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

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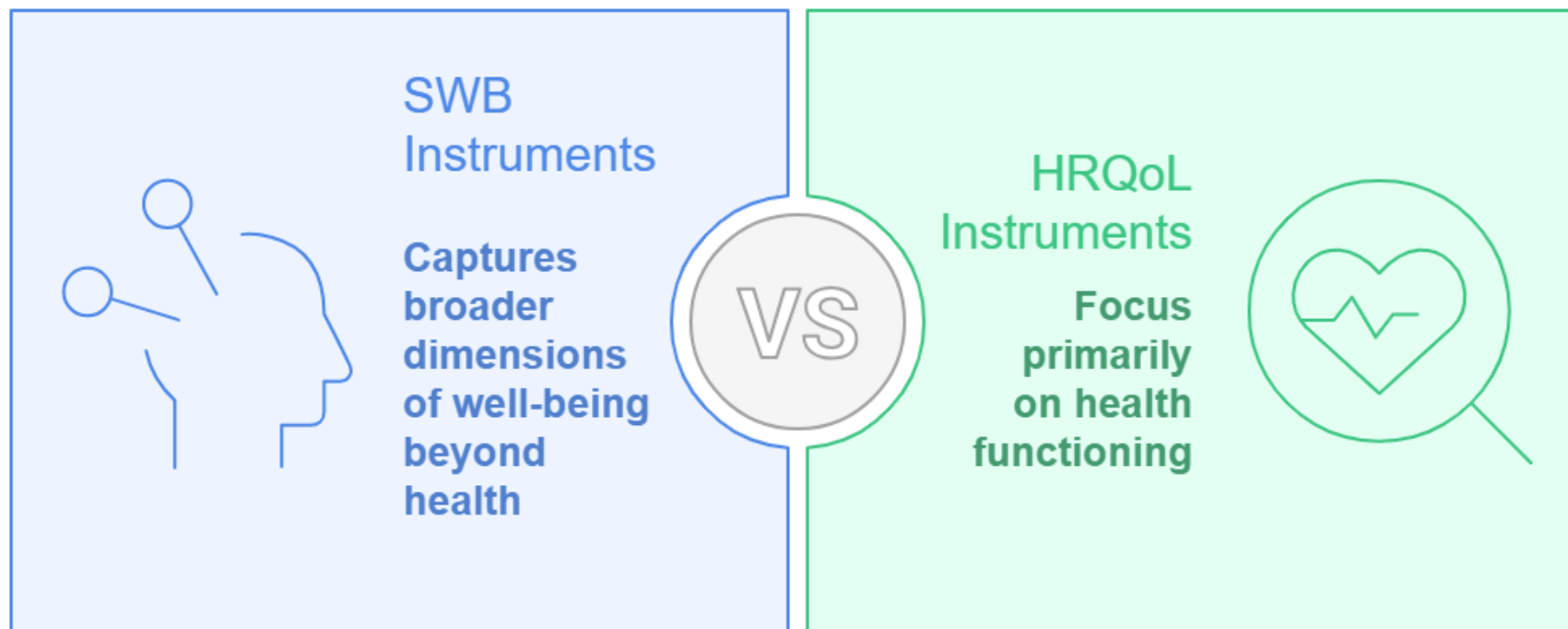
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How should Subjective Well-Being (SWB) and Health-Related Quality of Life (HRQoL) be conceptualised?



Distinct Concepts

Emphasises the unique focus of each construct, avoiding interchangeability.

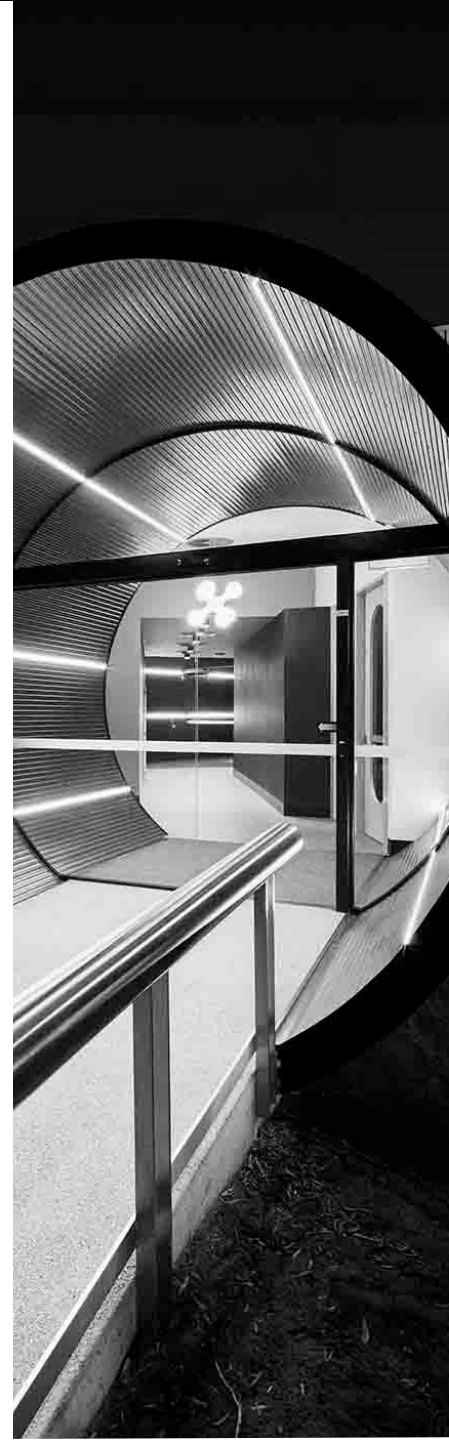
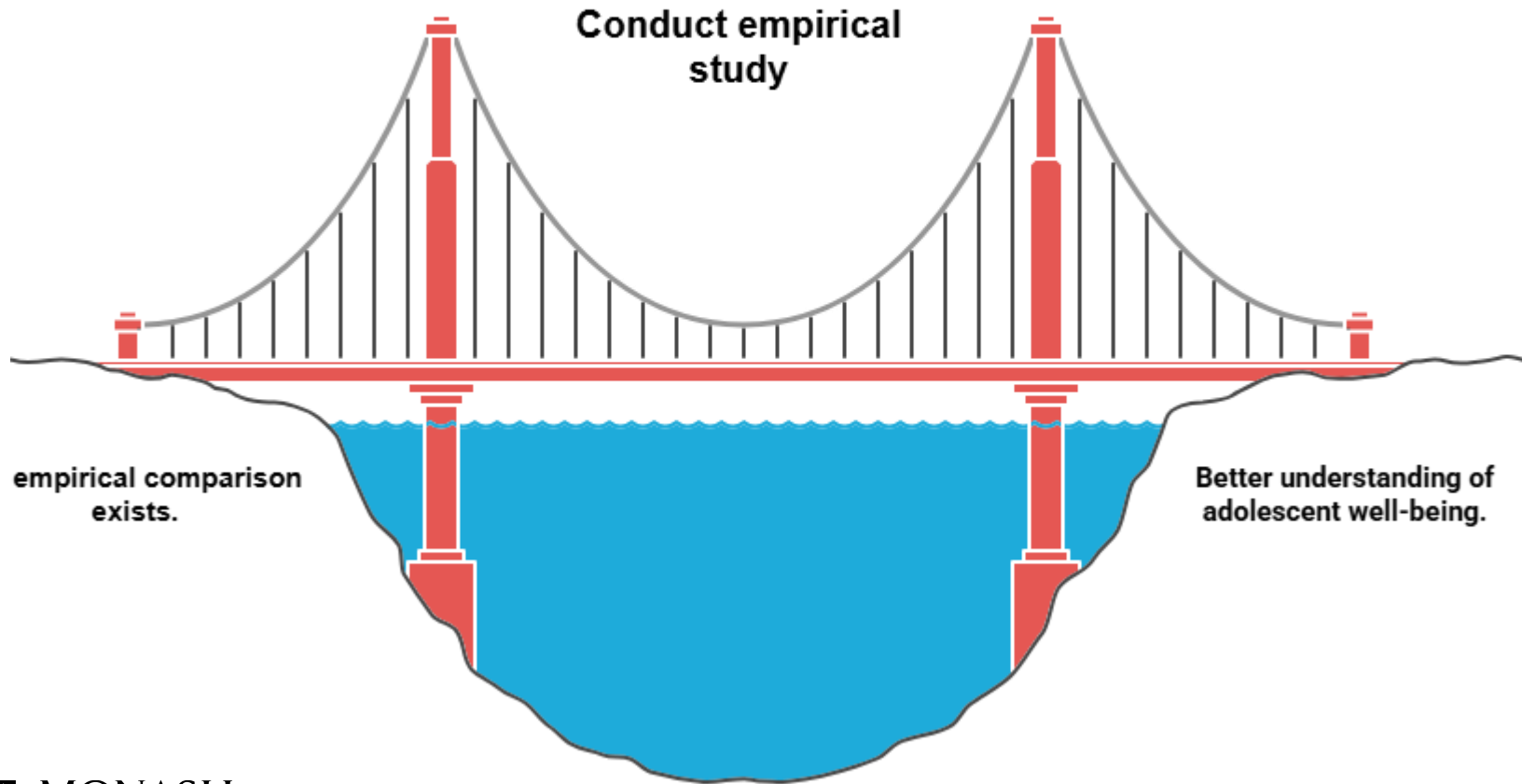


Overlapping Concepts

Acknowledges the shared aspects while maintaining distinct identities.

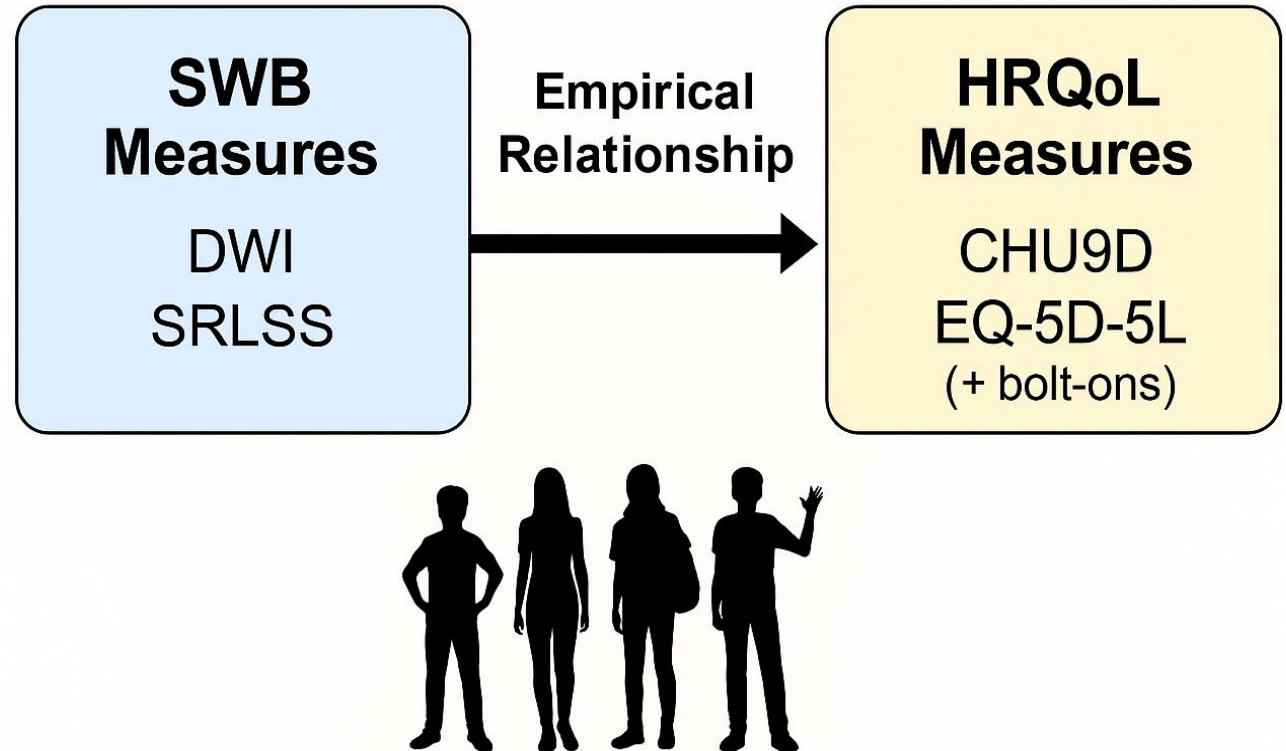
Research Gap

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	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 1. Anxiety/depression 2. Mobility 3. Pain/discomfort 4. Usual activities 5. Self-care <p>Psychosocial Bolt-ons*:</p> <ol style="list-style-type: none"> i. Sleep ii. Vitality iii. Community connectedness iv. Social relationships 	<ol style="list-style-type: none"> 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 Questionnaires	
	DWI	SRLSS	EQ-5D-5L	U-9D
Dimensions Included	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 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 	<ol style="list-style-type: none"> 1. Anxiety/depression 2. Mobility 3. Pain/discomfort 4. Usual activities 5. Self-care <p>Psychosocial Bolt-ons*:</p> <ol style="list-style-type: none"> i. Sleep ii. Vitality iii. Community connectedness iv. Social relationships 	<ol style="list-style-type: none"> 1. Worried 2. Annoyed 3. Sad 4. Tired 5. Pain 6. Schoolwork/homework 7. Daily routine 8. Activities

Mental Health

Physical Health

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:

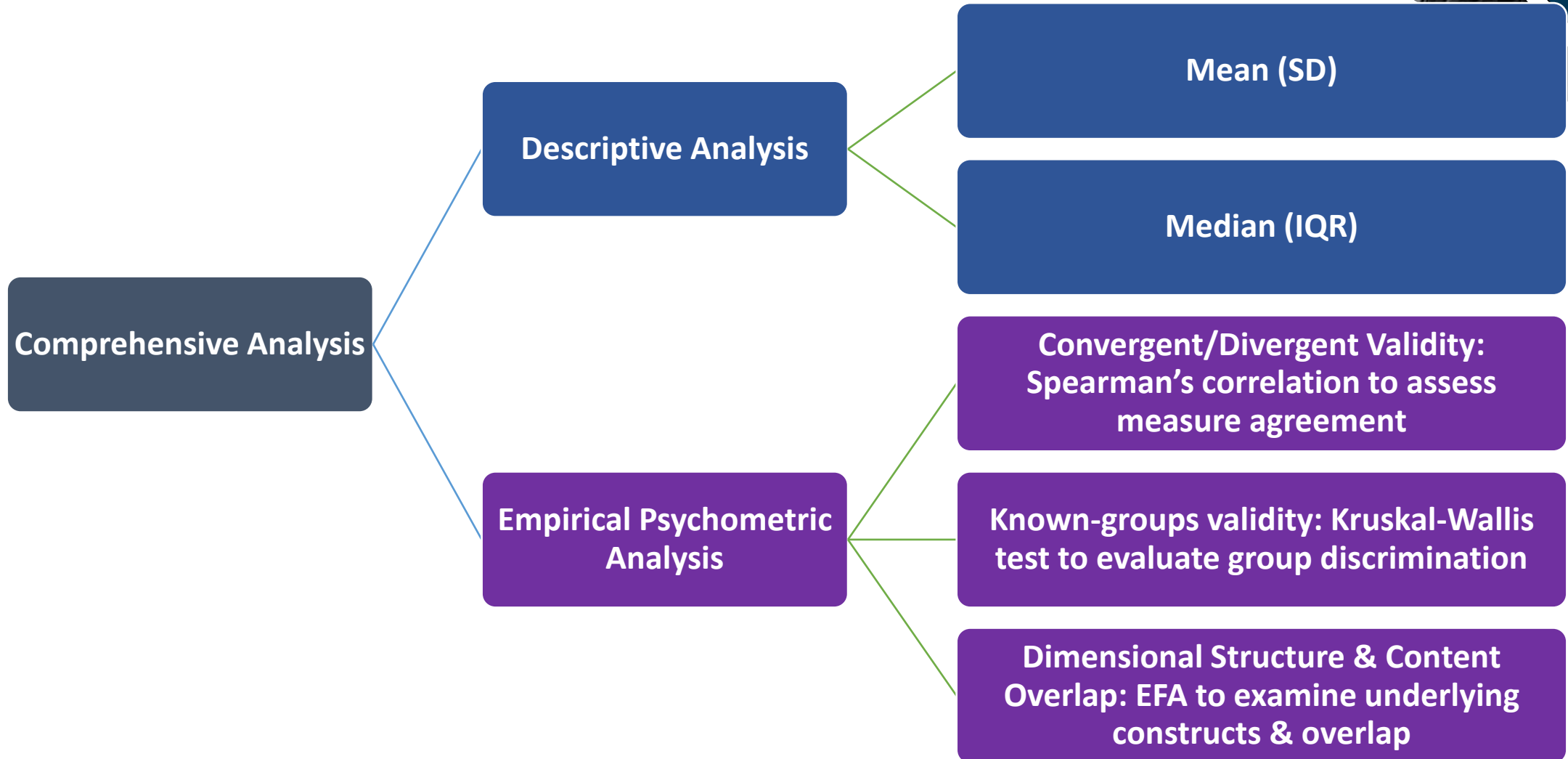
$$Scores\ (rescaled) = \frac{Score_{Maximum} - Score_{Raw}}{Score_{Maximum} - Score_{Minimum}}$$

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
I. Descriptive System					
Conceptual type	Subjective Well-being	Subjective Well-being	Health-related Quality of Life	Health-related Quality of Life	Health-related Quality of Life
Targeted populations	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
No. of Dimensions	14	12	5	9	9
No. of Items	14	12	5	9	9
Response levels	5	4	5	5	5
Well-being or health states defined	6,103,515,625	16,777,216	3,125	1,953,125	1,953,125
Recall period	Current	Not specified	Today	Today	Today
II. Scoring System					
Scoring algorithms	Summative scores	Summative scores	Utility scores	Utility scores	Utility scores
Score range (Minimum - Maximum)	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 (%)
Sample Size	1026 (100.00)	510 (49.71)	516 (50.29)
Age Groups			
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)
Gender			
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)
Education			
Secondary education	760 (74.07)	370 (72.55)	390 (75.58)
Tertiary education	266 (25.93)	140 (27.45)	126 (24.42)
Disability Status			
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		
Overall Scores							
Mean ± SD	0.693 ± 0.159	0.756 ± 0.149	0.615 ± 0.177	0.692 ± 0.170	0.886 ± 0.161	0.663 ± 0.197	0.539 ± 0.239
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)
Gender (Mean ± SD)							
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	0.711 ± 0.163	0.774 ± 0.149	0.646 ± 0.186	0.721 ± 0.175	0.891 ± 0.163	0.699 ± 0.204	0.576 ± 0.236
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
Disability Status (Mean ± SD)							
No	0.714 ± 0.149	0.777 ± 0.133	0.634 ± 0.172	0.702 ± 0.158	0.923 ± 0.108	0.698 ± 0.177	0.577 ± 0.229
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
Self-reported Socioeconomic Status – Australia (Range: 1 – 10) (Mean ± SD)							
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)	0.765 ± 0.143	0.824 ± 0.125	0.705 ± 0.165	0.775 ± 0.147	0.911 ± 0.130	0.720 ± 0.198	0.635 ± 0.231
Self-reported Socioeconomic Status – School (Range: 1 – 10) (Mean ± SD)							
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)	0.772 ± 0.137	0.830 ± 0.120	0.715 ± 0.165	0.784 ± 0.148	0.920 ± 0.123	0.748 ± 0.190	0.615 ± 0.230

Findings

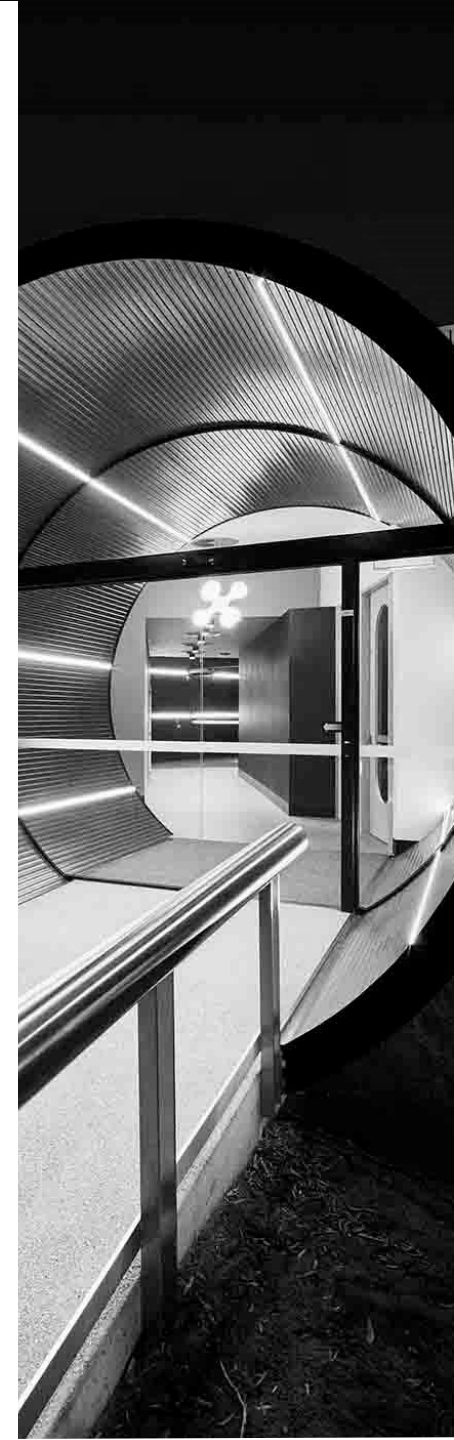
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Findings: Convergent/Divergent Validity

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 (ρ) 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 (ρ) 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 ($\rho = 0.526$)**

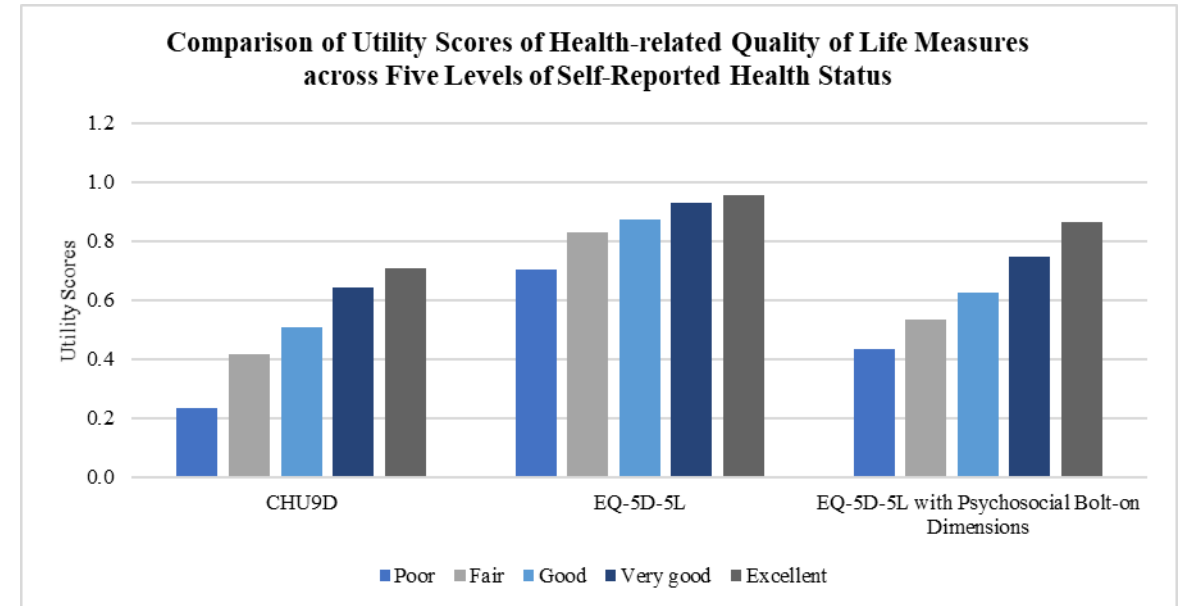
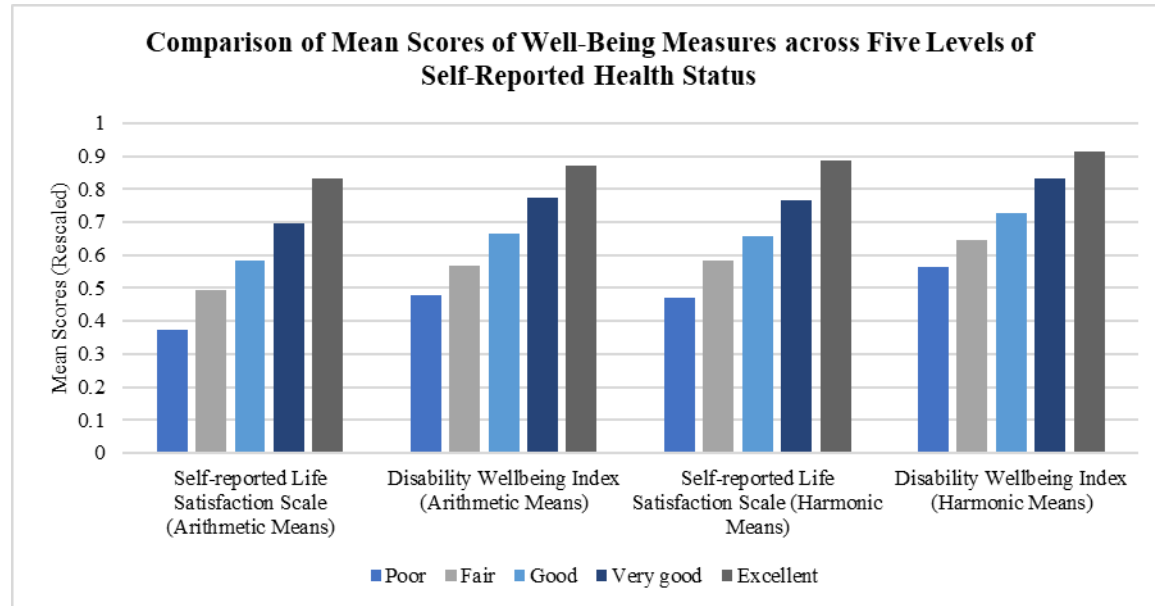


Findings: Known-groups Validity

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 ($p < 0.001$)

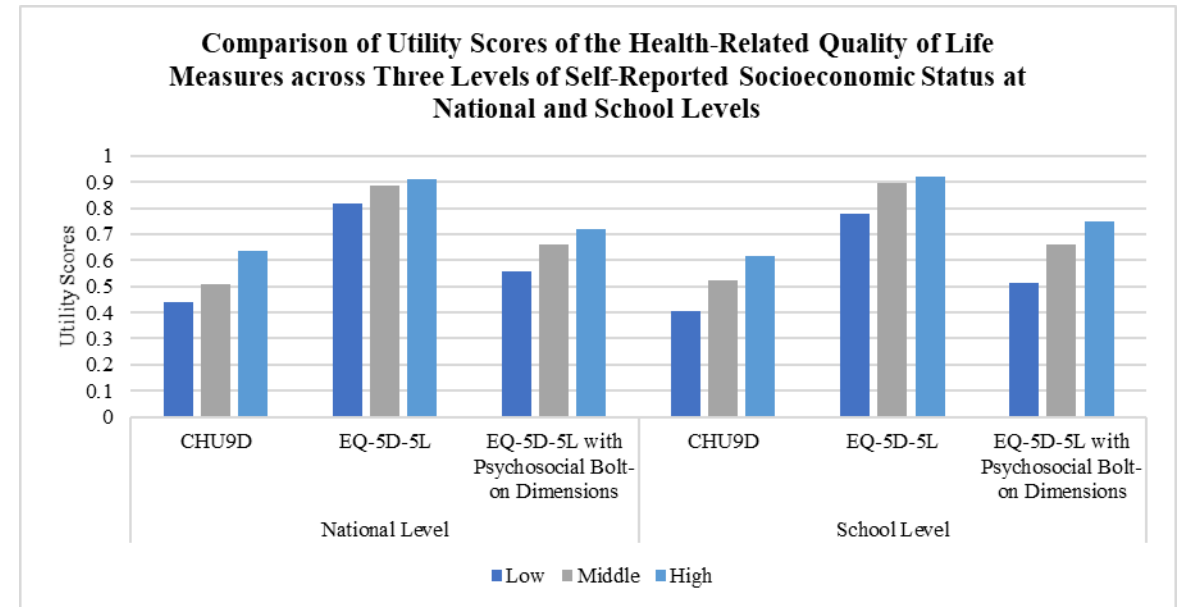
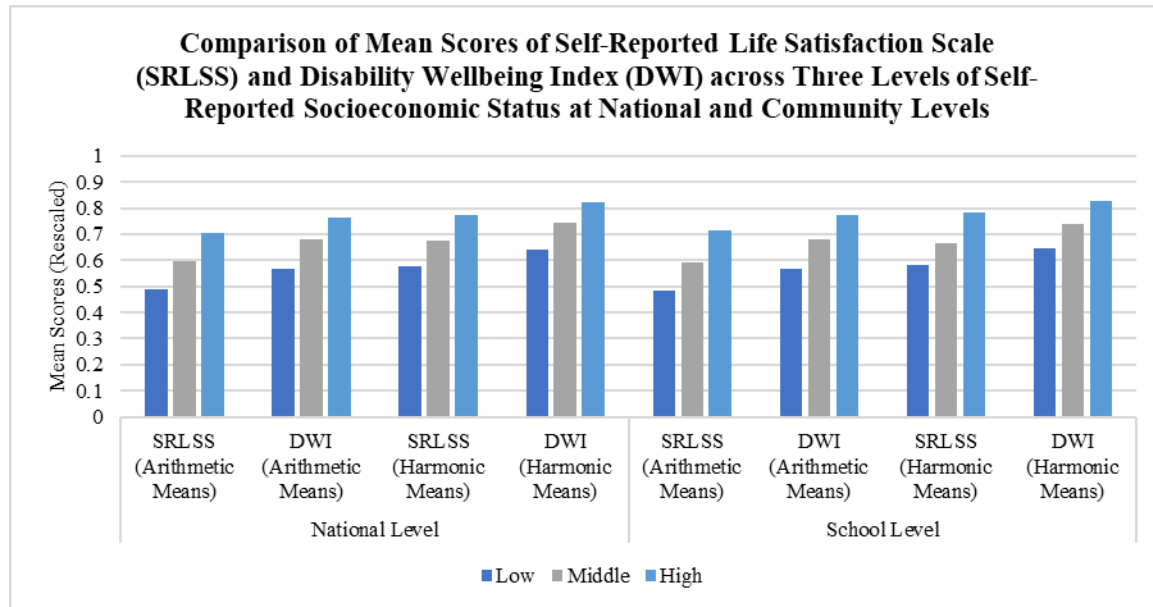


Findings: Known-groups Validity

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.

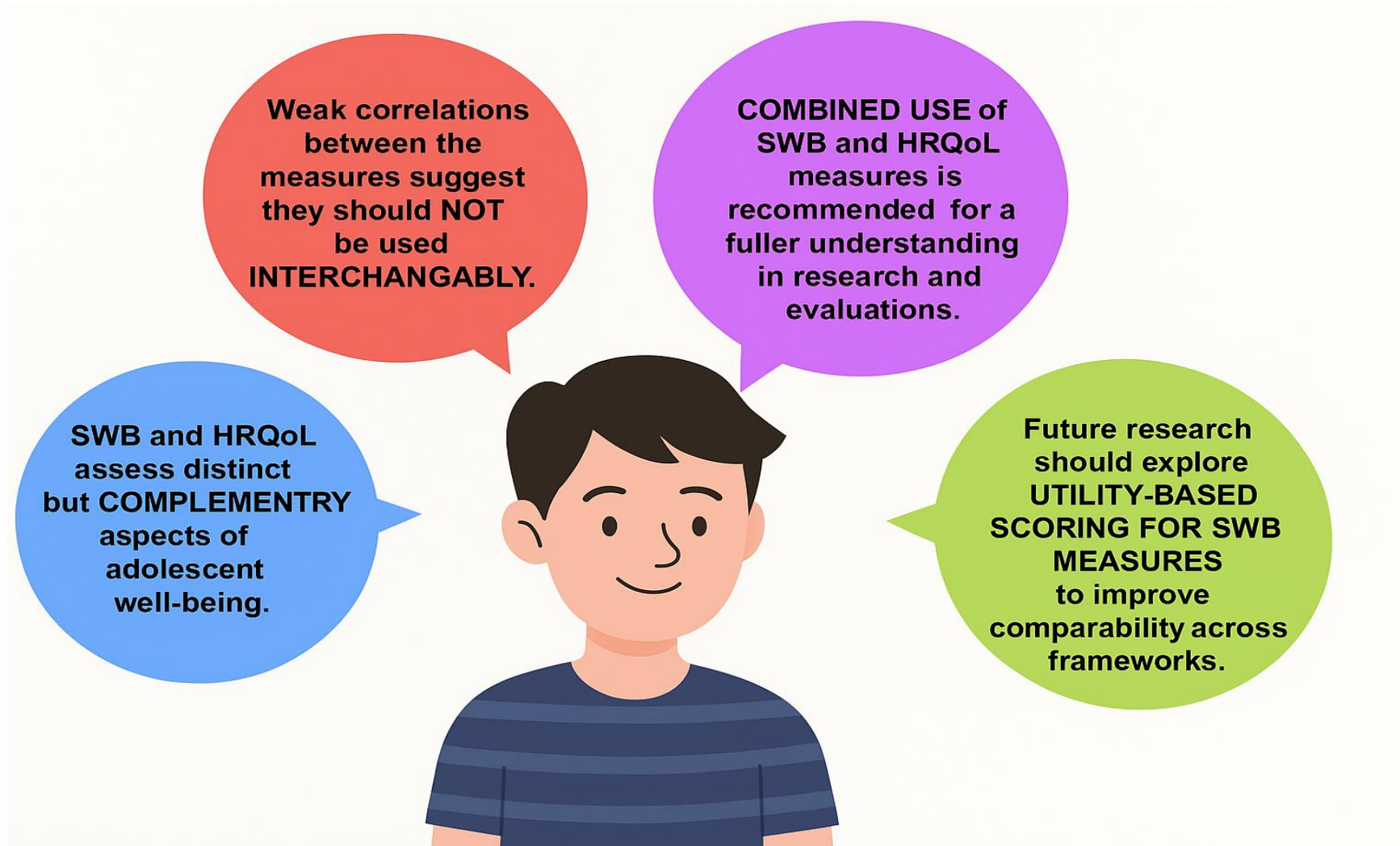
Key Discussion Points

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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