



# The Factor Structure of Different Subjective Well-Being Measures and its Correlates in the Croatian Sample of Children and Adolescents

Marija Džida<sup>1</sup> · Toni Babarović<sup>1</sup> · Andreja Brajša-Žganec<sup>1</sup>

Accepted: 20 May 2023 / Published online: 27 May 2023  
© The Author(s), under exclusive licence to Springer Nature B.V. 2023

## Abstract

The transition from middle childhood to early adolescence is one of the crucial developmental periods for studying children's subjective well-being (SWB). For developmental trends in SWB to be accurately estimated, it is necessary to demonstrate the measurement invariance of its measures. The first goal of this study was to explore the structure and measurement invariance with respect to age and gender of several common measures of child and adolescent subjective well-being. A tripartite higher-order model of subjective well-being was also tested, and its measurement invariance was investigated as well. Lastly, common sociodemographic (age and gender) and emotional (emotional clarity and regulation) correlates of SWB were investigated. Overall, 1534 children ( $M_{age}=10.53$ ,  $SD=1.15$ ) gave data about their subjective well-being by filling out context-free and domain-based life satisfaction measures, and positive and negative affect questionnaires. Children also gave data on their emotional clarity and emotion regulation strategies usage. Measurement invariance was supported for all SWB measures, as well as for the tripartite higher-order model consisting of context-free life satisfaction, and negative and positive affect. Small gender and age differences were detected with boys and younger children having somewhat higher SWB on some of the measures included. Emotional clarity and emotion regulation consistently predicted all latent SWB measures while explaining quarter-to-half variance in SWB depending on the measure. Results show comparability of SWB structures across gender and age groups, and consistent links between SWB and emotional skills.

**Keywords** subjective well-being · children · adolescents · emotional skills

---

✉ Marija Džida  
mdzida@pilar.hr

<sup>1</sup> Institute of Social Sciences Ivo Pilar, Zagreb, Croatia

In the last decades, there is a growing interest in studying children's and adolescents' subjective well-being (SWB). The period of life between the ages of 9 and 12, which includes the transition to adolescence, has been shown to be an interesting period for studying SWB since some authors have reported significant SWB decreases (González-Carrasco et al., 2017; Orben et al., 2022) in that period. However, to set the ground for meaningful mean level comparisons, the structure and measurement invariance of SWB measures should be clearly demonstrated. This study, therefore, had several goals. The first goal of this study is to explore the structure and measurement invariance of different SWB measures with respect to gender and age in the period of middle childhood and early adolescence. As our second goal, we will explore whether lower-order SWB measures can be modeled within a higher-order factor model in the sample of children and adolescents and whether this model also shows invariance across gender and age. The third goal of this study is to explore correlates of SWB measures in this specific developmental period. We have focused on age and gender as commonly researched demographic correlates, but we also explore different emotional skills as somewhat less researched correlates of SWB in child and adolescent samples.

## 1 Measures of Child and Adolescent SWB

Subjective well-being is a multidimensional construct that typically includes different cognitive and affective processes. Cognitive processes reflect the overall evaluation of one's life or different life domains, while affective processes involve one's experience of positive and negative affect (Diener, 2013). Cognitive aspects of child SWB are typically measured with context-free scales such as *Student Life Satisfaction Scale* (Huebner, 1991) or items such as the one-item *Overall Life Satisfaction* (OLS). Cognitive SWB can also be measured with domain-based scales which include satisfaction with specific life domains (i.e. family life, friends, school...) such as the *Brief Multidimensional Students Life Satisfaction Scale* (BMSLSS, Seligson et al., 2003) or the *Personal Well-being Index-School Children* (PWI-SC, Cummins & Lau 2005). Child's and adolescent's positive and negative affect are measured by reports of experiences of diverse affective states (e.g., happy, sad...) whose selection often slightly differs depending on the study (Casas et al., 2020; Weinstein et al., 2007). One available measure of positive and negative affect is Ebessutani et al.'s (2012) short 10-item version of *The Positive and Negative Affect Schedule for Children* (PANAS-C-SF; Laurent et al., 1999) which measures both positive and negative affect and which was shown to be adequate for use with children as young as 6 years old.

There are many different SWB measures available in the field, and often somewhat modified versions of questionnaires are used in different studies. However, for comparisons of SWB levels on these measures to be valid, a clear structure and measurement invariance of these measures should be demonstrated. The first goal of our study is to explore structures and measurement invariance of several different SWB measures: context-free life satisfaction measure (Croatian translation of SLSS), domain-based life satisfaction measure (Croatian translation of BMSLSS), and positive and negative affect measures (Croatian translation of PANAS-C-SF). We will

test the invariance of these SWB measures with respect to gender and age. Measurement invariance across different subgroups is crucial because it allows for reasonable comparisons in mean and regression coefficients between the groups (Brown, 2015). This methodological concept is especially important since one of the most common research questions in this area involves exploring age and gender differences in different SWB indicators.

## 2 Higher-order SWB Structure

Different measures of SWB are often moderately to highly correlated. In research with adults positive and negative affect and context-free scales are considered as primary SWB components (Diener, 1984) and are often modeled within a tripartite higher-order model (Busseri, 2018) which accounts for their intercorrelations. Only recently, as part of the Children's Worlds Survey, Savahl et al. (2021) explored the higher-order model of child SWB in a large dataset with over 90,000 children aged 10 and 12 in 35 countries including Croatia. In their study, the higher-order SWB factor consisted of four lower-order factors. The higher-order SWB factor was saturated with context-free life satisfaction measure, positive and negative affect, and a domain-based life satisfaction measure, forming the quadripartite SWB model. They found the quadripartite SWB model to be invariant across gender and age. They concluded their study by stressing the need of testing the higher-order SWB model in individual countries to prove its validity and to demonstrate comparability between different child and adolescent subgroups.

In this study, we will use a different sample of children from Croatia with somewhat different measures of SWB to test the higher-order SWB model. We decided to explore the fit of the tripartite hierarchical model with affective SWB and context-free cognitive SWB measures. We chose the tripartite SWB model instead of the quadripartite SWB model because the former is more often used in research with adults (Busseri, 2018). We expected the tripartite model to be more comparable across children and adults because the measures included in that model are context-free. Domain-based measures often differ from each other as different authors choose different life dimensions as indicators of LS. These differences are especially significant when looking at adults' and children's domain-based LS measures. Because of these reasons, we have chosen to test the structure and invariance of the tripartite higher-order model across age and gender.

## 3 SWB Correlates in Middle Childhood and Early adolescence - age and Gender

A few longitudinal studies (González-Carrasco et al., 2017; Orben et al., 2022) and cross-sectional studies (Casas et al., 2012; Goldbeck et al., 2007; Park, 2005) have shown that cognitive aspects of SWB tend to decrease in early adolescence. In a follow-up study, González-Carrasco et al. (2017) showed that domain-based satisfaction measured with BMSLS and PWI decreased in a year for children aged 11–15

years in the first time point. Orben et al. (2022) similarly showed that life satisfaction (one item global measure) decreases most steeply between the ages of 11 and 14 in both UK and Germany in a sample of over 37,000 children and young adults (aged between 10 and 24). In both González-Carrasco et al.'s (2017) and in the UK sample of Orben et al.'s study (2022) girls compared to boys experienced a steeper decline in life satisfaction in early adolescence. These results are in line with other results from cross-sectional studies which also show lower SWB for older children (12-year-olds compared to 10-year-old) measured with both context-free and domain-based measures (Savahl et al., 2021). Results from Croatia showed the same pattern with 4th grade children (age 10) having higher life satisfaction than 6th grade children (age 12) (Ajduković et al., 2020).

Fewer studies explored age differences in affective SWB. A longitudinal study (Weinstein et al., 2007) with 8th graders (mean age 13.94) and 10th graders (mean age 16.01) showed that daily positive mood decreases with age, while depressive mood doesn't. In another longitudinal study, Casas and González-Carrasco (2020) also reported a decrease in positive affect and an increase in negative affect as age increases (most children aged between 10 and 14). Data from the Croatian sample also supports that finding (Ajduković et al., 2020) with older children having a lower positive affect and higher negative affect.

Data regarding gender differences in cognitive aspects of SWB shows insignificant differences among boys and girls, with a small trend for boys to have higher satisfaction with life (meta-analysis by Chen et al., 2020). However, when looking at domain-satisfaction boys had higher satisfaction with self and living environment, and lower satisfaction than girls with school and friends (Chen et al., 2020). Regarding affective SWB, girls were reported to have lower positive and higher negative affect both in Croatia (Ajduković et al., 2020) and in other countries (Weinstein et al., 2007).

#### **4 SWB Correlates in Middle Childhood and Early adolescence – emotional Skills**

So far, many different correlates of SWB have been identified. Child and adolescent SWB has been extensively linked to self-esteem (Moksnes & Espnes, 2013), relationship with parents (Newland et al., 2019), personality traits, and temperament (Anglim et al., 2020; Fogle et al., 2002). Somewhat less research has been devoted to SWB and emotional competencies in this developmental period. Emotional competency is a broad term that captures different emotional skills such as emotion regulation and understanding of one's emotions among many others (Saarni, 1999). High emotional competencies may be protective factors for SWB in this sensitive period.

Emotion regulation refers to processes used to change current or expected emotional states (Thompson, 1994). It could be beneficial for SWB to use adaptive emotion regulation strategies such as cognitive reappraisal which refers to changing the interpretation of the situation. On the other hand, the usage of maladaptive strategies such as expressive suppression which consists of masking all emotion-expressive behavior may be harmful to SWB (Gross, 2014). Studies on older adolescents show

that cognitive reappraisal is usually positively linked to life satisfaction (age 14–18, Teixeira et al., 2015), and positive affect (age 14–18, Verzeletti et al., 2016). Suppression, on the other hand, shows negative relations with life satisfaction and positive affect, and positive relations to negative affect (Verzeletti et al., 2016). Both reappraisal and suppression were also shown to mediate the effects of stress on life satisfaction decline over one year (Ng et al., 2018). Adolescents (mean age at time 1 = 12.20) who experienced more stressful events at time 1 and who used less reappraisal and more suppression, experienced a decline in life satisfaction a year later (Ng et al., 2018).

Emotional clarity or understanding of our own's feelings (Salovey et al., 1995) is also considered to be important for SWB (Lischetzke & Eid, 2017). Even though most studies that explored that link relied on adults (Extremera et al., 2009; Lischetzke et al., 2012; Vergara et al., 2015) there is some evidence for these links in the samples of adolescents (Extremera et al., 2007; Sánchez-Álvarez et al., 2015). Higher emotional clarity was associated with higher life satisfaction and positive affect ( $M_{age}=15.76$ , Extremera et al., 2007;  $M_{age}=13.26$ ; Sánchez-Álvarez et al., 2015).

## 5 This Study

In this study, we will explore the structure of several SWB measures and the fit of the tripartite higher-order SWB model in the sample of children and early adolescents. We expect SWB measures and the tripartite model to be comparable among boys and girls and among younger (cca. 9.5-years-old) and older (cca. 11.5-years-old) children. We also explored the correlates of higher-order and lower-order SWB measures. We expect to find gender and age differences with boys and younger children having higher SWB. We also expected SWB measures to correlate positively to reappraisal and emotional clarity, and negatively to suppression.

## 6 Method

### 6.1 Participants

This study was conducted as part of project Child well-being in the context of family (CHILD-WELL) financed by the Croatian Science Foundation. Data used in this study was gathered in the first wave of the project in the spring of 2021. As part of the project, 1548 children attending third, fourth, fifth and sixth grades of elementary and middle school participated in the study. Overall, 1534 children (757 boys) were included in this study. Child ages ranged from 8 to 13 years with 97% of children in the range between 9 and 12 years ( $M_{age}=10.53$ ,  $SD=1.15$ ). Children were attending regular state schools in five towns in Croatia. Generally, primary education in Croatia consists of two phases. The first phase includes children from first to fourth grade (ages 7–10), and the second phase includes children in grades fifth to eight (ages 11–14). These phases differ in the number of courses and in the level of demandingness, with the second phase having more courses and generally higher demands.

To reflect the characteristics of the Croatian education system, we recoded grade levels into two categories – younger children who attended third or fourth grade ( $M=9.61$ ,  $SD=0.64$ ), and older children who attended fifth or sixth grade ( $M=11.56$ ,  $SD=0.60$ ). Around 80% of children included in the study reported living with both parents, 16% with a mother only, and the rest reported living only with a father, guardians, or someone else.

## 6.2 Instruments

### 6.2.1 SWB Measures

**SLSS** - The Student Life Satisfaction Scale (SLSS) (Huebner, 1991) is a measure of the general life satisfaction of children aged 8 to 18 years. The scale consists of 7 items rated on a range from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). Items reflect different cognitive judgments about general life satisfaction.

**BMSLSS** – Brief Multidimensional Student Life Satisfaction Scale (Seligson et al., 2003) - contains 6 items that measure children's satisfaction with life in general and satisfaction with five specific domains: friends, family, school experiences, self, and living environment. **One item measure of life satisfaction in general (OLS)** was used separately for validation purposes. All items were rated on a 7-point scale.

**PANAS-C-SF** – The Positive and Negative Affect Schedule for Children (Ebesutani et al., 2012) is a shortened version of the scale of positive and negative affect for children and young people, which consists of 10 adjectives. Children reported on a scale from 1 (*very little or not at all*) to 5 (*extremely*) to what extent they experienced the specified type of affect during the last few weeks. In a Croatian version of the questionnaire, the adjective *active* (positive affect) was added in order to replace *lively* which didn't show adequate loadings on the positive affect factor.

**HAPPINESS** – One item happiness measure was also used. Children rated how happy they are on a scale from 1 (*very unhappy*) to 7 (*extremely happy*). The item was used for validation purposes.

### 6.3 Correlates

**ERQ-CA** – Emotion Regulation Questionnaire – Children and Adolescents (Gullone & Taffe, 2012) consists of 10 items, and it measures the frequency of using two emotion regulation strategies – suppression (4 items) and cognitive reappraisal (6 items). Children answered on a scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*). The fit of the two-factor model was satisfactory ( $\chi^2=79.422$ ,  $df=33$ ,  $CFI=0.978$ ,  $RMSEA=0.034$ ,  $SRMR=0.030$ ). The reliability of cognitive reappraisal was 0.75 for Omega and 0.73 for Cronbach's alpha. Omega reliability for suppression was 0.66 and Cronbach's alpha was 0.67.

**EMOTIONAL CLARITY** – The Emotional Clarity Questionnaire (Flynn & Rudolph, 2010, 2014) measures the degree to which the children estimate that they clearly experience their own emotions. The original questionnaire has 10 items but a shortened version of 5 items was used i.e. this study. Out of 5 items, 2 were reverse-coded. Our analyses showed that 2 reverse-coded items didn't function well

among our youngest participants (third-grade students) therefore we have included only three emotional clarity items rated on a scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*). Cronbach's alpha reliability was 0.74, and Omega was 0.75.

## 6.4 Procedure

The study was conducted during regular school hours with the help of school psychologists or pedagogists. Children gave data on their experiences and feelings by filling out paper questionnaires. Prior to that, parents in chosen schools received information about the project, and only children who themselves and whose parents gave written consent participated in the study. The study was approved by Institute Ivo Pilar's Ethical Committee.

## 7 Data Analyses Strategy

Analyses were conducted in R with the usage of lavaan package (Rosseel, 2012). For model testing, we have employed MLR with full information maximum likelihood for inclusion of all available data. The best-fitting model was chosen based on several fit indices: Comparative Fit Index (CFI>0.950), the Standardized Root Mean Residual (SRMR<0.08), and Root Mean Squared Error of Approximation (RMSEA<0.06) (Hu & Bentler, 1999).

We examined the factor structure of each SWB measure independently. After that, we explored the fit of the higher-order SWB model with modifications of lower-order factors which were established during previous analyses. The higher-order model included three SWB measures (tripartite model): context-free measure (SLSS), and two affective measures – positive and negative affect (PANAS-C-SF). One item of life satisfaction (OLS) and happiness (HAP) measures were used to explore the convergent validity of higher-order SWB.

After we have established the best-fitting lower-order and higher-order models, we tested their measurement invariance with respect to gender and age. In the end, by using structural equation modeling we explored latent links between SWB and emotional clarity and emotion regulation strategies. Those analyses also controlled for gender and age.

## 8 Results

Descriptive statistics for all manifest measures of SWB are shown in Table 1.

## 9 Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis was conducted for each SWB measure separately (Table 2). The model for SLSS showed adequate fit after correlating residuals of the only two reverse-coded items (third and fourth items,  $r=.424$ ). Models for BMSLSS

**Table 1** Descriptive statistics for SWB measures

	<i>N</i>	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
<b>SLSS</b> (range 1–6)					
My life is going well.	1524	5.319	0.950	-1.809	4.061
My life is just right.	1509	4.987	1.147	-1.226	1.189
I would like to change many things in my life (R)	1501	3.789	1.756	-0.255	-1.310
I wish I had a different kind of life. (R)	1499	4.704	1.611	-1.045	-0.209
I have a good life.	1510	5.335	1.006	-2.040	4.816
I have what I want in life.	1510	5.191	1.122	-1.681	2.779
My life is better than most kids.	1521	4.172	1.515	-0.597	-0.602
<b>BMSLSS: How Satisfied Are You With...</b> (range 1–7)					
Family life	1522	6.400	1.058	-2.077	4.461
Friends	1517	6.340	1.053	-1.922	3.966
School experience	1510	5.652	1.332	-1.129	1.362
Yourself	1512	5.693	1.528	-1.339	1.360
Place where you live	1514	6.473	1.068	-2.577	7.423
<b>PANAS-C-SF</b> (range 1–5)					
Joyful	1526	4.125	0.857	-0.892	0.655
Afraid	1514	1.858	1.039	1.202	0.773
Happy	1513	4.404	0.831	-1.520	2.314
Scared	1507	1.594	0.975	1.793	2.677
Sad	1513	2.038	1.078	0.970	0.307
Proud	1508	3.802	1.144	-0.842	-0.031
Mad	1508	2.277	1.219	0.722	-0.441
Cheerful	1511	4.403	0.860	-1.622	2.624
Miserable	1493	1.523	0.965	2.009	3.361
Active	1499	4.098	1.026	-1.085	0.634
<b>Life satisfaction</b> (one item; range 1–7)	1520	6.309	1.172	-2.132	4.784
<b>Happiness</b> (one item; range 1–7)	1379	6.162	1.102	-1.543	2.556

Note: SLSS - The Student Life Satisfaction Scale; BMSLSS - Brief Multidimensional Student Life Satisfaction Scale; PA - Positive affect; NA - negative affect

and PA showed a good fit without modifications. One factor model of NA had a good fit after correlating residuals of items scared and afraid ( $r=.533$ ). We specified a higher-order factor model with three lower-order factors (SLSS, PA, and NA) based on their intercorrelations which ranged between 0.65 for SLSS and PA, and  $-0.48$  for NA and PA. The tripartite model of SWB also showed a good fit (Table 2).

Correlations between one-item life satisfaction and happiness and the tripartite higher-order SWB model were 0.83 and 0.82 respectively.

## 10 Measurement Invariance

Measurement invariance was tested for gender and two age groups by using multi-group structural equation modeling. We tested the three most common types of invariances: configural, metric, and scalar invariance (Widaman &



**Table 2** Fit indices for confirmatory factor analysis of different SWB measures

	$\chi^2$	df	p	CFI	RMSEA	SRMR	N	Reliability	
								Cronbach's alpha	Omega
SLSS	270.66	14	<0.001	0.901	0.126	0.057	1528	0.778	0.775
<b>SLSS</b> (corr.res.)	66.76	13	<0.001	0.979	0.060	0.026	1528	0.778	0.726
<b>BMSLSS</b>	17.61	5	0.003	0.980	0.052	0.021	1526	0.685	0.700
<b>PA</b>	24.58	5	<0.001	0.990	0.058	0.019	1531	0.807	0.806
<b>NA</b>	243.31	5	<0.001	0.828	0.197	0.077	1527	0.727	0.712
<b>NA</b> (corr.res.)	12.35	4	0.015	0.993	0.044	0.014	1527	0.727	0.656
<b>PANAS</b>	81.81	33	<0.001	0.986	0.036	0.032	1531	-	-
<b>Tripartite H-O model</b>	245.90	114	<0.001	0.981	0.031	0.032	1534	-	-

Note: SLSS - The Student Life Satisfaction Scale; BMSLSS - Brief Multidimensional Student Life Satisfaction Scale; PA - Positive affect; NA - negative affect; Tripartite H-O - higher-order SWB model; corr.res. - model allows some correlated residuals

Reise, 1997). Configural invariance assumes the same factor structure and patterns of free and fixed loadings in different groups, metric invariance assumes equivalence of factor loadings, and scalar invariance adds equivalence of item/ and factor intercepts for the groups. In the higher-order SWB model all parameter types were tested consecutively (first-order loadings then second-order loadings, followed by first-order intercepts and then second-order intercepts) following steps outlined by Chen, Sousa, and West (2005). Invariance was established if the fit of the subsequent model didn't change by more than -.01 for CFI, .015 for RMSEA and .030 for SRMR (Chen, 2007).

Results of measurement invariance tests are shown in Table 3 and Table 4. Results show that SLSS, PANAS, BMSLSS and the higher-order SWB model can be considered invariant across gender and age levels. Factor loadings for higher-order model and BMSLSS across gender and different ages are shown in Supplemental Material (Table 1- Table 2).

## 11 Latent mean Analyses

Latent mean analyses showed inconsistent results regarding gender and age differences (Table 3). There were no gender differences in the first-order SLSS factor. But girls had a lower positive affect and a higher negative affect. Older children had lower positive affect than younger children, but there were no differences between them in SLSS and negative affect. For BMSLSS, girls and older children had lower score compared to boys and younger children. All these first-order latent mean differences were compatible with sum score mean differences (Supplemental Material - Tables 4, 5 and 3). Significant gender differences were small, and age differences were of medium effect size.

**Table 3** Measurement invariance tests across gender and age groups for lower-order SWB measures

	$\chi^2$	df	p	CFI	TLI	RMSEA	SRMR	nl	n2	$\Delta$ CFI	$\Delta$ RMSEA	$\Delta$ SRMR
<b>SLSS</b>												
Gender - configural	73.176	26	<0.001	0.982	0.972	0.055	0.027	752	776			
Gender - metric	89.527	32	<0.001	0.977	0.97	0.056	0.039	752	776	-0.005	0.001	0.012
Gender - scalar	97.201	38	<0.001	0.978	0.975	0.051	0.04	752	776	0.001	-0.005	0.001
Age - configural	78.295	26	<0.001	0.981	0.969	0.057	0.026	809	716			
Age - metric	81.388	32	<0.001	0.981	0.975	0.052	0.034	809	716	0	-0.005	0.008
Age - scalar	102.821	38	<0.001	0.976	0.973	0.054	0.039	809	716	-0.005	0.002	0.005
<b>BMSLSS</b>												
Gender - configural	24.145	10	0.007	0.979	0.958	0.054	0.024	750	776			
Gender - metric	27.488	14	0.017	0.978	0.969	0.046	0.031	750	776	-0.001	-0.008	0.007
Gender - scalar	36.66	18	0.006	0.973	0.97	0.046	0.034	750	776	-0.005	0	0.003
Age - configural	22.149	10	0.014	0.980	0.959	0.051	0.024	807	716			
Age - metric	27.624	14	0.016	0.977	0.967	0.046	0.034	807	716	-0.003	-0.005	0.01
Age - scalar	39.261	18	0.003	0.967	0.963	0.049	0.038	807	716	-0.01	0.003	0.004
<b>PANAS-C-SF</b>												
Gender - configural	125.948	66	<0.001	0.983	0.977	0.039	0.036	755	776			
Gender - metric	136.476	74	<0.001	0.982	0.978	0.038	0.041	755	776	-0.001	-0.001	0.005
Gender - scalar	165.538	82	<0.001	0.977	0.974	0.041	0.044	755	776	-0.005	0.003	0.003
Age - configural	121.646	66	<0.001	0.984	0.979	0.037	0.035	812	717			
Age - metric	137.978	74	<0.001	0.982	0.978	0.038	0.042	812	717	-0.002	0.001	0.007
Age - scalar	167.051	82	<0.001	0.976	0.974	0.041	0.044	812	717	-0.006	0.003	0.002

When we tested differences in higher-order SWB, girls and older children had lower overall SWB compared to boys and younger children. These results suggest that a single mean for higher-order SWB can account for lower-order factor differences.

## 12 Emotional Skills and SWB

Separate models were tested to explore the independent contributions of different emotional skills to higher-order SWB and to first-order SWB measures. Age measured in years and gender were included as controls, and emotional skills were modeled as latent factors. Results showed that models have an acceptable fit and that all three emotional skills predict children's overall subjective well-being in a consistent way across different SWB measures. In Fig. 1 structural paths for higher-order SWB are shown. Results for other lower-order factors are shown in Supplemental Material (Table 6). Children who have higher emotional clarity and higher cognitive reappraisal usage also report higher levels of subjective well-being (higher life satisfaction and positive affect, lower negative affect). On the contrary, higher levels of suppression were negatively related to lower subjective well-being (lower life satisfaction and positive affect, higher negative affect). Percentage of explained variance varied between 20.5% (for negative affect) and 47.3% (for BMSLSS).

**Note** Bold paths are significant  $p < .001$ ;  $p$  values for gender and age are 0.048 and 0.061; Correlations between age and gender and other predictors are not shown for simplicity.

## 13 Discussion

In this study we have tested the structure of several common measures of child and adolescent SWB: context-free life satisfaction measure (SLSS), domain-based life satisfaction (BMSLSS), and positive and negative affect (PANAS-C-SF). All measures were shown to measure one factor which was invariant across gender and age groups. The tripartite higher-order model of SWB which consisted of three lower-order factors (cognitive context-free measure of LS, negative and positive affect) had good model fit statistics. Higher-order factor SWB model correlated highly with one-item life satisfaction and happiness measures which shows that they capture the same construct. Both metric and scalar invariance were supported for the tripartite model of SWB across gender and age groups which allowed us to compare the mean differences between those groups.

With respect to age differences, older children had lower scores on domain-based life satisfaction and on positive affect. These differences are in line with other studies (Casas & González-Carrasco, 2020; González-Carrasco et al., 2017; Weinstein et al., 2007) and are also reflected in the higher-order SWB score. There were no differences between younger and older children on a context-free measure of life satisfaction and on negative affect. Overall, these results generally show that there are some

**Table 4** Measurement invariance tests across gender and age groups for higher-order SWB model

Tripartite H-O model	$\chi^2$	df	p	CFI	TLI	RMSEA	SRMR	n1	n2	$\Delta$ CFI	$\Delta$ RMSEA	$\Delta$ SRMR
Gender - configural	381.867	228	<0.001	0.978	0.974	0.033	0.037	757	777			
Gender - metric 1	407.523	242	<0.001	0.976	0.973	0.034	0.041	757	777	-0.002	0.001	0.004
Gender - metric 2	409.497	244	<0.001	0.976	0.973	0.033	0.042	757	777	0	-0.001	0.001
Gender - scalar 1	444.757	258	<0.001	0.973	0.972	0.034	0.044	757	777	-0.003	0.001	0.002
Gender - scalar 2	449.900	260	<0.001	0.973	0.972	0.034	0.044	757	777	0	0	0
Age - configural	368.429	228	<0.001	0.980	0.976	0.032	0.036	813	718			
Age - metric 1	393.504	242	<0.001	0.978	0.975	0.032	0.042	813	718	-0.002	0	0.006
Age - metric 2	397.708	244	<0.001	0.978	0.975	0.032	0.044	813	718	0	0	0.002
Age - scalar 1	446.986	258	<0.001	0.973	0.972	0.034	0.045	813	718	-0.005	0.002	0.001
Age - scalar 2	474.761	260	<0.001	0.969	0.968	0.037	0.048	813	718	-0.004	0.003	0.003

Note: metric 1 – lower-order loadings are constrained; metric 2 – higher-order loadings are constrained; scalar 1 - lower-order intercepts are constrained; scalar 2 – higher-order intercepts are constrained

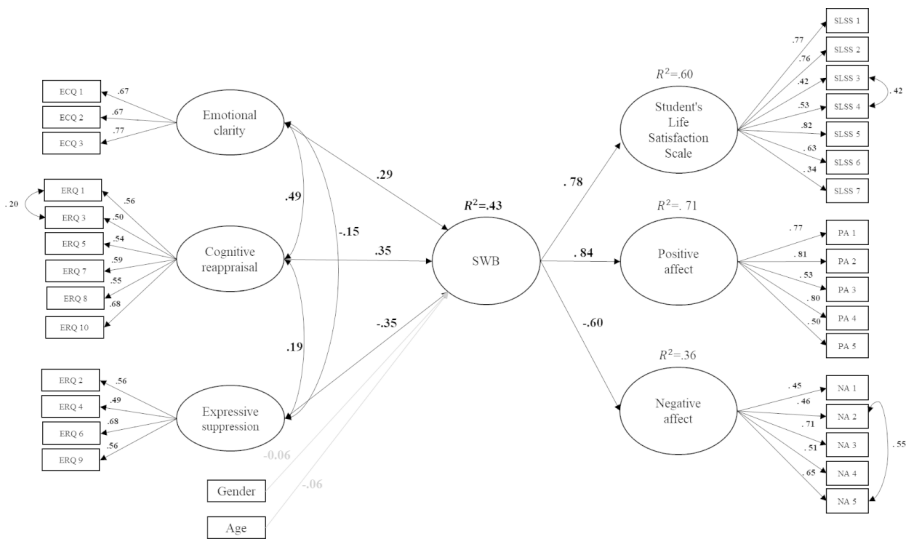
relatively small age differences although differences weren't detected on all SWB measures. This is in line with other studies which often point to potential changes in SWB in early adolescence (Aymerich et al., 2021; Casas & González-Carrasco, 2019; González-Carrasco et al., 2017; Orben et al., 2022). It is very likely that for some adolescents decreases do happen in this sensitive developmental period, therefore, differences are often present between younger and older adolescents in cross-sectional studies. A theoretical explanation of these differences is currently lacking. So far, these differences are often attributed to developmental changes and increases in school and social life demands across early adolescence, but further studies are needed to delineate potential causes of SWB changes in early adolescence.

When looking at gender, there were small differences in all measures except for context-free life satisfaction (SLSS) with boys having higher scores on domain-specific life satisfaction measure (BMSLSS) and positive affect (PA), and lower scores on negative affect (NA) compared to girls. This overall pattern was observed on the level of the higher-order SWB factor with boys also having higher overall scores. These results are in line with other studies which often show small differences in SWB indicators in favor of boys (Aymerich & Casas, 2020; Esnaola et al., 2019). The meta-analysis by Chen et al. (2020) didn't find differences in overall cognitive SWB, but gender differences appeared in satisfaction with specific life domains. Boys were less satisfied than girls with school, family, and friends. Somewhat surprisingly, additional item-level analysis in our study showed that boys had higher satisfaction with family, friends, and self, while there were no gender differences in satisfaction with school and the place where they live (Supplemental Material, Table 5). However, all gender differences were small in magnitude, and further studies should assess if there are any practical implications of this result.

Lastly, we explored whether emotional skills predict subjective well-being conceptualized as a higher-order factor and as first-order factors measured by SLSS, BMSLSS and PANAS-C-SF. Expectedly, emotion clarity and emotion regulation strategies predicted all SWB measures. Children who reported more emotional clarity, higher reappraisal usage, and less suppression also reported higher SWB (higher life satisfaction, higher positive and lower negative affect). At the level of first-order factors, emotional skills explained about a quarter to half of the variance in SWB (Supplemental Material – Table 6). These results show that emotional competency and SWB share a relatively big amount of variance. This result is particularly striking in the context of age and gender differences which are quite small in magnitude. So far studies have shown that personality factors explain around fifth of SWB variance, while sociodemographic correlates, family structure or family income explain a relatively small amount of variance in SWB (Rees & Bradshaw, 2018). Although emotional skills correlate with personality (Gresham & Gullone, 2012), they are also more malleable to conscious control and may be used flexibly to regulate emotions. Future studies should explore whether adequate emotional skills may protect children from decreases in SWB during adolescence.

**Table 5** Latent mean differences in first-order and second-order factors

	Estimate	SE	z	p	Effect size (d)
<b>SLSS</b>					
Boys as a reference	-0.046	0.040	-1.129	0.259	-0.06
Younger children as a reference	-0.060	0.041	-1.453	0.146	-0.08
<b>PA</b>					
Boys as a reference	-0.087	0.036	-2.401	0.016	-0.13
Younger children as a reference	-0.237	0.037	-6.471	0.000	-0.37
<b>NA</b>					
Boys as a reference	0.089	0.031	2.887	0.004	0.19
Younger children as reference	0.027	0.030	0.912	0.362	0.06
<b>SWB higher-order</b>					
Boys as a reference	-0.084	0.036	-2.339	0.019	-0.14
Younger children as a reference	-0.150	0.038	-3.996	0.000	-0.26
<b>BMSLSS</b>					
Boys as a reference	-0.114	0.040	-2.846	0.004	-0.18
Younger children as a reference	-0.292	0.043	-6.801	0.000	-0.47



**Fig. 1** Standardized structural paths for emotional skills as predictors of higher-order SWB ( $\chi^2(446) = 961.062, p = .000, CFI = 0.955, RMSEA = 0.030, SRMR = 0.042$ )

### 14 Limitations

This study had several limitations. Structure and measurement invariance of SWB measures was demonstrated for children aged between 9 and 12 years. To explore developmental changes in the structure of SWB in more detail, longitudinal studies should be conducted which would allow testing of longitudinal measurement invariance. Longitudinal studies should also be used to explore developmental changes in

SWB levels, as well as to determine more precisely whether and when gender differences emerge. This study used only self-report measures of SWB and emotional skills, in further studies links between SWB and child emotional skills should be explored by using other's reports (e.g., parents, peers) of children's emotional skills. Lastly, the study didn't employ a representative sample of children in middle childhood and early adolescence, so the conclusions could be somewhat limited.

## 15 Contributions

This is the first study to demonstrate adequate factor structures of common SWB measures used in research with children and adolescents in a Croatian sample.

SWB levels may change during early adolescence (González-Carrasco et al., 2017; Orben et al., 2022), and this study alongside other studies such as Savahl et al.'s (2021), shows that common SWB measures provide reliable and comparable measures in middle childhood and early adolescence which provides the basis for studying differences and changes in SWB during these developmental periods.

Similarly, to adults' SWB (Busseri, 2018), children's SWB can also be modeled as a tripartite model. This points to the possible stability of the SWB structure from middle childhood to adulthood. In future studies, links between parents' and children's SWB could be explored at the level of the general SWB factor.

Finally, in this study, we demonstrated the utility of using emotional skills as predictors of SWB compared to demographic characteristics such as age and gender. Emotional clarity and emotion regulation strategies consistently predicted both specific SWB measures and a general SWB factor. Children's and adolescents' emotional experiences may be closely associated to their SWB. Longitudinal studies should explore the direction of these links, but these results may point to the benefits of advancing children's emotional skills to protect their SWB levels.

## 16 Conclusion

This study shows it is possible to reliably measure children's and adolescents' subjective well-being with different measures. It is also possible to conceptualize children's SWB as a higher-order factor consisting of life satisfaction and positive and negative affect. A big contribution of this study is a demonstration of measurement invariance of these measures and of higher-order factor across gender and between groups of 9–10- and 11–12-years old children. In line with many other studies, boys and 9–10-year-olds reported higher subjective well-being, although gender differences were especially small. These results further point to the transition to adolescence as an especially sensitive period for changes in SWB. Furthermore, this study shows that emotional skills consistently predict higher SWB across different measures. Better emotional skills may allow children to cope more successfully with the rising demands of adolescence. These results point to emotional skills as a promising area for future studies of subjective well-being predictors in childhood and adolescence.

**Supplementary Information** The online version contains supplementary material available at <https://doi.org/10.1007/s12187-023-10041-1>.

**Funding** The work reported here has been fully supported by the Croatian Science Foundation under the project number IP-2019-04-6198 (CHILD-WELL).

## Declarations

**Conflict of interest** On behalf of all authors, the corresponding author states that there is no conflict of interest. Informed consent has been collected from both parents and children. The study was approved by Institute Ivo Pilar's Ethical Committee.

## References

- Ajduković, M., Bulat, R., Sušac, L., N., & Vejmelka, L. (2020). *Subjektivna dobrobit djece u Hrvatskoj*. UNICEF- Ured za Hrvatsku.
- Anglim, J., Horwood, S., Smillie, L. D., Marrero, R. J., & Wood, J. K. (2020). Predicting psychological and subjective well-being from personality: A meta-analysis. *Psychological Bulletin*, *146*(4), 279–323. <https://doi.org/10.1037/bul0000226>.
- Aymerich, M., & Casas, F. (2020). A contextualized measure of overall life satisfaction among adolescents: Differences by gender. *Child Indicators Research*, *13*(6), 2241–2260. <https://doi.org/10.1007/s12187-020-09747-3>.
- Aymerich, M., Cladellas, R., Castelló, A., Casas, F., & Cunill, M. (2021). The evolution of life satisfaction throughout childhood and adolescence: Differences in Young People's evaluations according to age and gender. *Child Indicators Research*, *14*(6), 2347–2369. <https://doi.org/10.1007/s12187-021-09846-9>.
- Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2nd ed.). The Guilford Press.
- Busseri, M. A. (2018). Examining the structure of subjective well-being through meta-analysis of the associations among positive affect, negative affect, and life satisfaction. *Personality and Individual Differences*, *122*, 68–71. <https://doi.org/10.1016/j.paid.2017.10.003> Asas et al 2012
- Casas, F., & González-Carrasco, M. (2019). Subjective well-being decreasing with age: New Research on Children over 8. *Child Development*, *90*(2), 375–394. <https://doi.org/10.1111/cdev.13133>.
- Casas, F., & González-Carrasco, M. (2020). The evolution of positive and negative affect in a longitudinal sample of children and adolescents. *Child Indicators Research*, *13*(5), 1503–1521. <https://doi.org/10.1007/s12187-019-09703-w>.
- Casas, F., Sarriera, J. C., Abs, D., Coenders, G., Alfaro, J., Saforcada, E., & Tonon, G. (2012). Subjective indicators of Personal Well-Being among adolescents. Performance and results for different Scales in Latin-Language speaking countries: A contribution to the International Debate. *Child Indicators Research*, *5*(1), 1–28. <https://doi.org/10.1007/s12187-011-9119-1>.
- Casas, F., Oriol, X., & González-Carrasco, M. (2020). Positive affect and its relationship with General Life satisfaction among 10 and 12-Year-old children in 18 countries. *Child Indicators Research*, *13*(6), 2261–2290. <https://doi.org/10.1007/s12187-020-09733-9>.
- Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling*, *14*(3), 464–504. <https://doi.org/10.1080/10705510701301834>.
- Chen, F. F., Sousa, K. H., & West, S. G. (2005). Testing measurement invariance of second-order factor models. *Structural Equation Modeling*, *12*(3), 471–492. [https://doi.org/10.1207/s15328007sem1203\\_7](https://doi.org/10.1207/s15328007sem1203_7).
- Chen, X., Cai, Z., He, J., & Fan, X. (2020). Gender differences in life satisfaction among children and adolescents: A Meta-analysis. *Journal of Happiness Studies*, *21*(6), 2279–2307. <https://doi.org/10.1007/s10902-019-00169-9>.
- Cummins, R. A., & Lau, A. L. (2005). *Personal wellbeing index–school children*. Manual (3rd ed.). Melbourne, Vic: School of Psychology, Deakin University.
- Diener, E. (1984). Subjective well-being. *Psychological Bulletin*, *95*(3), 542–575. <https://doi.org/10.1037/0033-2909.95.3.542>.



- Diener, E. (2013). The remarkable changes in the science of subjective well-being. *Perspectives on Psychological Science*, 8(6), 663–666. <https://doi.org/10.1177/1745691613507583>.
- Ebesutani, C., Regan, J., Smith, A., Reise, S., Higa-McMillan, C., & Chorpita, B. F. (2012). The 10-item positive and negative affect schedule for children, child and parent shortened versions: Application of item response theory for more efficient assessment. *Journal of Psychopathology and Behavioral Assessment*, 34(2), 191–203. <https://doi.org/10.1007/s10862-011-9273-2>.
- Esnaola, I., Benito, M., Antonio-Agirre, I., Ballina, E., & Lorenzo, M. (2019). Gender, age and cross-cultural differences in life satisfaction: A comparison between Spain and Mexico. *Child Indicators Research*, 12(6), 1935–1949. <https://doi.org/10.1007/s12187-018-9616-6>.
- Extremera, N., Durán, A., & Rey, L. (2007). Perceived emotional intelligence and dispositional optimism–pessimism: Analyzing their role in predicting psychological adjustment among adolescents. *Personality and Individual Differences*, 42(6), 1069–1079. <https://doi.org/10.1016/j.paid.2006.09.014>.
- Extremera, N., Durán, A., & Rey, L. (2009). The moderating effect of trait meta-mood and perceived stress on life satisfaction. *Personality and Individual Differences*, 47(2), 116–121. <https://doi.org/10.1016/j.paid.2009.02.007>.
- Flynn, M., & Rudolph, K. D. (2010). The contribution of deficits in emotional clarity to stress responses and depression. *Journal of Applied Developmental Psychology*, 31(4), 291–297. <https://doi.org/10.1016/j.appdev.2010.04.004>.
- Flynn, M., & Rudolph, K. D. (2014). A prospective examination of emotional clarity, stress responses, and depressive symptoms during early adolescence. *The Journal of Early Adolescence*, 34(7), 923–939. <https://doi.org/10.1177/0272431613513959>.
- Fogle, L. M., Huebner, S. E., & Laughlin, J. E. (2002). The relationship between temperament and life satisfaction in early adolescence: Cognitive and behavioral mediation models. *Journal of Happiness Studies*, 3, 373–392. <https://doi.org/10.1023/A:1021883830847>.
- Goldbeck, L., Schmitz, T. G., Besier, T., Herschbach, P., & Henrich, G. (2007). Life satisfaction decreases during adolescence. *Quality of Life Research*, 16(6), 969–979. <https://doi.org/10.1007/s11136-007-9205-5>.
- González-Carrasco, M., Casas, F., Malo, S., Viñas, F., & Dinisman, T. (2017). Changes with age in Subjective Well-Being through the adolescent years: Differences by gender. *Journal of Happiness Studies*, 18(1), 63–88. <https://doi.org/10.1007/s10902-016-9717-1>.
- Gresham, D., & Gullone, E. (2012). Emotion regulation strategy use in children and adolescents: The explanatory roles of personality and attachment. *Personality and Individual Differences*, 52(5), 616–621. <https://doi.org/10.1016/j.paid.2011.12.016>.
- Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 3–20). The Guilford Press.
- Gullone, E., & Taffe, J. (2012). The emotion regulation questionnaire for children and adolescents (ERQ-CA): A psychometric evaluation. *Psychological Assessment*, 24(2), 409–417. <https://doi.org/10.1037/a0025777>.
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>.
- Huebner, E. S. (1991). Initial development of the students' life satisfaction scale. *School Psychology International*, 12(3), 231–240.
- Laurent, J., Catanzaro, S. J., Joiner, T. E. Jr., Rudolph, K. D., Potter, K. I., Lambert, S., Osborne, L., & Gathright, T. (1999). A measure of positive and negative affect for children: Scale development and preliminary validation. *Psychological Assessment*, 11(3), 326–338. <https://doi.org/10.1037/1040-3590.11.3.326>.
- Lischetzke, T., & Eid, M. (2017). The functionality of emotional clarity: A process-oriented approach to understanding the relation between emotional clarity and well-being. In M. D. Robinson & M. Eid (Eds.), *The happy mind: Cognitive contributions to well-being* (pp. 371–388). Springer International Publishing/Springer Nature. [https://doi.org/10.1007/978-3-319-58763-9\\_20](https://doi.org/10.1007/978-3-319-58763-9_20)
- Lischetzke, T., Eid, M., & Diener, E. D. (2012). Perceiving one's own and others' feelings around the world: The relations of attention to and clarity of feelings with subjective well-being across nations. *Journal of Cross-Cultural Psychology*, 43(8), 1249–1267. <https://doi.org/10.1177/0022022111429717>.
- Moksnes, U. K., & Espnes, G. A. (2013). Self-esteem and life satisfaction in adolescents—gender and age as potential moderators. *Quality of Life Research*, 22(10), 2921–2928. <https://doi.org/10.1007/s11136-013-0427-4>.

- Newland, L. A., Giger, J. T., Lawler, M. J., Roh, S., Brockevelt, B. L., & Schweinle, A. (2019). Multilevel analysis of child and adolescent subjective well-being across 14 countries: Child- and country-level predictors. *Child development, 90*(2), 395–413. <https://doi.org/10.1111/cdev.13134>.
- Ng, Z. J., Huebner, E. S., Hills, K. J., & Valois, R. F. (2018). Mediating effects of emotion regulation strategies in the relations between stressful life events and life satisfaction in a longitudinal sample of early adolescents. *Journal of school psychology, 70*, 16–26. <https://doi.org/10.1016/j.jsp.2018.06.001>.
- Orben, A., Lucas, R. E., Fuhrmann, D., & Kievit, R. A. (2022). Trajectories of adolescent life satisfaction. *Royal Society open science, 9*(8), 211808. <https://doi.org/10.1098/rsos.211808>.
- Park, N. (2005). Life satisfaction among Korean children and youth. *School Psychology International, 26*, 209–223. <https://doi.org/10.1177/0143034305052914>.
- Rees, G., & Bradshaw, J. (2018). Exploring low subjective well-being among children aged 11 in the UK: An analysis using data reported by parents and by children. *Child Indicators Research, 11*, 27–56. <https://doi.org/10.1007/s12187-016-9421-z>.
- Rosseel, Y. (2012). lavaan: An R Package for Structural equation modeling. *Journal of Statistical Software, 48*(2), 1–36. <https://doi.org/10.18637/jss.v048.i02>.
- Saarni, C. (1999). *The development of emotional competence*. Guilford Press.
- Salovey, P., Mayer, J. D., Goldman, S. L., Turvey, C., & Palfai, T. P. (1995). Emotional attention, clarity, and repair: Exploring emotional intelligence using the Trait Meta-Mood Scale. In J. W. Pennebaker (Ed.), *Emotion, disclosure, and health* (pp. 125–154). Washington, DC: American Psychological Association.
- Sánchez-Álvarez, N., Extremera, N., & Fernández-Berrocal, P. (2015). Maintaining life satisfaction in adolescence: Affective mediators of the influence of Perceived Emotional Intelligence on overall life satisfaction judgments in a two-year longitudinal study. *Frontiers in psychology, 6*, 1892. <https://doi.org/10.3389/fpsyg.2015.01892>.
- Savahl, S., Casas, F., & Adams, S. (2021). The structure of children's Subjective Well-being. *Frontiers in Psychology, 12*, 650691. <https://doi.org/10.3389/fpsyg.2021.650691>.
- Seligson, J. L., Huebner, E. S., & Valois, R. F. (2003). Preliminary validation of the brief multidimensional students' life satisfaction scale (BMSLSS). *Social Indicators Research, 61*, 121–145. <https://doi.org/10.1023/A:1021326822957>.
- Teixeira, A., Silva, E., Tavares, D., & Freire, T. (2015). Portuguese validation of the emotion regulation questionnaire for children and adolescents (ERQ-CA): Relations with self-esteem and life satisfaction. *Child Indicators Research, 8*(3), 605–621. <https://doi.org/10.1007/s12187-014-9266-2>.
- Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. *Monographs of the Society for Research in Child Development, 59*(2/3), 25–52. <https://doi.org/10.2307/1166137>.
- Vergara, A. I., Alonso-Alberca, N., San-Juan, C., Aldás, J., & Vozmediano, L. (2015). Be water: Direct and indirect relations between perceived emotional intelligence and subjective well-being. *Australian Journal of Psychology, 67*(1), 47–54. <https://doi.org/10.1111/ajpy.12065>.
- Verzeletti, C., Zammuner, V. L., Galli, C., & Agnoli, S. (2016). Emotion regulation strategies and psychosocial well-being in adolescence. *Cogent Psychology, 3*(1), 1199294. <https://doi.org/10.1080/23311908.2016.1199294>.
- Weinstein, S. M., Mermelstein, R. J., Hankin, B. L., Hedeker, D., & Flay, B. R. (2007). Longitudinal patterns of daily affect and global mood during adolescence. *Journal of Research on Adolescence, 17*(3), 587–600. <https://doi.org/10.1111/j.1532-7795.2007.00536.x>.
- Widaman, K. F., & Reise, S. P. (1997). Exploring the measurement invariance of psychological instruments: Applications in the substance use domain. In K. J. Bryant, M. Windle, & S. G. West (Eds.), *The science of prevention: Methodological advances from alcohol and substance abuse research* (pp. 281–324). American Psychological Association. <https://doi.org/10.1037/10222-009>.

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.