



Cantril Ladder or Overall Life Satisfaction? Comparing 0–10 Summary Indicators of Adolescent Wellbeing

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Abstract

Despite widespread use in wellbeing research, little is known about whether the Cantril Ladder (CL) and Overall Life Satisfaction (OLS) questions (both 0–10 single-item indicators) capture the same construct in adolescent populations. We analysed data from 6,445 students aged 11–18 in 38 International Baccalaureate schools across 24 countries. We compared CL and OLS using descriptive statistics, confirmatory factor analysis (CFA), regression models, and subgroup analyses. Mean CL and OLS scores were similar, but response distributions differed: OLS showed more extreme values and negative skew. In a CFA including other life evaluation measures, both OLS and CL items loaded on a shared life evaluation latent factor, but OLS showed higher loadings. OLS also showed stronger predictive validity than CL across measures of life evaluation, affect, and eudaimonic wellbeing. Subgroup analyses revealed interpretive differences across age, gender, and language groups (English, Spanish, and French). Both CL and OLS are valid indicators of adolescent life evaluation, but they are not interchangeable. OLS may be preferable as a summary measure due to stronger predictive performance, while CL may offer more consistent subgroup comparability. Researchers should consider these trade-offs when selecting or interpreting single-item measures of adolescent wellbeing.

Keywords Life satisfaction · Cantril ladder · Adolescent wellbeing · Measurement validity · Socio-demographic variation

1 Introduction

Wellbeing has traditionally been approached from two main theoretical perspectives. The first, subjective well-being (SWB), also referred to as hedonic well-being, emphasizes the experience of feeling good and encompasses both affective components (positive and negative emotions) and cognitive evaluations such as life satisfac-

tion (Diener et al., 2002). In contrast, psychological wellbeing (PWB), or eudaimonic wellbeing, focuses on functioning well and is typically defined through dimensions such as autonomy, purpose in life, environmental mastery, optimism, personal growth, self-acceptance, and positive interpersonal relationships (Ryff et al., 2021). Wellbeing has also been conceptualised differently in certain fields. For instance, in health sciences, the terms wellbeing and mental health are often used interchangeably to refer to the absence of psychological distress or mental illness (Campbell et al., 2021; Orben & Przybylski, 2019; Stewart-Brown et al., 2009). However, to ensure conceptual clarity throughout this paper, we adopt a comprehensive, widely-accepted definition of wellbeing that integrates both SWB and PWB.

In both adult and child/adolescent research, wellbeing has historically been measured primarily through the lens of SWB, with a strong emphasis on its cognitive component (life evaluation). This has most commonly been assessed using single-item measures (typically ranging from 0 to 10) that ask individuals to evaluate their life “all things considered”, with less frequent use of multi-item scales or domain-specific evaluation measures (Ben-Arieh et al., 2014; OECD, 2013, 2023). This is due to obvious practical reasons (simplicity and concision) and, more importantly, the view that they constitute adequate global judgements (Layard & De Neve, 2023; VanderWeele & Johnson, 2025). Among these single-item indicators, two have been especially prevalent: the Cantril Ladder (CL) and Overall Life Satisfaction (OLS) questions. Although both use 0–10 response scales, they differ subtly in framing. The CL invites respondents to imagine a ladder where zero represents the worst possible life and ten the best possible life, and to indicate the step at which they currently stand (Cantril, 1965), aligning with the notion of general life evaluation. In contrast, the OLS question directly asks individuals to rate their current satisfaction with life as a whole, from 0 (not at all satisfied) to 10 (completely satisfied), thereby aligning more explicitly with the notion of satisfaction (OECD, 2023).

In the child and adolescent literature, both measures are common. However, despite their widespread use, limited evidence exists on whether CL and OLS capture the same underlying construct of life evaluation, especially among children and adolescents. Foundational wellbeing frameworks and measures were initially developed with adult populations (e.g., Diener et al., 1985; Ryff, 1989), and although significant progress has been made in adapting and validating these frameworks and measures for younger populations (Casas, 2011; Casas & González-Carrasco, 2021, 2022; Savahl et al., 2021, 2023), empirical comparisons of the CL and OLS measures in adolescent samples remain scarce.

1.1 Why Important

Understanding whether CL and OLS questions capture the same underlying construct is essential for conceptual and methodological clarity in wellbeing research. Given their differences in framing (life evaluation vs. satisfaction) and cognitive demands (imagining a metaphorical ladder vs. a direct satisfaction rating), it is evident the need to clarify what each measure is actually measuring, and whether they are interchangeable or conceptually distinct, which has implications for how researchers interpret findings. Clarifying their relationship enhances comparability across large-scale international surveys, such as the Health Behaviour in School-aged Children (HBSC), the Programme for International Student Assessment (PISA), and Children’s Worlds, which often rely on

one measure but not the other. From a measurement design perspective, determining whether one item consistently demonstrates stronger construct or predictive validity can inform which instrument should be prioritised in future monitoring and evaluation efforts. Finally, establishing measurement equivalence across key demographic groups ensures that scores derived from either item are interpretable and fair, avoiding biased conclusions when comparing across age, gender, or language groups.

Assessing whether CL and OLS items capture the same underlying construct in children and adolescents is especially timely given the increasing emphasis on monitoring and supporting youth wellbeing in both education systems and global policy agendas (Guthold et al., 2023; Taylor et al., 2022). This growing attention reflects not only a rising concern over reported declines in adolescent life evaluation and broader wellbeing over the past 10–15 years (Marquez et al., 2024, The Children’s Society, 2024), but also a recognition of adolescence as a critical developmental period, typically marked by a decline in wellbeing beginning in early adolescence (Casas & González-Carrasco, 2021). Strong evidence links higher adolescent wellbeing with a wide range of later-life outcomes, including better academic performance, physical and mental health, social relationships, and even long-term economic success (De Neve & Oswald, 2012; Geijsen & Bartels, 2024). Enhancing the accuracy and cross-group comparability of wellbeing indicators during this life stage is therefore essential to identify vulnerable populations, track changes over time, and inform policies and practices that support healthier developmental pathways.

1.2 What Do We Know

A growing body of research with adult samples suggests that, although the CL and OLS questions often perform similarly in terms of structure and interpretation, subtle differences may exist. For instance, Benjamin et al. (2023) found that when participants were asked to reflect on the extent to which various life domains (e.g., themselves, their immediate family, friends) influenced their responses to each item, they reported placing less emphasis on domains like “friends” and “other relatives” when responding to the CL than to the OLS. Fleurbay & Schwandt (2015) noted that when individuals are asked to consider what they aim to “maximize” in life (a proxy for what they value most), the OLS question more closely aligns with those targets than the CL. Similarly, Nilsson et al. (2024) found that, compared to standard satisfaction questions such as OLS, the ladder metaphor embedded in the CL may prime respondents to frame their evaluations in terms of power, achievement, and success. Supporting this distinction, Lomas et al. (2025), using cross-national data from the Global Flourishing Study in 22 countries, showed that the OLS was more strongly associated with flourishing and happiness, while the CL was more tightly linked to the Gross Domestic Product (GDP) and financial metrics. However, using Gallup World Poll data from a much larger sample of 128 countries, Heliwell et al. (2010) showed that income coefficients were very similar comparing the OLS and CL. The authors of this study argue that CL and OLS are related but not interchangeable: they are framed differently, may evoke somewhat different evaluations, and behave differently depending on context; however, both are valid life evaluation tools and may be best used in combination.

Despite these insights from adult samples, evidence on children and adolescents remains limited. This gap is partly due to the later development of the field of child and adolescent wellbeing research (Casas, 2022) and ongoing data collection challenges (Marquez et al., 2024). The CL was first used systematically in adolescent populations across nations through the HBSC study starting in 2002. Although originally developed for adults, the adapted CL version has demonstrated acceptable psychometric properties in adolescent samples, including those aged 11, 13, and 15 in Scotland (Levin & Currie, 2014). While the CL is still commonly used in child and adolescent research (e.g. Mazur et al., 2018; Mohammed & Warner, 2024), the OLS measure has gained broader popularity in child-focused research (OECD, 2023) and is now used in the two other major international surveys collecting data on child and adolescent wellbeing (PISA (OECD, 2023) and Children's Worlds (Savahl et al., 2022) in dozens of countries. Despite this growing use, very few studies have collected both measures within the same child or adolescent sample, nor explored potential differences in how young respondents interpret and respond to each.

One notable exception is the Community Child and Youth Well-being Survey in Canada. In a non-representative sample of children and adolescents aged 9 to 18 from three communities, CL and OLS mean scores differed in some locations, and distinct response patterns emerged. Specifically, a larger proportion of respondents selected extreme values (i.e. below the midpoint or the maximum value on the scale) on the OLS than on the CL (UNICEF, 2022), suggesting divergent interpretations between the two items. A recent study applying network analysis to the same data set used in the present study and considering a wide range of wellbeing measures (affect, life evaluation, and eudaimonic/PWB measures) found that OLS was the top measure in terms of strength and centrality within the wellbeing network. By contrast, the CL showed substantially lower strength and betweenness centrality than the OLS, indicating that although multiple aspects of wellbeing are meaningfully linked to current life evaluation through the CL, these links are fewer and weaker compared to those associated with the OLS (Zhou et al., 2025). Additional indirect evidence comes from Chap. 3 of the World Happiness Report 2024 (Marquez et al., 2024), which highlighted discrepancies in life evaluation trends in the mid-to-late 2010s. Between 2015 and 2018, among 15-year-olds, PISA data (using the OLS) showed declines in multiple countries, while HBSC data (using the CL) reported increases between 2013/14 and 2017/2018. In Appendix 2 of the supplementary materials for Chap. 3, the authors discuss potential reasons for these discrepancies, including methodological differences (e.g., survey timing, sampling issues (notably exclusion rates in some countries), academic testing context in PISA, and slightly different age and year group) but also potential divergence in how these seemingly similar questions may be interpreted by adolescents across different socio-cultural contexts.

1.3 The Current Study

Several important research gaps remain in understanding the conceptual and empirical overlap between OLS and the CL in child and adolescent populations. First, few studies have assessed, within the same youth samples, how the CL and OLS items load on a common latent life evaluation construct, and whether one provides a stronger or more

consistent representation of this underlying dimension. Second, it is unclear which measure offers stronger predictive validity across key wellbeing outcomes. Third, limited evidence exists on whether socio-demographic groups (e.g., by age, gender, or language) interpret or use the two scales differently. Addressing these gaps is crucial for ensuring conceptual clarity, comparability, and equity in the measurement of adolescent wellbeing. To do so, this study aims to shed light on the following questions:

- RQ1. Conceptual similarity (construct validity): Do the CL and OLS measure the same underlying construct?
- RQ2: Predictive validity: Which scale better reflects indicators of adolescent life evaluation (i.e. cognitive SWB) and other wellbeing dimensions?
- RQ3: Subgroup differences in interpretation or use: Do adolescents respond to and interpret the CL and OLS scales differently across socio-demographic groups?

While a recent study using the same dataset applied network analysis to evaluate the relative centrality of various wellbeing indicators (Zhou et al., 2025), the current study adopts a distinct psychometric approach. We directly compare the CL and OLS measures by examining their shared factor structure, predictive validity, and distributional patterns across subgroups, offering novel insight into whether they can be used interchangeably in adolescent wellbeing research.

2 Method

2.1 Sample

Data were gathered in May 2024 through an online survey administered via Qualtrics (Zhou, 2024). Participating schools were selected from the International Baccalaureate (IB) network, many of which had previously expressed interest in the IB's Wellbeing in Schools initiative. This approach allowed for engagement with IB schools across multiple global regions. Ethical approval for the study was granted by the Central University Research Ethics Committee at the University of Oxford (CUREC; Reference: R90787/RE001). A passive parental consent process (opt-out) was implemented, and students gave active assent before beginning the survey, with the freedom to withdraw at any point. The final sample included 6,445 adolescents aged 11 to 18, from 38 IB schools in 24 countries.

The original English questionnaire was translated into French and Spanish with assistance from native-speaking collaborators. A subject expert (native speaker with postdoctoral training), a professional translator, and a researcher jointly reviewed the translations to ensure conceptual clarity and cultural appropriateness. To verify semantic equivalence across versions, back-translation was carried out using ChatGPT-4. The final versions were finalised once the back-translations closely matched the source English text. To minimise order effects, the location of the OLS and CL items, as well as other wellbeing questions, was randomised within the survey.

2.2 Measures

Participants completed a battery of self-report measures capturing multiple dimensions of wellbeing, and provided socio-demographic information.

Overall life evaluation was assessed using two single-item measures rated on scales from 0 to 10: CL and OLS. CL is a widely used tool in global wellbeing research that asks respondents to rate their life on a “ladder” from the worst (0) to the best (10) possible life. Similarly, OLS ask respondents to rate their satisfaction with life all things considered from 0 (lowest) to 10 (highest).

Other wellbeing variables used to assess the construct validity of CL and OLS include:

- Several measures of life evaluation (i.e. cognitive SWB). This includes the Satisfaction with Life Scale (SWLS) (Diener et al., 1985), which consists of 5 items rated on 7-point Likert scales ranging from ‘Strongly disagree’ to ‘Strongly agree’, which captures global cognitive evaluations of life, such as “I’m satisfied with my life.” (in our sample, $\alpha=0.85$). In addition, we examined 14 domain-specific life satisfaction items using 0 to 10 scales, covering satisfaction across a range of life domains: relationships (e.g., family, friends, teachers), environment (e.g., home area, safety), self-perception (e.g., appearance, health, future expectations), and daily life (e.g., learning at school, time use). These items were adapted from previous large-scale international studies of child and adolescent wellbeing (e.g., Casas et al., 2015).
- Affective SWB, which was assessed using 12 items from the Scale of Positive and Negative Experience (SPANE) (Diener et al., 2010). This includes 6 items for positive affect (e.g., joyful, contented) and 6 for negative affect (e.g., sad, afraid), rated on 5-point scales from ‘Very rarely or never’ to ‘Very often or always’, referring to the past four weeks ($\alpha=0.87$).
- PWB (i.e. eudaimonic wellbeing) was measured using the Flourishing Scale (Diener et al., 2010), which includes 8 items assessing aspects such as life purpose, competence, virtue, and social contribution, using 7-point Likert scales from ‘Strongly disagree’ to ‘Strongly agree’ ($\alpha=0.87$).
- Finally, we also used a measure covering both SWB and PWB aspects, the Short Warwick–Edinburgh Mental Well-Being Scale (SWEMWBS) (Stewart-Brown et al., 2009; Tennant et al., 2007), which includes 7 items measuring positive affect and psychological functioning (e.g., optimism, problem-solving, feeling connected), rated on 5-point scales from ‘None of the time’ to ‘All of the time’, referring to the past two weeks ($\alpha=0.81$).

Socio-demographic variables include gender (boy, girl, and ‘prefer not to say’), age (early adolescence (11–14) and middle adolescence (15–18)), and language (English, Spanish, and French).

2.3 Analytical Approach

We adopted a four-stage analytical strategy. First, we conducted preliminary analyses to assess differences in overall mean and distribution of responses between the OLS item and the CL, using descriptive statistics, paired *t*-tests, and histograms.

Second, to evaluate construct validity, we assessed the degree to which OLS and CL reflect a shared underlying construct of global life evaluation. This involved testing a single-factor confirmatory factor analysis (CFA) using structural equation modelling, where OLS and CL were treated as observed indicators (alongside 14 domain-based satisfaction items and the multi-item SWLS) of a latent life evaluation factor (i.e., cognitive SWB). A residual correlation between OLS and CL was also included to capture item-specific shared variance beyond the latent construct. To compare the strength of association between each item and the latent factor, we tested the equality of their factor loadings using likelihood ratio tests between constrained and unconstrained models.

Third, we examined predictive validity by estimating a series of regression models predicting domain-specific satisfaction, SWLS items, and other related wellbeing constructs capturing affective and eudaimonic wellbeing (SPANE (positive and negative affect), Flourishing Scale (PWB) and SWEMWBS (affect and PWB)) from OLS and CL. We compared R^2 values across models, ran joint models including both predictors, and formally tested R^2 differences and nested model improvement via likelihood ratio tests. Given the moderate correlation between CL and OLS, multicollinearity diagnostics were conducted. Variance inflation factors ($VIF=2.03$ for both items) fell within acceptable thresholds, allowing both measures to be included in joint regression models to assess their unique predictive contributions. All wellbeing measures were analysed in their original response scales (e.g., 0–10 for CL and OLS, 0–7 for SWLS, 1–5 for other scales) without rescaling. This decision aligns with the study's applied aim of comparing the relative predictive power of each measure under real-world survey conditions.

Fourth, we assessed subgroup differences across gender, age, and language in response patterns (subgroup-specific paired *t*-tests, multivariate repeated measures ANOVA) and interpretation (subgroup correlations, and regression models).

All regression analyses used robust standard errors clustered at the school level. The data set had no missing data. Analyses were conducted using Stata 15.

3 Results

3.1 Preliminary Analysis

Mean scores for the OLS item ($M=6.658$) and the CL ($M=6.645$) were nearly identical (see Table 1), with no statistically significant difference based on a paired *t*-test ($p>.05$).

However, the response distributions differed in shape and spread. The OLS item exhibited stronger negative skew (-0.735) than the CL (-0.561), indicating more clustering of responses toward the upper end. Yet, the CL had fewer extreme responses at both ends of the scale. As shown in Fig. 1 8–10 scores were more common for OLS

Table 1 Descriptive statistics for main study variables

	(1)			
	mean	sd	min	max
<i>Wellbeing variables:</i>				
OLS	6.658	2.150	0	10
CL	6.645	1.826	0	10
Multi-item life satisfaction scale (SWLS)	23.839	6.546	5	35
Satisfaction with people you live with	8.136	2.167	0	10
Satisfaction with student life	6.288	2.382	0	10
Satisfaction with learning at school	6.636	2.319	0	10
Satisfaction with classmates	6.505	2.482	0	10
Satisfaction with friends	8.230	2.101	0	10
Satisfaction with local area	8.008	2.301	0	10
Satisfaction with things you have	8.551	1.768	0	10
Satisfaction with use of time	5.965	2.596	0	10
Satisfaction with safety	8.435	1.989	0	10
Satisfaction with freedom	7.619	2.484	0	10
Satisfaction with body image	6.634	2.723	0	10
Satisfaction with future	6.817	2.486	0	10
Satisfaction with health	7.642	2.347	0	10
Satisfaction with teacher relationships	7.269	2.319	0	10
Positive Affect (SPANE-P)	21.816	4.230	6	30
Negative Affect (SPANE-N)	19.834	5.223	7	35
PWB (Flourishing Scale)	42.544	8.190	8	56
SWEMWBS	23.577	4.874	7	35
<i>Socio-demographics:</i>				
	n	%		
Age 11–14	3343	51.87%		
Age 15–18	3102	48.13%		
Gender: Boy	2913	45.20%		
Gender: Girl	3335	51.75%		
Gender: Prefer not to say	197	3.06%		
Language English	5369	83.30%		
Language Spanish	396	6.14%		
Language French	680	10.55%		
Observations	6445			

(38.6%) than CL (32.8%), but 0–3 scores were also more frequent for OLS (8.9%) than CL (5.0%). This suggests that OLS may elicit more polarized evaluations, while CL responses are somewhat more moderate and centrally distributed.

3.2 Construct Validity (RQ1)

To assess the extent to which the CL and OLS reflect a shared underlying life evaluation construct, we examined their bivariate correlation and their joint load-

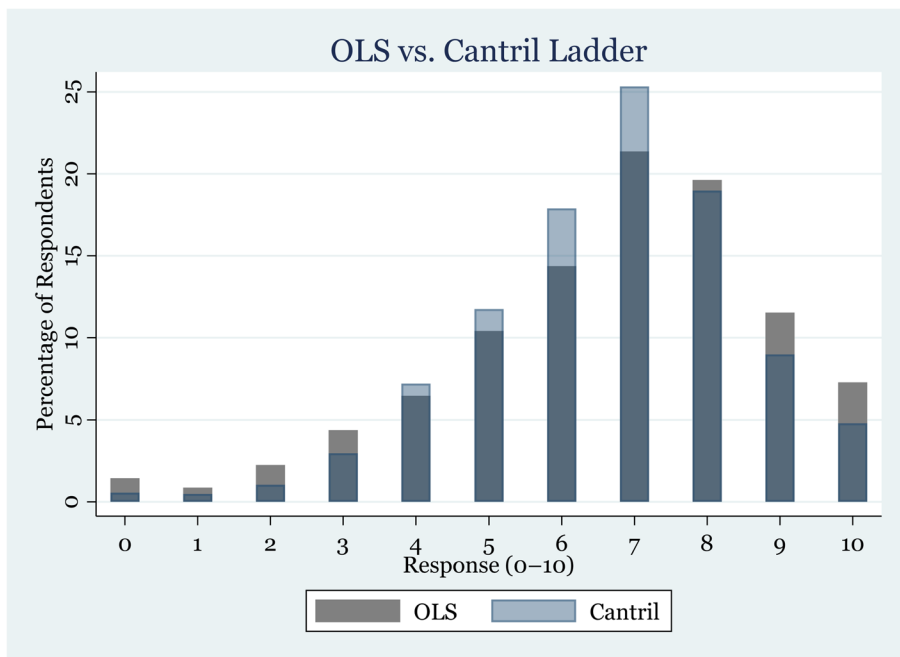


Fig. 1 Response distribution: OLS vs. Cantril Ladder

ing on a common latent factor. The two items were strongly correlated ($r=.71$, $p<.001$), indicating substantial shared variance. We then estimated a CFA via structural equation modelling, including CL, OLS, the five-item SWLS, and 14 domain-specific satisfaction items, to test whether they reflected a common latent construct of global life evaluation. Standardized loadings on the latent factor were high for both items (although higher for OLS (0.79) than for CL (0.71)), supporting their relevance as indicators of the same underlying construct. The residual correlation between the two was also moderate and statistically significant ($r=.35$, $z=28.57$, $p<.001$), suggesting that each item captures additional unique variance beyond the shared factor. Despite strong conceptual support, overall model fit was moderate and did not meet conventional thresholds (CFI=0.86; RMSEA=0.096), calling for caution in interpreting results. Similar levels of fit were observed in two additional CFA models: one excluding OLS (CFI=0.85; RMSEA=0.100) and another excluding CL (CFI=0.85; RMSEA=0.100). In the version with both OLS and CL included, a likelihood ratio test comparing a model with freely estimated loadings to one where OLS and CL loadings were constrained to be equal revealed a significantly poorer fit for the constrained model ($\Delta\chi^2(1)=289.34$, $p<.001$). This suggests that, although both items load on the same latent dimension, they are not psychometrically equivalent Table 2.

Together, these findings suggest that while both CL and OLS reflect a shared latent dimension of life evaluation, the OLS item may serve as a slightly stronger and more consistent indicator of life evaluation in adolescent populations.

Table 2 Standardized factor loadings and model fit from SEM model of life evaluation

Indicator	Standardized Loading	Residual Variance
Overall Life Satisfaction (OLS)	0.788	0.378
Cantril Ladder (CL)	0.713	0.491
Multi-item life satisfaction scale (SWLS)	0.791	0.374
Satisfaction with people you live with	0.613	0.624
Satisfaction with student life	0.733	0.463
Satisfaction with learning at school	0.597	0.643
Satisfaction with classmates	0.568	0.678
Satisfaction with friends	0.465	0.784
Satisfaction with local area	0.535	0.713
Satisfaction with things you have	0.595	0.646
Satisfaction with use of time	0.644	0.585
Satisfaction with safety	0.556	0.691
Satisfaction with freedom	0.654	0.573
Satisfaction with body image	0.620	0.615
Satisfaction with future	0.683	0.533
Satisfaction with health	0.648	0.580
Satisfaction with teacher relationships	0.560	0.686
Residual correlation		
OLS × Cantril Ladder	0.35 ($z=28.57$, $p<.001$)	
Model Fit Statistics		
χ^2 (df)	7153.83 (df=118), $p<.001$	
Comparative Fit Index (CFI)	0.862	
Tucker-Lewis Index (TLI)	0.840	
RMSEA	0.096 (90% CI: 0.094–0.098)	
SRMR	0.056	

All factor loadings are standardized estimates from the baseline (unconstrained) model. The residual covariance between OLS and CL is estimated freely

3.3 Predictive Validity (RQ2)

To evaluate predictive validity, we examined whether OLS or CL better predicted a range of wellbeing outcomes (Table 3). We regressed each outcome (including the multi-item SWLS, its five constituent items, 14 domain-specific satisfaction indicators, and other wellbeing constructs such as positive and negative affect (SPANES), PWB (Flourishing Scale), and SWEMWBS on OLS and CL separately.

Across all models, OLS consistently explained more variance than CL. For example, when predicting SWLS, OLS accounted for 50.8% of the variance ($R^2 = 0.508$), compared to 46.2% for CL ($R^2 = 0.462$). In a joint model including both predictors, explained variance increased to $R^2 = 0.568$, with both items remaining statistically significant (OLS $\beta=1.41$; CL $\beta=1.25$; $p<.001$). A likelihood ratio test confirmed that the joint model significantly improved fit over the OLS-only model ($\Delta\chi^2(1)=842.70$, $p<.001$). Model diagnostics indicated acceptable collinearity ($VIF=2.03$). Additional diagnostic checks

Table 3 Predictive validity of OLS vs. Cantril ladder across wellbeing outcomes

Outcome Variable	R^2 (OLS)	R^2 (Cantril Ladder)
Life Satisfaction		
Multi-item Life Satisfaction (SWLS)	0.508	0.462
Domain-Specific Satisfaction		
Satisfaction with people you live with	0.223	0.190
Satisfaction with student life	0.356	0.277
Satisfaction with learning at school	0.189	0.146
Satisfaction with classmates	0.179	0.133
Satisfaction with friends	0.132	0.099
Satisfaction with local area	0.147	0.134
Satisfaction with things you have	0.175	0.164
Satisfaction with use of time	0.270	0.215
Satisfaction with safety	0.140	0.121
Satisfaction with freedom	0.231	0.210
Satisfaction with body image	0.267	0.186
Satisfaction with future	0.312	0.228
Satisfaction with health	0.254	0.198
Satisfaction with teacher relationships	0.153	0.114
Other Wellbeing Domains		
Positive Affect (SPANE-P)	0.428	0.328
Negative Affect (SPANE-N)	0.256	0.174
PWB (Flourishing Scale)	0.430	0.340
SWEMWBS	0.419	0.304

supported the robustness of the joint model: residuals were approximately normally distributed (Fig. 3), and no major violations of linearity were detected (Fig. 4), although the Breusch–Pagan test indicated heteroskedasticity ($\chi^2(1)=279.19, p<.001$).

OLS also outperformed CL across all domain-specific satisfaction measures (e.g. satisfaction with school life ($R^2 = 0.356$ vs. 0.277), safety ($R^2 = 0.140$ vs. 0.121), friends ($R^2 = 0.132$ vs. 0.099), and the future ($R^2 = 0.312$ vs. 0.228)). Similarly, for other wellbeing outcomes, OLS showed stronger predictive power: positive affect ($R^2 = 0.428$ vs. 0.328), negative affect ($R^2 = 0.256$ vs. 0.174), PWB (flourishing scale: $R^2 = 0.430$ vs. 0.340), and SWEMWBS ($R^2 = 0.419$ vs. 0.304).

Overall, these results suggest that the OLS item has stronger predictive validity than the CL across a wide range of adolescent wellbeing indicators.

3.4 Subgroup Differences in Response Patterns and Interpretation (RQ3)

We next examined whether these overall patterns held across key demographic subgroups, namely age, gender, and language differences.

First, we explored mean differences (Table 4). Paired t-tests showed no significant difference between OLS and CL scores in the overall sample ($p>.05$). However, subgroup analyses revealed notable variation. Among boys, OLS scores were on average 0.10 points higher than CL scores ($p<.001$), whereas among respondents who preferred not to report their gender, CL scores were 0.33 points higher than OLS ($p<.05$). No significant difference was found for girls. By language, French-speaking

Table 4 Mean differences between OLS and CL by subgroup

Subgroup	<i>N</i>	Mean OLS	Mean CL	Mean Difference (OLS–CL)	<i>p</i> -value
Total sample	6,445	—	—	—	—
Age group					
11–14	3,343	6.996	6.970	0.03	0.31
15–18	3,102	6.295	6.294	0.00	0.97
Gender					
Male	2,913	6.926	6.824	0.10****	0.00
Female	3,335	6.485	6.527	–0.04	0.09
Prefer not to say	197	5.655	5.985	–0.33*	0.03
Language					
English	5,369	6.484	6.498	–0.01	0.53
Spanish	396	7.614	7.583	0.03	0.66
French	680	7.485	7.260	0.23****	0.00

* $p < .05$, ** $p < .01$, *** $p < .001$

students rated OLS 0.23 points higher than CL ($p < .001$), while no significant differences emerged for English or Spanish speakers. No meaningful differences were observed for younger (11–14) and older (15–18) adolescents.

Second, we examined distributional patterns. Across all subgroups, OLS responses were more negatively skewed than CL responses, although the size of this gap varied. Among younger adolescents (11–14), the skewness gap between OLS and CL was largest (OLS = –0.88; CL = –0.68), while older adolescents (15–18) exhibited a smaller skewness gap and less skewed distributions overall (OLS = –0.69; CL = –0.56). A similar pattern was observed by gender: boys showed the largest skewness gap (OLS = –0.89; CL = –0.65), while girls showed milder skewness and a smaller skewness gap between OLS and CL (OLS = –0.62; CL = –0.46). Respondents who preferred not to report their gender were the only group with smaller skewness in OLS than in CL (OLS = –0.39; CL = –0.52). Language subgroups also differed: French-speaking students showed the highest overall skew (but the smallest skewness gap: OLS = –1.24; CL = –1.20), followed by Spanish speakers (OLS = –1.10; CL = –0.95) and English speakers (OLS = –0.66; CL = –0.49). These patterns are visualized in Fig. 2 and suggest that CL responses were more consistent across subgroups, which may reflect greater practical comparability.

Next, we assessed association strength (Table 6 in Appendix 1). Correlations between OLS and CL also varied across groups. Correlations were highest among younger adolescents ($r = .73$), girls ($r = .74$), and Spanish-speaking students ($r = .76$). Lower correlations were observed among older adolescents ($r = .67$), boys ($r = .69$), respondents who preferred not to report their gender ($r = .65$), and English speakers ($r = .70$). These differences further suggest variation in how subgroups interpret or respond to the two items.

In addition, we conducted model-based subgroup analyses. A repeated measures ANOVA confirmed significant variation in CL and OLS scores across subgroups. The overall multivariate test was significant (Wilks' $\lambda = 0.927$, $F(13, 12,876) = 77.93$, $p < .001$). Significant main effects were found for age ($F(1, 12,876) = 44.65$, $p < .001$), gender ($F(2, 12,876) = 17.71$, $p < .001$), and language ($F(2, 12,876) = 36.42$, $p < .001$), indicating that score differences across OLS and CL vary systematically by these demographic char-

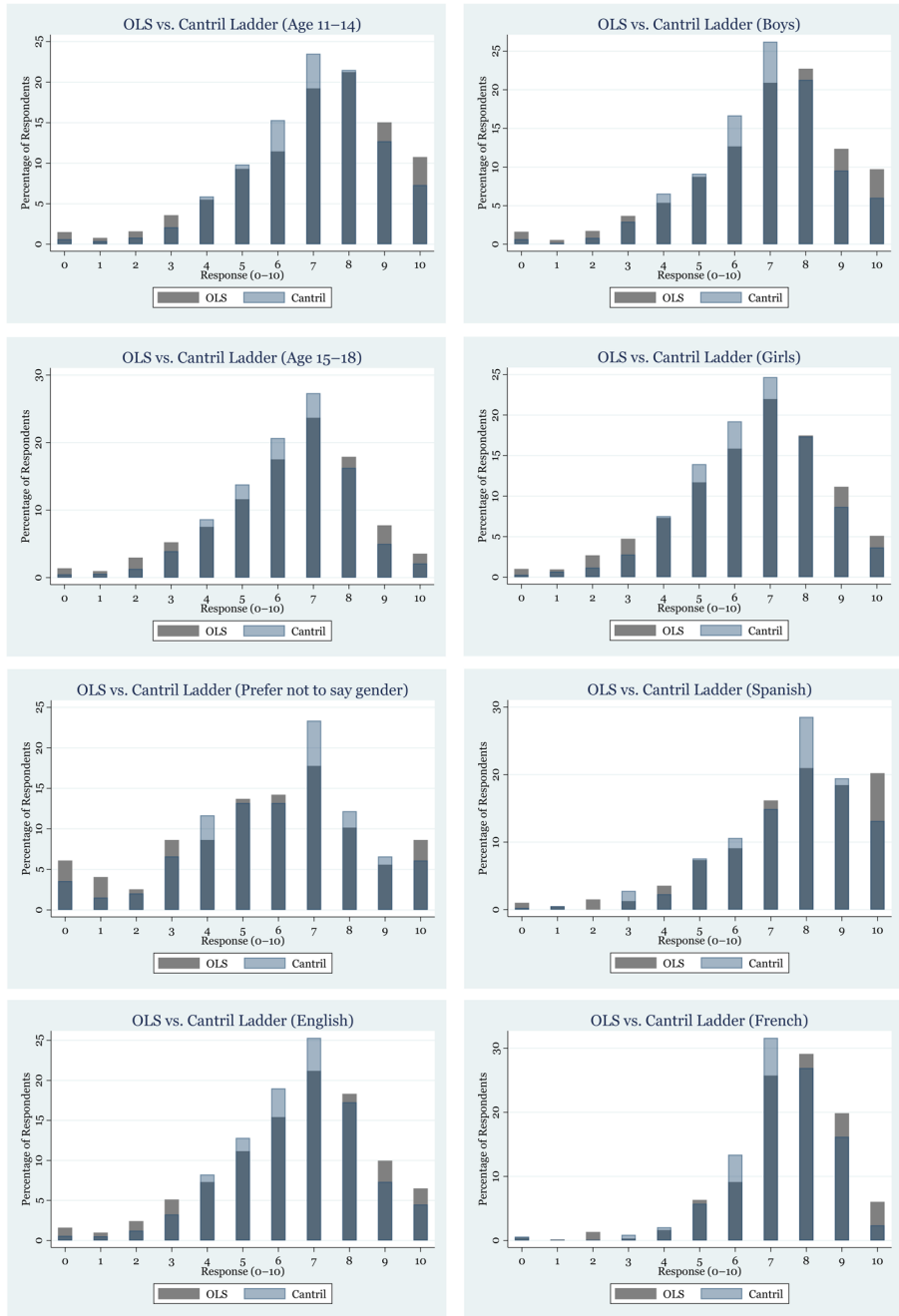


Fig. 2 Response distribution: OLS vs. Cantril Ladder, by group

acteristics. Complementary regression models also predicted the score gap (OLS–CL) using age, gender, and language (Table 5). The gap was significantly larger for boys compared to girls ($\beta = -0.15, p = .001$), and for French-speaking students relative to English speakers ($\beta = 0.26, p < .001$), while other contrasts were not statistically significant.

4 Discussion

This study explored the conceptual and empirical overlap between two widely used single-item overall life evaluation measures (the CL and the OLS item) among adolescents across diverse countries and languages. The two measures were strongly correlated ($r = .71$) and loaded on a common latent factor of life evaluation. However, the two measures were not psychometrically equivalent. The OLS item consistently showed stronger psychometric performance, including higher factor loadings and greater predictive validity, suggesting it may be a more robust summary indicator of adolescents' overall life evaluation. At the same time, the CL exhibited more consistent response distributions across age, gender, and language groups and smaller skewness differences across these subgroups, suggesting greater potential for comparability in demographic analyses.

These findings offer a different perspective from our previous work using network analysis (Zhou et al., 2025), which assessed the interconnectedness of wellbeing indicators but did not examine the psychometric equivalence of specific measures. The present study provides a more focused and rigorous comparison of CL and OLS, combining factor analysis, predictive modelling, and subgroup distributional analysis to assess the extent to which these measures capture the same construct and can be used interchangeably in adolescent populations.

Our findings align with prior research in adults suggesting that the CL and OLS, while conceptually similar, are not interchangeable. Studies suggest that the CL (by asking respondents to imagine a metaphorical ladder anchored to the “best possible life”) may engage more abstract, comparative, or externally referenced reasoning (Fleurbay & Schwandt, 2015; Lomas et al., 2025; Nilsson et al., 2024). In contrast, the OLS, which asks directly about satisfaction with life as a whole, tends to elicit more affective or intuitive appraisals and aligns more closely with measures such as the SWLS. Our results extend this distinction to adolescents and suggest that developmental factors may amplify these differences. Specifically, we observed lower CL–OLS correlations and greater skewness divergence among younger adolescents, boys, and English-speaking students. Age-related differences may be due to differ-

Table 5 Regression results predicting gap between OLS and CL (OLS–CL)

Predictor	Coefficient (β)	SE	<i>p</i> -value
Age group (15–18 vs. 11–14)	0.015	0.063	0.810
Gender (Boy vs. Girl)	-0.146**	0.041	0.001
Gender (Prefer not to say vs. Girl)	-0.275	0.184	0.144
Language (Spanish vs. English)	0.069	0.061	0.262
Language (French vs. English)	0.263***	0.041	0.000

Coefficients from linear regression with school-level clustered SEs. Reference groups are: Age 11–14, Girls, English language; * $p < .05$, ** $p < .01$, *** $p < .001$

ences in cognitive capacities for abstraction, future-oriented thinking, and social comparison, which may be less consistent or still developing for younger adolescents (Fuhrmann et al., 2022; Lee & Oishi, 2021). These findings also help contextualize previously observed differences in trends and means between CL and OLS in adolescent samples (UNICEF, 2022; Marquez et al., 2024 (Appendix 2) and underscore the importance of considering item framing and cognitive demands when selecting summary wellbeing indicators for use in adolescent populations.

4.1 Implications

From a measurement perspective, the OLS item demonstrated stronger psychometric performance than the CL, with higher factor loadings and greater predictive validity across a range of wellbeing outcomes. These results suggest that OLS may be a more reliable single-item indicator of adolescent life evaluation, particularly when predictive accuracy is prioritized. However, the CL showed more consistent response distributions across demographic subgroups. Thus, as noted above, while the two items are conceptually aligned, they should not be treated as interchangeable. When using a single-item measure, researchers should consider the trade-off between predictive strength (favouring OLS) and potential cross-group comparability (favouring CL).

For population-level monitoring, especially in international or longitudinal contexts, the CL retains value due to its widespread use in international surveys such as HBSC and the Gallup World Poll, which makes it suitable for benchmarking, and its relatively stable response patterns across subgroups. However, researchers should not assume it is free from interpretive bias, particularly among younger or linguistically diverse respondents. Mean comparisons should be made with caution and ideally accompanied by sensitivity analyses or subgroup modelling.

When space allows, including both OLS and CL items can enhance measurement robustness and provide opportunities to explore framing effects and interpretation differences across groups. Divergences in responses between the two items may reveal important subgroup-specific cognitive, linguistic, or cultural factors that shape adolescents' life evaluation. Such dual-item approaches may be especially useful in mixed-methods or cross-cultural studies seeking to balance validity with comparability.

Future research should explore whether these differences reflect distinct cognitive demands or frames of reference, and how developmental and contextual factors shape adolescents' understanding and use of these items. In particular, future qualitative research could explore how adolescents interpret and differentiate between these items, particularly given the importance of peer comparisons in adolescence.

In sum, as noted by Heliwell et al. (2010), CL and OLS are both valid life evaluation tools and may be best used in combination, rather than interchangeably.

4.2 Limitations

Several limitations should be considered when interpreting these findings. Although the sample was large and geographically diverse, it was drawn exclusively from International Baccalaureate (IB) schools, whose students may differ from national-system peers in terms of socioeconomic background, academic motivation, or school

climate, potentially limiting generalisability. The nature of countries where data were collected (i.e. mostly high-income nations), and the number of languages assessed, also limit generalizability across more linguistically and socio-culturally diverse contexts. Finally, the cross-sectional nature of the data restricts causal inference and prevents the analysis of developmental change over time. Together, these limitations underscore the need for replication in more socioeconomically and academically diverse settings, and for future studies to adopt longitudinal and cross-cultural designs that can better isolate age- and culture-specific response patterns.

5 Conclusions

While both CL and OLS are valid measures of adolescent life evaluation, they are not psychometrically interchangeable. OLS is the stronger predictor and more robust summary measure, while CL may be preferable for subgroup comparisons and benchmarking. Researchers should weigh these trade-offs and, when feasible, include both measures to enhance interpretability and comparability.

Appendix 1.

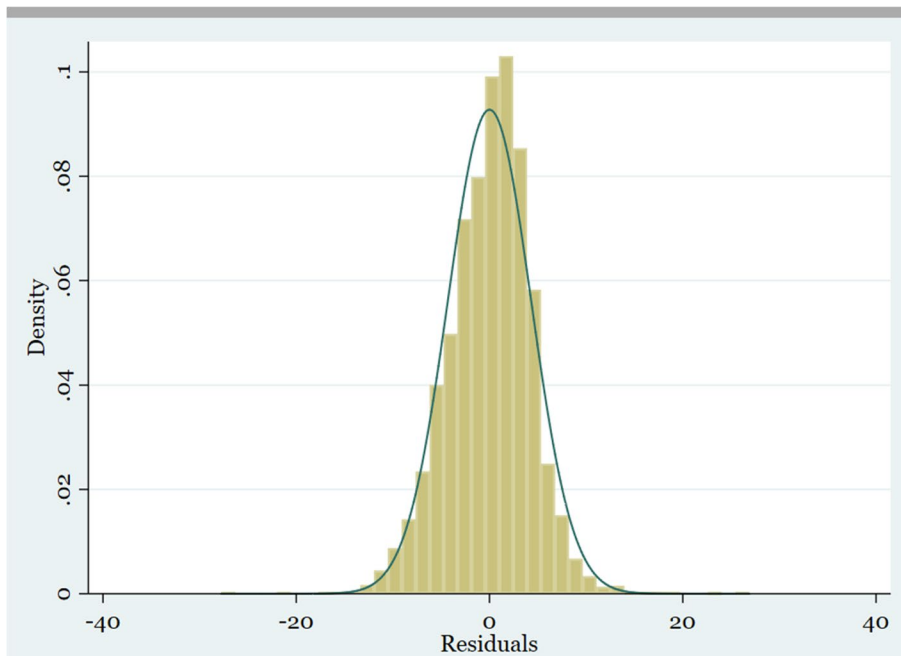


Fig. 3 Histogram of residuals from joint model

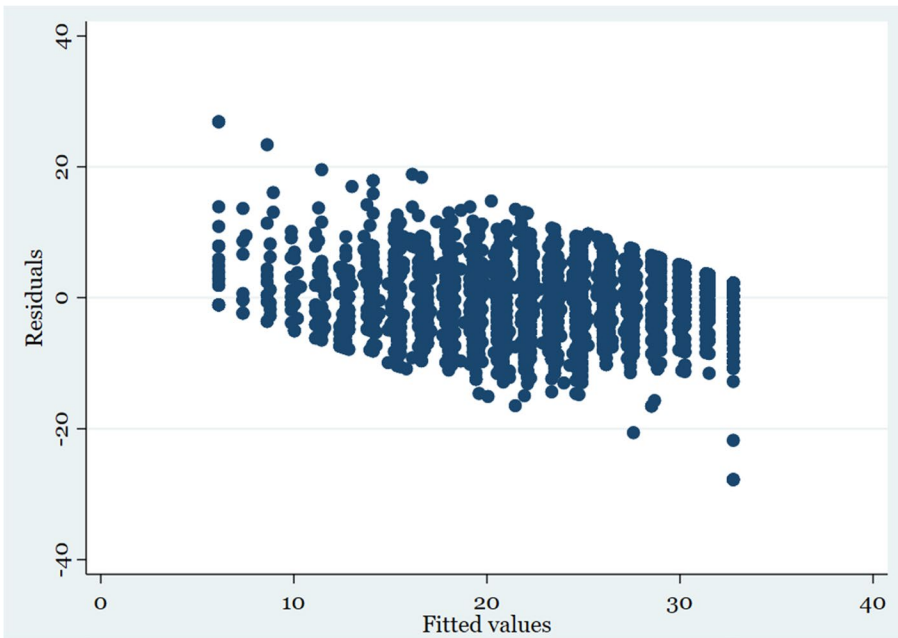


Fig. 4 Residual vs. fitted plot for joint model

Table 6 Correlation between OLS and CL, by subgroup

Subgroup	Correlation (<i>r</i>)
Age 11–14	0.73
Age 15–18	0.67
Girls	0.69
Boys	0.73
Neither boy nor girl	0.65
English-speaking students	0.70
Spanish-speaking students	0.76
French-speaking students	0.74

Table 7 Sample characteristics by country

Country	Respondents	Number of schools	English	Spanish	French	Age 11–14	Age 15–18	Boy	Girl	Prefer not to say gender
Argentina	202	1	1.8%	98.0%	0.0%	56.4%	43.6%	43.6%	56.4%	0.0%
Armenia	135	1	91.1%	3.7%	5.2%	0.0%	100.0%	52.6%	47.4%	0.0%
Austria	72	1	100.0%	0.0%	0.0%	62.5%	37.5%	52.8%	45.8%	1.4%
Bahrain	303	1	100.0%	0.0%	0.0%	66.7%	33.3%	54.8%	42.6%	2.6%
Bangladesh	132	2	100.0%	0.0%	0.0%	79.6%	20.5%	53.0%	44.7%	2.3%
Canada	1202	2	46.5%	0.3%	53.2%	61.8%	38.2%	49.1%	48.0%	2.9%
China	156	1	100.0%	0.0%	0.0%	80.8%	19.2%	48.1%	43.6%	8.3%
Denmark	300	2	98.3%	1.3%	0.3%	30.0%	70.0%	43.3%	54.0%	2.7%
Ecuador	109	1	3.7%	96.3%	0.0%	42.2%	57.8%	48.6%	49.5%	1.8%
Egypt	155	1	89.0%	0.0%	11.0%	51.0%	49.0%	54.8%	45.2%	0.0%
Estonia	172	1	99.6%	0.0%	0.4%	48.9%	51.2%	41.9%	54.1%	4.1%
Germany	437	1	95.6%	3.9%	0.5%	43.0%	57.0%	46.5%	51.5%	2.0%
Ghana	64	1	96.9%	1.6%	1.6%	7.9%	92.1%	58.3%	41.7%	0.0%
India	755	4	100.0%	0.0%	0.0%	75.2%	24.8%	48.9%	50.9%	0.3%
Japan	139	1	99.3%	0.0%	0.7%	75.4%	24.7%	49.2%	50.1%	0.7%
Mexico	98	1	43.9%	56.1%	0.0%	91.8%	8.2%	60.2%	38.8%	1.0%
Russia	145	1	100.0%	0.0%	0.0%	49.7%	50.3%	50.3%	48.3%	1.4%
Sint Maarten	163	1	99.4%	0.0%	0.6%	66.7%	33.3%	41.1%	54.6%	4.3%
Slovakia	82	1	100.0%	0.0%	0.0%	53.7%	46.3%	52.4%	46.3%	1.2%
Sweden	312	2	97.1%	1.6%	1.3%	42.0%	58.0%	44.9%	52.9%	2.2%
The Netherlands	94	1	96.8%	2.1%	1.1%	81.9%	18.1%	47.9%	51.1%	1.1%
Turkey	572	4	100.0%	0.0%	0.0%	4.4%	95.6%	45.3%	52.3%	2.5%
United Arab Emirates	451	2	99.3%	0.2%	0.4%	65.6%	34.4%	46.3%	49.0%	4.7%
United Kingdom	95	2	97.9%	0.0%	2.1%	92.0%	8.0%	27.3%	67.3%	5.3%

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Author Contributions J.M. conceptualized the study, drafted the manuscript, analysed the data, produced the data visualizations, and interpreted the results; W.Z. helped to draft the manuscript, assisted with data analysis and with interpretation of the results; L.B. helped to draft the manuscript and interpret the results; L.T. helped to draft the manuscript and interpret the results. All authors read and approved the final manuscript.

Data Availability No datasets were generated or analysed during the current study.

Declarations

Competing interests The authors declare no competing interests.

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