safety	0.56	
SRLSS	Life at School	0.56	
SRLSS	Things you have	0.54	
SRLSS	Physical Health	0.53	
SRLSS	Neighbourhood	0.51	
SRLSS	Time use	0.51	
SRLSS	Mental Health	0.49	
SRLSS	Friends	0.42	

CHU-9D – Child Health Utility – 9D; SRLSS – Self-Reported Life Satisfaction Scale; Extraction Method: maximum likelihood; Number of factors was determined by the minimum average partial method; Rotation Method: Oblique Promax; Root mean square residual (RMSR) = 0.046; Loadings smaller than 0.30 were suppressed.

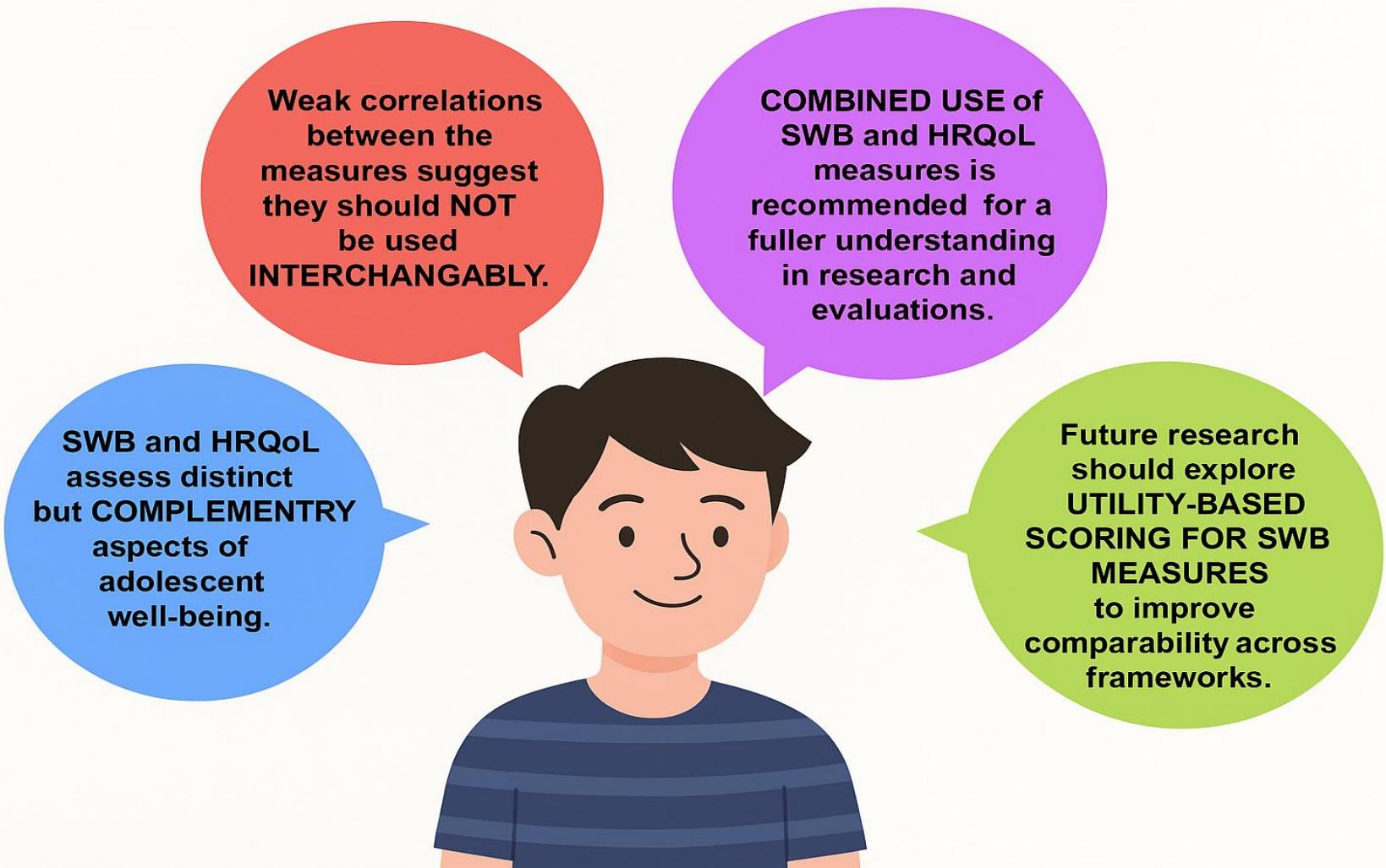
# Key Discussion Points

## SWB Vs HRQoL: Key Insights and Implications

- **Low Convergence:** Correlations between SWB and HRQoL dimensions were low to moderate, indicating a low degree of convergence.
- **Psychosocial Link:** Psychosocial dimensions of HRQoL measures were more strongly associated with SWB items than physical or functional dimensions.
- **Distinct Domains:** Despite some structural overlap, SWB and HRQoL measures capture fundamentally different aspects of adolescent well-being.
- **Discriminative Power:** All instruments effectively differentiated between adolescents by self-reported health and socioeconomic status (SES).

# Conclusions: Take-home messages

## How should SWB and HRQoL be used in adolescent well-being assessments?





Thank you for your  
kind attention!

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