

EXPLORING ADOLESCENTS' POSITIVE MENTAL HEALTH AND ITS MEASUREMENT IN CROATIA

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Analysing mental health among adolescents with valid and reliable measures presents a vital undertaking in the present times. Therefore, this study is aimed at exploring mental health among adolescents using an adapted Croatian language version of the Mental Health Continuum–Short Form, MHC-SF (Keyes, 2018). MHC was applied to a sample of 518 Croatian adolescents. Factor and reliability analyses, as well as convergent and discriminant validity, were performed to test the psychometric properties of this scale. While adolescents reported moderate levels of mental health, a disparity emerged across domains, with social well-being significantly lower than emotional and psychological well-being. This pattern reflects the heightened salience of peer affiliation during adolescence and signals the importance of supporting social integration in youth mental health frameworks. Validity analyses confirmed that the best fit was found for the original three-model and bifactorial model, with more advantages to the three-factor model. Satisfactory levels of convergent and discriminant validity and internal reliability were determined.

Keywords: adolescents, MHC-SF, mental health, psychometric properties



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INTRODUCTION

Mental health encompasses emotional, psychological, and social aspects crucial for optimal functioning (Galderisi et al., 2015). Contemporary approaches increasingly emphasise that mental health is not only the absence of mental disorders, but also the presence of well-being and positive functioning. The significance of mental health for both individual and societal well-being has been firmly recognised by global health authorities for decades; however, its preservation remains a persistent and complex challenge (Guthold et al., 2019; Orth & Van Wyk, 2022b; Patton et al., 2016; Tatalović Vorkapić & Pereša, 2024). Good mental health is associated with stronger social relationships, academic success, general health, and positive family functioning (Butler et al., 2022; Grevenstein et al., 2019; Maurizi et al., 2013; Mental Health Foundation, 2022).

Mental health disorders affect all age groups, with prevalence estimates ranging from 5% to 20% (Kieling et al., 2024; Kessler et al., 2009). Globally, the incidence of these disorders has risen, with depression and anxiety increasing by 25% in 2020 compared to prepandemic levels (WHO, 2022; Thorisdottir et al., 2021; Verhulst et al., 2023). More than half of adult mental health disorders begin during adolescence or earlier (Schlack et al., 2021; Segura-Frontelo et al., 2020). Alongside these trends, strengthening positive mental health and well-being during adolescence has become a key public health priority.

Approximately 15% of adolescents are affected by mental health disorders, with one in seven adolescents worldwide diagnosed with at least one mental disorder annually (WHO, 2021; UNICEF, n.d.). Depression is among the leading causes of illness and disability in this age group, and suicide is the fourth leading cause of death among older adolescents (Guthold et al., 2019; Orth & Van Wyk, 2022a; Patalay & Gage, 2019; UNICEF, 2021; Verhulst et al., 2023; WHO, 2017, 2020).

Poor mental health in adolescence is linked to high-risk behaviours such as self-harm, violence, risky sexual activity, and substance use, which can have long-lasting effects (Patalay & Gage, 2019; Peters et al., 2019; Schlack et al., 2021; Suldo & Shaffer, 2008; WHO, 2020).

Vulnerabilities in mental health are *multi-layered and specific to different age groups*: children may be affected by inadequate nurturing and attachment, adolescents by academic stress and exposure to risky behaviours, young adults by occupational, financial, and social difficulties, and older adults by declining physical health and perceived isolation (Laranjeira & Querido, 2024; McCrory et al., 2017).

Mental health disorders are among the leading causes of long-term disability, economic loss, reduced productivity, and increased healthcare costs (Peters et al., 2019; Sorsdahl et al., 2021). Their early onset and widespread impact across the life course underscore the importance of prevention and early intervention, particularly during adolescence, as early intervention in this period is recognised as one of the most effective and cost-efficient public health strategies (Orth & Van Wyk, 2022a; Orth et al., 2022; Patton et al., 2016; UNICEF, 2021).

Growing attention has been directed towards improving mental health research, policy, diagnosis, and treatment; however, progress relies on the availability of reliable and valid data, along with psychometrically sound instruments to measure key constructs (Erskine et al., 2017; Guthold et al., 2023; Hayes et al., 2021; Manderscheid et al., 2009; Manwell et al., 2015; Orth et al., 2022; UNICEF, 2021; Verhulst et al., 2023). A major gap remains in psychometrically validated measures and comparable data on adolescent well-being across diverse socio-cultural contexts, including South-Eastern Europe and many low- and middle-income countries.

Theoretical background on the Mental Health Continuum

Early approaches to mental health focused predominantly on the presence or absence of mental illness (Keyes, 2002, 2006, 2009). Contemporary perspectives, however, emphasise well-being, aligning with the WHO's definition of mental health as a state of well-being in which individuals realise their abilities, cope with normal life stressors, work productively, and contribute to their communities (WHO). Mental health is thus viewed as a multidimensional construct that integrates subjective mental state, psychological functioning, and social engagement.

The Mental Health Continuum (MHC) model conceptualises mental health along a spectrum from flourishing (optimal well-being) to languishing (low mental health), with moderate states in between (Keyes, 2002, 2006, 2009). This model incorporates both hedonic (positive affect) and eudaimonic (positive functioning) dimensions of well-being and uniquely includes social well-being as a core element (Keyes, 2002, 2007).

Hedonic well-being or emotional well-being (EWB) reflects subjective happiness and life satisfaction (Diener, 1984; Diener et al., 2018). The eudaimonic dimension encompasses Ryff's (2019) psychological well-being (PWB) and Keyes's concept of social well-being (SWB), referring to the perceived quality of one's relationships and societal functioning. Therefore, the positive mental health model encompasses three dimensions:

emotional, psychological, and social well-being. These dimensions form the theoretical basis for the Mental Health Continuum–Short Form (MHC-SF), which enables the assessment of flourishing, moderate, and languishing mental health states and has been widely used to estimate the prevalence of positive mental health (Guo et al., 2015, 2018). The original three-dimensional MHC model has been examined across cultures and age groups, including adults (Keyes, 2002, 2009), adolescents, and children (Greenspoon & Saklofske, 2001; Guo et al., 2015; Keyes, 2006; Rose et al., 2017).

The original MHC three-dimensional model has been examined across cultures and age groups (Rose et al., 2017; Huta & Waterman, 2014), including adults (Keyes, 2002, 2009), adolescents, and children (Greenspoon & Saklofske, 2001; Guo et al., 2015; Keyes, 2006). Nevertheless, empirical research has shown that different measurement models may be plausible, depending on sample characteristics and analytic approach. In psychometric evaluations of the MHC-SF, several competing factor structures have been tested, including single-factor, two-factor, and three-factor solutions (Franken et al., 2018; Žemojtel-Piotrowska et al., 2018). A unidimensional (single-factor) representation of the MHC-SF has been examined as a parsimonious alternative to multidimensional models (Doré et al., 2016; Joshanloo et al., 2016). Regarding single-factor approach, all items are assumed to reflect one general positive mental health construct. In contrast, two-factor models typically distinguish between broader domains such as hedonic well-being (emotional well-being) and eudemonic well-being (psychological and social functioning). However, the theoretically proposed three-factor model specifies emotional, psychological, and social well-being as related but distinct dimensions of positive mental health (Keyes, 2002, 2006; Perugini et al., 2017).

Hierarchical and bifactor models have also been tested to account for the overlap among the three well-being dimensions. Hierarchical models assume that emotional, psychological, and social well-being are explained by a higher-order general well-being factor (Moreta-Herrera et al., 2025), whereas bifactor models allow items to load simultaneously on a general factor and a specific domain factor (Reise, 2012). Some studies suggested the bifactorial model for validation of MHC-SF, since it was a better fit than the three-factorial model (Jovanović, 2015; Rogoza et al., 2018; Yeo & Suárez, 2022), including for adolescents (Piqueras et al., 2022; Söderqvist & Larm, 2023). However, research also emphasises that the interpretability of bifactor solutions depends not only on global fit indices but also on the strength and reliability of the general and specific factors.

The contemporary systematic review and meta-analytic structural equation modelling (MASEM) study showed, based on data from 26 studies, support for the original three-model structure as well as for the bifactorial model (Iasiello et al., 2022). Taken together, these findings indicate that the factor structure of the MHC-SF should be evaluated in each new cultural and developmental context rather than assumed a priori. In Croatia, the three-factor structure of the MHC-SF has previously been supported in a sample of older adolescents (university students aged 18+) (Vuletić et al., 2018). However, evidence on the psychometric properties of the MHC-SF in younger adolescents (primary and secondary school students) is currently lacking. Beyond its measurement structure, the MHC-SF is widely used to estimate the prevalence of flourishing. A review by Guo et al. (2018) reported substantial variation in flourishing rates, ranging from 11.7% among South Korean adolescents to 76.9% among Canadian youth and adults.

Given the absence of national data on positive mental health among younger adolescents in Croatia, validating the MHC-SF in this population is important for both research and practice. Therefore, the primary aim of this study is to examine the factorial validity and psychometric properties of the MHC-SF in Croatian primary and secondary school students.

METHOD

Participants

A non-random stratified sample of 518 Croatian primary school and secondary school students whose parents live in the four biggest cities of different regions of Croatia participated in this study. Distribution by gender was 214 males (41.55%), 301 females (58.45%), and three unidentified (0.58%). One primary school (6-8 grade; 13-15 years), one vocational high school (15-18 years), and one grammar school (15-18 years) from each city were included in the research. The participants' mean age was $M = 15.82$ years ($SD = 1.66$), ranging from 13 to 18 years.

Measure and procedure

The 14-item *Mental Health Continuum – Short Form* (MHC-SF; Keyes, 2018) is a self-report questionnaire for a brief positive mental health assessment that combines three dimensions of well-being: emotional (3 items; EWB), psychological (6 items; PWB), and social (5 items; SWB), previously described. Participants were instructed how to answer questions related to 14 items as cited: 'Please answer the following questions about how you felt in the past month', using the 6-point Likert scale (0 – *Never*, 1 – *Once or twice*, 2 – *About once a week*, 3 – *2 or 3 times a*

week, 4 – *Almost every day*, 5 – *Every day*). For this study, the back-translation method was used to adjust the scale to the Croatian language, since the data collection in this study had been done before the publication on MHC-SF validation by Vuletić et al. (2018).

For assessing the convergent and discriminant validity of MHC-SF, other measures are used: life satisfaction and positive affect (SWLS, PANAS's Positive affect subscale), and depression and negative affect (Depression subscale of DASS-21, PANAS's Negative affect subscale). Life Satisfaction Questionnaire (SWLS, Diener et al., 1985) is one of the most used questionnaires that assesses satisfaction with life as a whole. It is a self-reported Likert-type questionnaire, consisting of five items, the first three of which assess satisfaction with current life, while the fourth and fifth items relate to the assessment of life as a whole. Participants assessed how much they agreed with each statement on a scale from 1 to 7 (1 – *I completely disagree*, 7 – *I completely agree*). The reliability of the SWLS questionnaire in this study is satisfactory, $\alpha = 0.84$, which is in line with previous research with adolescents where reliability ranges between 0.8 and 0.9 (Pavot & Diener, 1993; Suldo & Huebner, 2004).

PANAS (Positive and Negative Affect Schedule; Watson et al., 1988) is a self-report Likert-type questionnaire. It is one of the most widely used ones for assessing positive and negative emotions in adults and adolescents (Jovanović & Gavrilov-Jerković, 2016; Ortuño-Sierra et al., 2019). The shorter version of the questionnaire contains 20 items, 10 adjectives for positive emotions (interested, unhappy, excited, upset, strong, guilty, scared, hostile, enthusiastic, proud) (Positive emotions subscale) and 10 adjectives for negative emotions (irritable, alert, embarrassed, inspired, nervous, determined, attentive, nervous, active, afraid) (Negative emotions subscale). Participants rate how they usually feel on a scale from (1 = *Very little or not at all* to 5 = *Extremely*). In this research, Cronbach's alpha type reliability $\alpha = 0.86$ for both subscales was obtained, which is in line with research with adolescents (Jovanović & Gavrilov-Jerković, 2016; Ortuño-Sierra et al., 2015).

The *Depression subscale* of the *Depression Anxiety Stress Scales* (DASS-21; Lovibond & Lovibond, 1995) is a self-report questionnaire for measuring negative emotional states connected to three dimensions: depression, anxiety, and stress. It consists of 21 items, divided into three subscales (7 items each). In this study, only the Depression subscale was used, which includes items for assessing dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. Participants rated the extent to which each statement applied to them over the past week using a 4-

point Likert scale ranging from (0 = *Did not apply to me at all* to 3 = *Applied to me very much or most of the time*). In the present sample, the Depression subscale demonstrated high internal consistency (Cronbach's $\alpha = 0.89$), which is consistent with previous findings for Croatian adolescents (Novak et al., 2021) and adults (Henry & Crawford, 2005; Lovibond & Lovibond, 1995).

After receiving the school principals' approval to participate in the study, the parents' informed consents were collected for their children's participation in the research by the Ethical Code of research with children (Ajduković & Kolesarić, 2020). The questionnaires were administered by teachers who received the same detailed written instructions on how to collect data. The students filled out the questionnaires during one school lesson. Before filling out the questionnaire, it was explained to the students that participation in the research is voluntary and anonymous. This study focused on the perception of well-being within specific dimensions of the mental health continuum (e.g., emotional well-being, social well-being, and psychological well-being) in the general population of primary school and secondary school students. Therefore, data on their lived experiences related to mental health were not collected. Regarding the statistical processing of the collected data, descriptive, factor, reliability, convergent and discriminant analyses were done using JASP 0.95.3 and Jamovi 2.6.24.

RESULTS

Descriptive statistics

Univariate descriptive statistics were carried out that show the means, standard deviations, skewness, and kurtosis of all MHC-SH items, then separately for each subscale (EWB, SWB, PWB) and the overall MHC-SF score (MHC_total), as shown in Table 1. Primary school and secondary school students self-rated on average their emotional well-being as elevated (feeling happy almost every day), and their social and psychological well-being as moderate (being socially and psychologically satisfied 2-3 times per week).

☞ TABLE 1
Descriptive univariate statistics of 3 subscales (Emotional well-being: EWB, Social well-being: SWB and Psychological well-being: PWB), and the overall MHC-SF score (MHC_total)

Items	Mean	Standard deviation	Skewness	Kurtosis
EWB	3.60	1.08	-0.85	0.40
SWB	2.70	1.22	0.02	-0.89
PWB	3.44	1.04	-0.71	0.24
MHC_total	3.23	1.00	-0.39	-0.39

MHC-SF psychometric properties: Structural validity and reliability

TABLE 2
Four confirmatory factor analysis fit statistics for the MHC-SF

Regarding exploration on validity three analyses were run: factor validity, discriminant validity and convergent validity. Since there is a previously confirmed MHC model, four confirmatory factor analyses (CFA) were run to test the four models, as presented in Table 2.

Models	$\chi^2(df)$	χ^2 / df	RMSEA (90% CI)	SRMR	CFI
Model 1 – Single factor	736.82 (77)	9.57	0.13 (0.12-0.14)	0.07	0.82
Model 2 – Two factors	538.20 (76)	7.08	0.11 (0.10-0.12)	0.06	0.87
Model 3 – Three factors	416.22 (74)	5.62	0.09 (0.09-0.10)	0.06	0.91
Model 4 – Bifactorial model	207.51 (63)	3.29	0.07 (0.06-0.08)	0.07	0.96

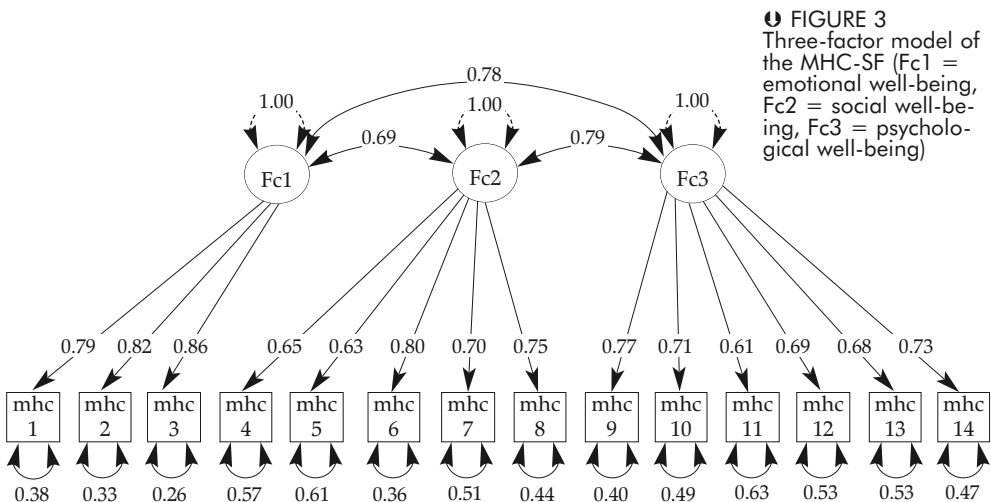
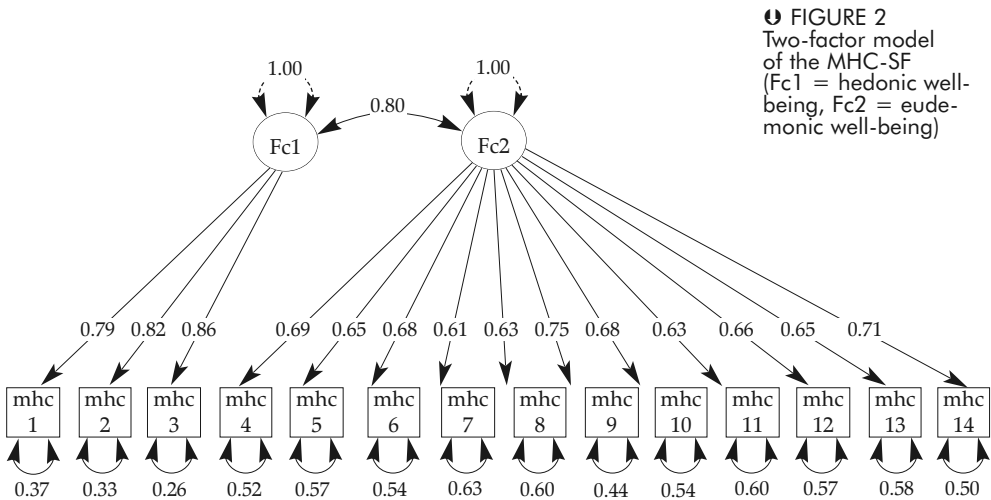
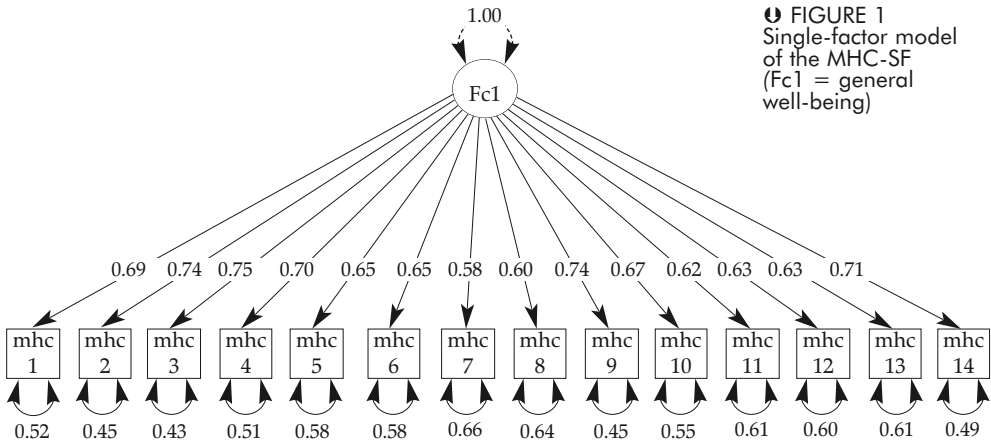
χ^2 = chi square, df = degrees of freedom, RMSEA = root mean square error of approximation, CI = confidence intervals, SRMR = standardised root mean square residual, CFI = comparative fit index.

The graphical representations of all models were presented in Figures 1, 2, 3 and 4. To assess the model fit, the following indicators were calculated and analysed: Chi-squared test, Comparative fit index, Root mean square error of approximation, and Standardised root mean square residual. Those criteria for model fit values were considered: CFI above 0.90 as acceptable and above 0.95 as satisfactory, RMSEA and SMRS equal to or less than 0.08 (Hu & Bentler, 1999; Marsh et al., 2004). The assumption of univariate normality was checked by skewness and kurtosis. Regarding univariate normality, determined skewness and kurtosis values ranged between -1 (-2) and 1 (2), which means that distributions are not significantly different from normal. However, to ensure the quality of CFA-s that were run, we used Maximum Likelihood Robust (MLR) since this estimator is resistant to non-normality of the distribution. Standard errors were calculated as standard, i.e., no bootstrapping method was used. The graphical representation of the single-factor model of MHC-SF is presented in Figure 1.

In the second CFA, the two-factor model of hedonic (first three items, i.e., emotional well-being) and eudemonic well-being (all other items, i.e., social and psychological well-being) was analysed (Figure 2).

The three-factor model of the MHC-SF, including emotional well-being (1-3 items), social well-being (4-8 items), and psychological well-being (9-14 items), are represented in Figure 3.

Finally, in the fourth model, one general and three well-being factors of emotional, social and psychological well-being were tested as in the bifactorial model, as can be observed in Figure 4.



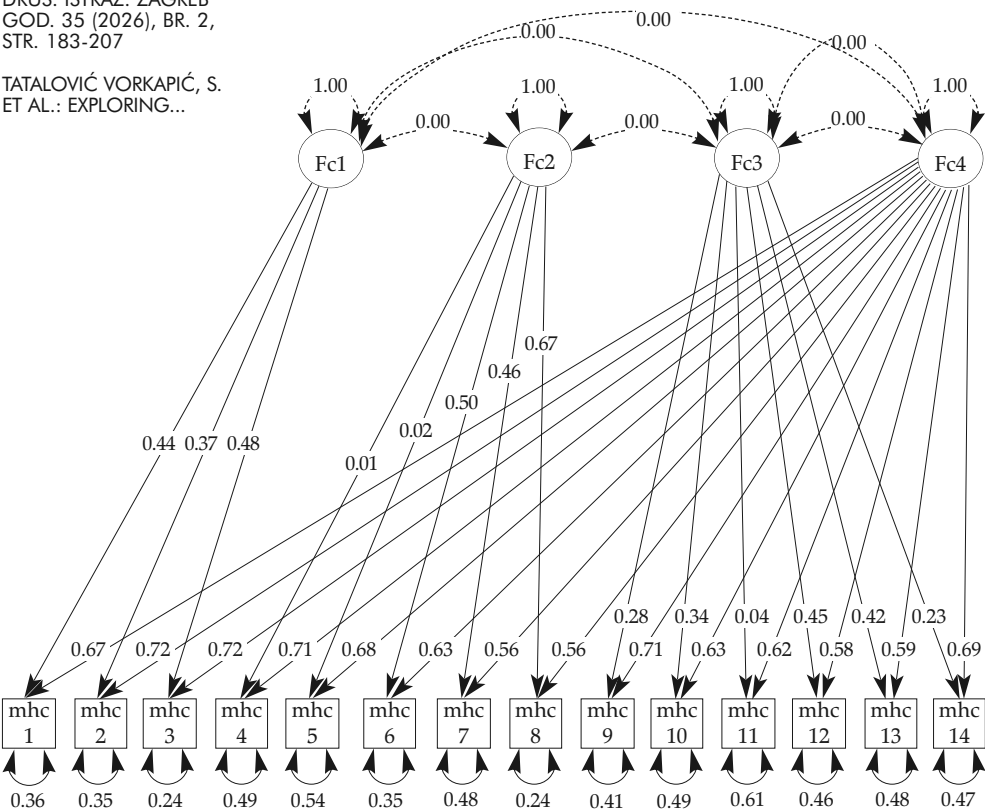


FIGURE 4
Bifactorial model
of the MHC-SF
(Fc1 = emotional well-
being, Fc2 = social
well-being, Fc3 = psy-
chological well-being,
Fc4 = general well-
being)

Considering the criteria for the satisfactory fit model, close indices could be observed in the third and fourth models (Table 2). To closely check the fourth, bifactorial model, three supposed dimensions, EWB, SWB, and PWB, with a general factor (MHC_{total}), were created based on the original three-factor model, with their descriptive parameters (means and standard deviations) presented in Table 1. Even though the bifactorial model showed best model fit indices (RMSEA, SRMR and CFI), some fundamental issues regarding several indices were determined: factor loadings in the range of 0.005 are implausibly low, especially when consistently so across indicators; a reliability estimate of 4.11 is clearly out of bounds, as are standardised factor loadings, both of which point to fundamental problems in the model specification and estimation; and the degrees of freedom reported rather suggest a hybrid between a hierarchical and a bi-factor model; the third model would have the best fit. Therefore, the item loadings of all items regarding the three-factor model are presented in Table 3. Furthermore, as anticipated, significant positive correlations (Pearson's) were determined between all MHC dimensions, ranging from $r = 0.61$ to $r = 0.71$, as presented in Table 4.

➡ TABLE 3
Item loadings for the
Three-factor model

Items and dimensions	Standard estimate		
	EWB	SWB	PWB
mhc1 – happiness	0.799		
mhc2 – interest	0.828		
mhc3 – life satisfaction	0.847		
mhc4 – social contribution		0.685	
mhc5 – social integration		0.682	
mhc6 – social actualisation		0.782	
mhc7 – social acceptance		0.639	
mhc8 – social coherence		0.688	
mhc9 – self-acceptance			0.757
mhc10 – environmental mastery			0.690
mhc11 – positive relations			0.624
mhc12 – personal growth			0.690
mhc13 – autonomy			0.675
mhc14 – purpose in life			0.725
Model-based reliability estimates (ω)	0.86	0.85	0.85
Variance-covariance-based reliability estimates (α)	0.86	0.83	0.85

Note. EWB = emotional well-being; SWB = social well-being; PWB = psychological well-being; ω = coefficient omega; α = coefficient Cronbach alpha.

Convergent and discriminant validity. In order to check convergent validity, Pearson's correlations of three MHC-SF subscales (EWB – emotional well-being, SWB – social well-being, PWB – psychological well-being) with two other scales (SWLS, a subscale of positive emotions of PANAS-20) are calculated (Table 5). For testing the divergent validity of MHC-SF's subscales, two measures of ill-being are used: The Depression subscale of DASS-21, and the PANAS-20's subscale of negative emotions.

➡ TABLE 4
Correlation matrix of
three MHC factors

	EWB	SWB
Social well-being (SWB)	0.608***	–
Psychological well-being (PWB)	0.685***	0.712***

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Concerning convergent validity of the MHC-SF subscales, it was well supported as indicated by moderate to high significant positive correlations of MHC-SF subscales with scales that measure similar well-being construct domains ($p < 0.01$). The strongest correlations were observed for emotional well-

being, which showed moderate to high positive associations with life satisfaction and positive emotions. Similarly, psychological well-being demonstrated moderate to high positive correlations with life satisfaction and positive emotions, indicating that higher levels of positive psychological functioning are associated with higher subjective well-being. In contrast, social well-being showed slightly lower, but still moderate positive correlations with life satisfaction and positive emotions. Overall, the obtained pattern of correlations provides clear evidence of good convergent validity for the MHC-SF subscales.

TABLE 5
Pearson's correlations
of the MHC-SF's
subscales with other
measures: SWLS,
PANAS-P, DASS and
PANAS-N

	SWLS	PANAS-P	DASS	PANAS-N
MHC-EWB	0.64**	0.66**	-0.61**	-0.46**
MHC-SWB	0.55**	0.56**	-0.36**	-0.37**
MHC-PWB	0.61**	0.65**	-0.52**	-0.47**

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Regarding discriminant validity, significant negative correlations were found between all MHC-SF subscales and measures of negative emotions and depression. The strongest negative associations were observed for emotional well-being, which was moderately to strongly negatively correlated with depressive symptoms and negative emotions. Psychological well-being also showed moderate to relatively strong negative correlations with depression and negative emotions, indicating that higher levels of positive psychological functioning are associated with lower levels of negative emotional states. In contrast, social well-being demonstrated weaker, yet still significant, negative correlations with depression and negative emotions. The analysed correlations are lower than those for convergent validity, which was expected. Overall, this pattern of correlations provides clear evidence of good discriminant validity of the MHC-SF subscales.

DISCUSSION

Levels of MHC dimensions among Croatian primary school and secondary school students

Regarding the descriptive findings, the participants expressed moderate levels of overall mental health ($M = 3.23$, $SD = 1.00$) – feeling and being well *approximately '2 or 3 times a week.'* The increasing trend is determined regarding the level of emotional well-being (EWB) ($M = 3.60$, $SD = 1.08$), and the decreasing trend when observing social well-being (SWB) ($M = 2.70$, $SD = 1.22$), while psychological well-being (PWB) ($M = 3.44$, $SD = 1.04$)

is close to the level of EWB. When comparing the determined levels of the three MHC dimensions, it is interesting to emphasise that the decreasing trend in social well-being confirmed social interactions and identity as being of utmost importance in adolescence. This is the period during which social interactions with peers are the most important of all other parts of adolescent identity, making it the most vulnerable period. Therefore, even though there is room for improvement in each of the MHC dimensions, social well-being needs to be more intentional and supported than emotional and psychological well-being, which needs to be kept in mind. Given that the data were collected eight years ago, it is possible that today we would find somewhat lower levels of emotional well-being, more pronounced gender differences favouring boys, and age differences favouring younger adolescents due to the effects of the pandemic, social media, and a higher incidence of mental health difficulties; which present clear implications for MHC application in future studies.

Furthermore, compared to Croatian older adolescents and university students (Vuletić et al., 2018), the overall well-being levels of Croatian primary and secondary school students in the present study appear broadly comparable. Even though Croatian adolescents tend to report relatively lower mean levels of positive mental health, when descriptively contrasted with adolescent samples from other countries for which published MHC-SF data are available, future analyses should employ model invariance with the data from different countries to ensure quality comparison and possible discussion on cross-national comparisons. Therefore, the present comparison is intended as an indicative benchmark based on available published descriptive statistics rather than as evidence of statistically significant cross-national differences.

At the item level, the highest mean scores were observed in the emotional well-being domain, particularly for life satisfaction and happiness ($M \approx 3.5$). Higher scores were also evident for items reflecting positive interpersonal relationships and aspects of psychological well-being related to functioning and personal growth. In contrast, the lowest mean levels were found for social well-being, especially in perceptions of societal progress and coherence ($M = 2.2\text{--}2.3$). This pattern suggests that adolescents evaluate their personal emotional state and functioning relatively positively, while expressing lower optimism and clarity regarding the broader social environment, consistent with previous findings showing weaker endorsement of social well-being in adolescent samples.

These results were expected and in line with previous findings because young adolescents are focused on hedonic

outcomes, while as they grow, eudemonic outcomes (López-Pérez & Zuffianò, 2021), positive relations with peers, and their life and an increasing sense of identity become more relevant (Alsarrani et al., 2022; Suldo et al., 2014). Concerning social well-being, Croatian youth expresses (Gvozdanović et al., 2019) a pronounced decline in values about, interest in (engagement in politics, civil society), and trust in political and various social institutions. In a national scientific study from Croatia, students in an early adolescence stage gave the lowest assessment of their well-being in all indicators of subjective well-being, especially in the social domain (Ajduković et al., 2020). Social well-being, measured with the SWB-subscale, has the lowest levels in primary school and secondary school students in many countries. Considering the Croatian cultural context, this low evaluation of social well-being among primary school and secondary school students, especially in their social growth and coherence, could imply their first real facing reality and dealing with the conflict between their expectations and ideals and reality. Therefore, the effect could be overwhelming for the average adolescent who is focused on him/herself, engaged in personal development, challenges, schooling, and relations, and among all of this, trying to deal with the technology's impact on his/her life, such as social media impact, etc.

Psychometric properties of MHC-SF among the Croatian primary school and secondary school students

The CFA results supported a three-factor structure of the MHC-SF in a sample of Croatian adolescents aged 13–18, showing adequate fit indices relative to the one- and two-factor solutions. Although the bi-factorial model yielded a slightly improved fit, the three-dimensional model demonstrated overall satisfactory indices (CFI and SRMR within recommended thresholds, and RMSEA slightly above the margin of acceptable range), supporting the original conceptualisation proposed by Keyes (2002). These findings are consistent with previous research reporting satisfactory fit for the three-factor model (Joshanloo & Jovanović, 2017; Rogoza et al., 2018). *Because of the overly restrictive assumptions of the CFA approach and the resulting inflation of factor intercorrelations, some researchers have recently recommended the use of ESEM to represent the factor structure of multidimensional constructs* (Joshanloo, 2016, p. 3). In addition, the intercorrelations of these three factors for these data are far below the critical limit of 0.80 – there is enough unshared variance for treating them as distinct factors (Kline, 2011). Moreover, the factor structure found for Croatian primary school and secondary school students' data is in line with

previous research in young adolescents concerning satisfactory fit indices about the three-factor structure (de Carvahlo et al., 2016; Karaš et al., 2014; Faradiba et al., 2023; Perugini et al., 2017; Yousefi Afrashteh & Janjani, 2023), as well as for the bifactor model. The confirmed three-factor model offers more differentiated information about dimensions of well-being, which is valuable to gain an understanding of what is driving the data and to suit beneficial interventions. So, MHC-SF could satisfactorily be used in Croatia to measure Keyes's three distinct dimensions of mental health, EWB, PWB, and SWB, among primary school and secondary school students.

Convergent validity was confirmed as the MHC-SF subscales show a significant positive relationship with well-being variables of primary school and secondary school students' life satisfaction and their positive emotions. This is consistent with theory: the MHC-SF measures psychological and emotional well-being, which is closely related to positive affect and subjective well-being (Keyes, 2002, 2005; Lamers et al., 2011). Emotional and psychological well-being showed the strongest associations with life satisfaction and positive affect, whereas social well-being demonstrated slightly lower, though still moderate, correlations. This pattern is consistent with previous validation studies of the MHC-SF in adolescent populations, which have reported positive associations between MHC-SF dimensions and indicators of well-being, while also suggesting that the social well-being component may relate somewhat less strongly to hedonic outcomes such as positive affect and global life satisfaction (Luijten et al., 2019; Piqueras et al., 2022). Furthermore, this finding may reflect developmental characteristics of adolescence, a period in which social functioning and perceived belonging are particularly context-dependent and sensitive to peer influence and social risk, which may contribute to greater variability in social well-being evaluations (Tomova et al., 2021).

On the other hand, discriminant validity is also shown to be satisfactory because the MHC-SF subscales show significant negative correlations with measures of psychological distress: negative emotions and depression. The determined significant correlations indicate that the MHC-SF is not the opposite of depression or negative affect, but rather measures a positive construct. The finding that emotional and psychological well-being tend to demonstrate stronger inverse associations with depression and distress-related outcomes, whereas social well-being displays weaker but still significant negative relationships is consistent with previous MHC-SF validation research (Guo et al., 2015; Keyes, 2005; Orpana et al., 2017). The stronger negative associations of emotional and psychological well-being with depression and negative affect may

be explained by the greater conceptual proximity of these subscales to internal affective experiences and self-related functioning, whereas social well-being reflects broader and more distal evaluations of societal integration and social functioning (Lamers et al., 2011; Orpana et al., 2017).

CONCLUSIONS

This study on a Croatian sample of primary school and secondary school students has confirmed previous studies regarding their level of positive mental health and psychometric properties of the applied MFC-SH. Validity and reliability analyses confirmed previous satisfactory levels of internal reliability and the supposed tri-partite model, along with satisfactory convergent and discriminant validity. Therefore, MHC-SF was shown to be a valid and reliable measure for exploring three dimensions of the mental health continuum: emotional, social, and psychological well-being, as well as mental health in Croatian primary school and secondary school students in general. Today, adolescence is part of life when young people simultaneously face various, frequent, and rather intense developmental, relational, transitional, daily, and life-stressful events, and many of them struggle to cope with them. Because of digitalisation and the urge to grow up at an accelerated pace, there are additional stressors that have never before been experienced by generations of adolescents. This research has greenlighted the use of MHC-SF as a valuable and reliable instrument for measuring primary school and secondary school students' mental health in Croatia for the first time. In addition, its contribution lies in the reliable and valid measurement of primary school and secondary school students' emotional, social, and personal well-being levels. In future studies, ESEM should be employed when exploring the factor structure of positive mental health; analyses on gender and age differences should be thoroughly explored in future studies, and some other significant correlates and determinants of mental health among young adolescents, thus enabling a more nuanced comparison on an intercultural level.

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Istraživanje pozitivnoga mentalnog zdravlja adolescenata i njegovo mjerjenje u Hrvatskoj

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Analiza mentalnoga zdravlja adolescenata valjanim i pouzdanim mjerama vrlo je važan pothvat u današnje vrijeme. Stoga je cilj ove studije istražiti mentalno zdravlje adolescenata korištenjem prilagođene hrvatske verzije Kratkog upitnika kontinuuma mentalnoga zdravlja (MHC–SF, Keyes, 2018). MHC je primijenjen na uzorku od 518 hrvatskih adolescenata. Faktorske analize i analize pouzdanosti, kao i konvergentna i diskriminantna valjanost, provedene su kako bi se testirala psihometrijska svojstva ove ljestvice. Dok su adolescenti izvijestili o umjerenoj razini mentalnoga zdravlja, pojavila se razlika među domenama, pri čemu je socijalna dobrobit značajno niža od

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emocionalne i psihološke dobrobiti. Ovaj obrazac odražava pojačanu važnost pripadnosti vršnjacima tijekom adolescencije i signalizira važnost podržavanja socijalne integracije unutar okvira mentalnoga zdravlja mladih. Analize valjanosti potvrdile su prethodne nalaze da je najbolje pristajanje pronađeno za izvorni model s tri faktora i bifaktorski model, s više prednosti u odnosu na model s tri faktora. Utvrđene su zadovoljavajuće razine konvergentne i diskriminantne valjanosti te unutarnje pouzdanosti.

Ključne riječi: adolescenti, MHC-SF, mentalno zdravlje, psihometrijska svojstva



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