Study

Looking on the Bright Side of Life

Introducing the Positive Mental Health Scale for Children and Adolescents (PMH-Kids)

Michael W. Lippert[1], Johanna Schoppmann[2], Anna-Luisa Kranhold[1], Jessica Marks[1], Lena Marie Liedtke[1], Jürgen Margraf[1,3], and Silvia Schneider[1,3]

[1]Mental Health Research and Treatment Center, Ruhr University Bochum, Germany
[2]Department of Developmental Psychology, Faculty of Psychology, Ruhr University Bochum, Germany
[3]German Center for Mental Health (DZPG), partner site Bochum/Marburg, Germany

Abstract. *Theoretical Background:* Positive mental health is not simply the absence of a mental disorder. We need a better understanding of the development of mental health, particularly if we are to better understand prevention, remission, and relapse in the context of mental disorders. To date, no measurement tool exists that captures positive mental health for childhood and adolescence, building on a robust theory of positive mental health. *Objective:* This study develops a questionnaire to assess positive mental health in children and adolescents between 6 and 18 years of age, both in self-report and in external report, and analyzes its quality in a first small sample. *Method:* Based on established adult scales, we developed a new questionnaire. 83 children and adolescents aged 6–18 years (M = 11.89, SD = 3.0; 66% female) and 77 parents completed the new questionnaire and other questionnaires assessing positive mental health and psychopathology. *Results:* The questionnaire showed a unidimensional factor structure as well as very good internal consistency and test-retest reliability. High positive correlations with self-efficacy and life satisfaction as well as high negative correlations with anxiety and depression confirmed the very good construct validity, both in child and parent ratings. *Discussion and Conclusion:* The PMH-Kids provides evidence of excellent psychometric quality in this first evaluation attempt. The questionnaire is comparable to its adult pendant, enabling researchers to assess positive mental health across the lifespan.

Keywords: positive mental health, children, adolescents, assessment, evaluation

Die positive Seite des Lebens betrachten: Einführung der Skala für positive psychische Gesundheit bei Kindern und Jugendlichen (PMH-Kids)

Zusammenfassung. *Theoretischer Hintergrund:* Positive psychische Gesundheit ist nicht nur die Abwesenheit von psychischen Störungen. Ein besseres Verständnis der Entwicklung von psychischer Gesundheit ist notwendig, um Prävention, Remission und Rezidive psychischer Störungen besser zu verstehen. Bislang liegt kein Messinstrument vor, das für das Kindes- und Jugendalter positive psychische Gesundheit erfasst. *Fragestellung:* Ziel der Studie ist die Entwicklung und erste Überprüfung der Gütekriterien eines Fragebogens zur Erfassung von positiver mentaler Gesundheit bei Kindern und Jugendlichen im Selbst- und Fremdbericht. *Methode:* Aufbauend auf Skalen aus dem Erwachsenenbereich wurde ein Fragebogen entwickelt. 83 Kinder und Jugendliche im Alter von 6–18 Jahren, sowie 77 Eltern füllten den Fragebogen, sowie Fragebögen zu positiver mentaler Gesundheit und Psychopathologie aus. *Ergebnisse:* Der Fragebogen zeigte eine eindimensionale Faktorenstruktur, sowie eine sehr gute interne Konsistenz und Test-Retest Reliabilität. Korrelationen mit Selbstwirksamkeit und Lebenszufriedenheit, sowie negative Korrelationen mit Angst und Depression zeigen im Eltern- und Kinderrating eine gute Konstruktvalidität. *Diskussion und Schlussfolgerung:* Die PMH-Kids zeigt in der Evaluation vergleichbare Ergebnisse wie die Erwachsenenversion. Damit kann erstmals positive psychische Gesundheit über die Lebensspanne erfasst werden.

Schlüsselwörter: Positive psychische Gesundheit, Kinder, Jugendliche, Fragebogen, Validierung

Traditionally, mental health was defined by the absence of psychopathology or the absence of mental disorders (Keyes, 2005). However, the recent rise of positive psychology concepts in clinical psychology has made it clear that the absence of symptoms is not the same as the presence of positive mental health (Keyes & Lopez, 2002). Positive mental health (PMH) is now understood as an independent but correlated concept as important as psychopathology (Keyes & Lopez, 2002; Suldo & Shaffer, 2008) which builds on components of well-being and positive functioning in everyday life. Thus, PMH includes both hedonic (positive affect, life satisfaction) and eudaimonic concepts of well-being ("optimal human functioning and the endeavor to achieve meaningful goals in life," Waterman, 2007). Following the tripartite model (Keyes, 2007), PMH refers to a conglomerate of emotional, social, and psychological well-being factors (Keyes & Lopez, 2002; Velten et al., 2022). It includes several subconcepts,

such as self-efficacy, life satisfaction, self-acceptance, sense of coherence, optimism, and a social network of support (Lamers et al., 2012). Since its introduction, the concept of PMH has proved to be of great value in predicting the effects of prevention, treatment, and remission of mental disorders (Bieda et al., 2017; Brailovskaia et al., 2019; Trumpf et al., 2010).

To effectively measure PMH with a brief, unidimensional person-centered questionnaire as described in the validation study by Lukat and colleagues (2016), Lutz, Heyn, Schmid, Sick & Steinl (1992, unpublished manuscript) developed the Positive Mental Health Scale. The questionnaire comprises 9 items covering a wide range of PMH components and combining internal factors (emotional and psychological well-being) and external factors (social support). The scale has proved to be a valid, reliable instrument to assess PMH in adults, which is sensitive to changes during treatment (Lukat et al., 2016). The scale was originally developed with 14 items (Trumpf, Vriends et al., 2010) and was shortened in the process to its final 9-item version (Lukat et al., 2016). It has been translated into several languages and proven valid in different cultures (Bieda et al., 2017; Velten et al., 2022). During the COVID-19 pandemic, the PMH scale was a useful tool to demonstrate the importance of both PMH and resilience in dealing with this crisis. Brailovskaia and Margraf (2020) found that participants with higher scores in PMH could cushion the negative effects of a lockdown better than participants with lower scores. Unfortunately, we have no comparable results for children and adolescents, although systematic reviews and empirical studies have demonstrated how the pandemic drastically influenced children's and adolescents' mental health (Holler et al., 2023; Newlove-Delgado et al., 2021; Panchal et al., 2023; Ravens-Sieberer et al., 2022; for an overview of the German-speaking countries, see Asbrand & Brinkmann, 2022). This research gap might result from a lack of psychometric instruments to measure PMH in children and adolescents. Most existing instruments for children focus on one concept of PMH, such as self-efficacy (e.g., SWE, Schwarzer & Jerusalem, 2003) or life satisfaction (e.g., ILK, Mattejat & Remschmidt, 2006). Further instruments try to measure well-being in combination with psychopathology with only few items (e.g., KIDSCREEN-10, Erhart et al., 2009; MHI-5, Rivera-Riquelme et al., 2019).

If we are to conduct further research on PMH in children and adolescents using a more holistic approach and to replicate results from adult research, we need a new instrument that includes broader concepts of well-being while using age-adequate wording. Thus, the Positive Mental Health Scale for Children and Adolescents (PMH-Kids) was developed by adapting the Positive Mental Health Scale (Lukat et al., 2016) for the ages between 6 and 18 years. As multi-informants are preferred when dealing with children and adolescents (e.g., Kraemer et al., 2003), we developed both a self-rating and a caregiver rating. The present study aimed to introduce the adapted version for children and adolescents and present validation data in a sample of healthy controls. We hypothesize that we can replicate both the excellent reliability and the one-dimensional factor structure of the adult version (Lukat et al., 2016). We further expect the PMH-Kids scale to correlate positively with self-efficacy and life satisfaction as well as negatively with anxiety and depression scores, thus confirming the convergent and divergent validity. Additionally, we hypothesize finding a consensus between the caregiver and the child version of the PMH-Kids.

Method

Participants

We advertised the present study through several channels, such as social media, friends, and coworkers. Additionally, we directly contacted the usual gathering points for children and adolescents, such as sports clubs, scouting groups, family education facilities, and music schools in several German cities, and asked them to invite their members to participate. The study was preregistered at AsPredicted (https://aspredicted.org/81G_R9L) and approved by the local Ethics Committee of the faculty of psychology, Ruhr University Bochum. Because of recruitment problems, we had to change the preregistered age range of 8 to 14 years to 6 to 18 years. We do not include a third PMH questionnaire examining positive mental health in the parent role; it will be part of another publication.

Eighty-three children and adolescents completed at least the PMH-Kids. The mean age was m = 11.89 (SD = 3.0, range 6–18 years). Twenty-nine (34 %) children were younger than 11 years, 42 (51 %) were 11–15 years of age, and 12 (15 %) adolescents were older than 15. Of these, n = 55 were female (n = 28 male). 21.7 % attended an elementary school, and the others attended various secondary schools in the German school system (49.4 % Gymnasium, 9.6 % Realschule, and 10.8 % Gesamtschule).

N = 77 parents completed the PMH-Kids parent questionnaire. Of these, 87 % were mothers (n = 10 fathers). N = 36 children and N = 35 parents completed the second assessment 1 week later.

Design

After parents had given their informed consent, they received two links: one for the parent version of questionnaires and a second link for their children to fill out. The participants generated an individual code to combine the datasets. All questionnaires were processed online. After completing the first version, the participants were asked to be contacted for the second test to measure retest reliability a week later. If they agreed, they were invited to leave their email address at an additional survey to ensure anonymity. Families who had completed all (children and caregiver) questionnaires received a 10 € voucher.

Questionnaires

Development of the Positive Mental Health Scale for Children and Adolescents (PMH-Kids)

The PMH-Kids was developed as a 9-item instrument to assess positive mental health in children and adolescents aged 6 to 18, including self-rating and caregiver-rating versions. Items are rated on a 4-point Likert scale from 0 (*do not agree*) to 3 (*totally agree*). Based on the original Positive Mental Health Scale for adults (Lukat et al., 2016), we adapted the original 9 items using age-adequate wording. We changed the wording of some items in detail, whereas we kept others close to the adult version. To check whether children need the age-adequate wording, we added 5 items from the original long version, leading to 14 items.

We included children in the development of the questionnaire from an early stage. Before starting data collection, we showed the 14-item questionnaire to a boy aged 10 and a girl aged 8, who were available because they were participating in other research in the treatment center. We discussed all items regarding accessibility and wording following a semistructured protocol (talking about every single item, asking whether the children had problems understanding specific words, see Electronic Supplement 1). If the children rated individual words or phrases as incomprehensible, we discussed the items in the research team and changed them according to the children's recommendations.

Data collection started with the 14-item version, during which we added questions asking about the comprehensibility of every single item. We used these to further shorten the questionnaire to 9 items, in accordance with the adult version of the PMH. Table 1 presents the reasons for the removal of 5 items. First, we removed 4 items because the participating children rated them incomprehensible (Table 1). The fifth excluded item was one that had originally belonged to the long form of the adult PMH scale (Lukat et al., 2016), which asked the degree to which the children and adolescents felt as having someone in their life who liked them. However, we excluded it to increase the comparability to the short adult PMH Scale (Lukat et al., 2016) and because factor analysis showed an inferior model fit if the item was included (see table in Electronic Supplement 2).

The 9 final items used in the PMH-Kids were specifically worded for children and adolescents; they were also the item versions rated the most comprehensible by the children and adolescents. The caregiver rating PMH-Kids was based entirely on the newly developed self-rating PMH-Kids, leading to a parallel version for caregivers (Table 2).

Additional Child Ratings

Children's Life Satisfaction Inventory (ILK, Mattejat & Remschmidt, 2006)

The ILK is a German instrument to assess the quality of life in children and adolescents. It assesses quality of life in six domains: school, family, social contacts, personal interests, physical and mental health, and an overall assessment of quality of life. The questionnaire has proved to be reliable (α = .55–.76). In the present study, internal consistency was α = .88.

General Self-Efficacy Scale (WIRK-ALL, Schwarzer & Jerusalem, 2003)

This German self-efficacy scale is a 10-item questionnaire to assess self-efficacy in children and adolescents on a 4-point Likert scale (*not true* to *always true*). The internal consistency of the scale ranges between. α = .79 and α = .90 (Luszczynska et al., 2009). In the current study, internal consistency was α = .92.

Revised Child Anxiety and Depression Scale (RCADS, Chorpita, Moffitt, & Gray, 2005)

The RCADS (Chorpita et al., 2005) is a 47-item self-report questionnaire to assess anxiety and depressive symptoms in children and adolescents on a 4-point Likert scale (*never* to *always*). It measures anxiety on five subscales (separation anxiety disorder, social phobia, generalized anxiety disorder, panic disorder, obsessive-compulsive disorder) as well as depression on one subscale. A total anxiety score can be calculated. This study used the German translation of the child-rated version (Grothus et al., 2023), which shows good psychometric properties (Cronbach's α = .73–.96). Internal consistency in this sample was α = .97 for the anxiety subscale.

Table 1. Overview of the final and removed items of the PMH-Kids-Scale, Version for Children and Adolescents

Positive Mental Health Scale for Children and Adolescents – Self-Rating	Mean (*SD*)	Item difficulty	Range
Item 1: Ich habe wenig Sorgen und bin gut drauf (I have few worries and am in good spirits)	2.18 (.84)	.73	0 – 3
Item 2: Ich genieße mein Leben (I enjoy my life)	2.45 (.69)	.82	0 – 3
Item 3: Insgesamt bin ich zufrieden mit meinem Leben (Overall, I am satisfied with my life)	2.53 (.65)	.84	1 – 3
Item 4: Ich glaube insgesamt, dass die Dinge gut laufen werden (Overall, I think things will go well)	2.28 (.69)	.76	0 – 3
Item 5: Ich kann gut selber dafür sorgen, dass es mir gut geht (I am good at making things go well for myself)	2.37 (.64)	.79	1 – 3
Item 6: Ich bin gesund und fühle mich gut (I am healthy and feel well)	2.55 (.61)	.85	1 – 3
Item 7: Ich kann eigentlich mit Problemen gut umgehen (I can actually handle problems well)	2.39 (.64)	.80	1 – 3
Item 8: Vieles, was ich mache, bereitet mir Freude (Much of what I do gives me pleasure)	2.51 (.59)	.84	1 – 3
Item 9: Ich bin ruhig und rege mich selten auf (I am calm and rarely get upset)	1.83 (.79)	.61	0 – 3
Removed items	**Reasons for removal**		
Im Allgemeinen glaube ich, dass alles gut geht (In general, I believe that everything is going well)	*Alternative wording, rated rather incomprehensible by participants*		
Es gelingt mir gut, meine Bedürfnisse zu erfüllen (I manage well to fulfill my needs)	*Adult PMH wording, rated rather incomprehensible by participants*		
Ich fühle mich dem Leben und seinen Schwierigkeiten eigentlich gut gewachsen (I actually feel that I can cope well with life and its difficulties)	*Adult PMH wording, rated rather incomprehensible by participants*		
Ich bin ein ruhiger, ausgeglichener Mensch (I am a calm, balanced person)	*Adult PMH wording, rated rather incomprehensible by participants, not age-appropriate*		
Ich habe Menschen in meinem Leben, die mich mögen (I have people in my life who like me)	*Model fit not better, taken from the adult long version of the PMH*		

Table 2. Overview of the items of the PMH-Kids-Scale, Caregiver-Rating

Positive Mental Health Scale for Children and Adolescents – Caregiver Rating	Mean (*SD*)	Item difficulty	Range
Item 1: Mein Kind ist oft unbeschwert und gut aufgelegt (My child is often light-hearted and in a good mood)	2.35 (.70)	.78	1 – 3
Item 2: Mein Kind genießt das Leben (My child enjoys life)	2.44 (.75)	.81	0 – 3
Item 3: Alles in allem wirkt mein Kind zufrieden mit seinem Leben (All in all, my child seems content with their life)	2.42 (.64)	.81	1 – 3
Item 4: Im Allgemeinen ist mein Kind zuversichtlich (In general, my child is confident)	2.43 (.68)	.81	1 – 3
Item 5: Es gelingt meinem Kind gut, seine Bedürfnisse eigenständig zu erfüllen (My child can meet their needs independently)	2.19 (.74)	.73	0 – 3
Item 6: Mein Kind ist in guter körperlicher und seelischer Verfassung (My child is in good physical and mental health)	2.45 (.68)	.82	1 – 3
Item 7: Mein Kind fühlt sich Herausforderungen, die für sein Alter typisch sind, gut gewachsen (My child feels well able to meet challenges that are typical for their age)	2.17 (.80)	.72	0 – 3
Item 8: Mein Kind empfindet bei vielem, was es tut, Freude (My child feels pleasure in much of what they do)	2.52 (.53)	.84	1 – 3
Item 9: Mein Kind ist in der Regel ruhig und ausgeglichen (My child is usually calm and balanced)	2.22 (.66)	.74	0 – 3

Additional Child and Parent Rating

Short Mood and Feelings Questionnaire (SMFQ, Messer et al., 1995) Child and Parent Version

The SMFQ is a short, internationally established self- and parent-rating instrument to assess depressive symptoms in children and adolescents on a 3-point Likert scale (*not true*, *sometimes*, *true*). The 13-item questionnaire has shown excellent reliability (α = *.85)* and good screening quality (Messer et al., 1995). In the present study, internal consistency was α = .94 for the child and α = .92 for the parent version of the SMFQ.

The Strength and Difficulties Questionnaire (SDQ, Goodman, 2001)

The SDQ is an internationally established screening instrument for psychopathology for children aged 4 to 16 years. It consists of five subscales (emotional symptoms, peer problems, hyperactivity/inattention, conduct problems, and prosocial behavior). Each item is rated on a 3-point Likert scale from *not true* to *certainly true*. Two higher-order factors (externalizing symptoms and internalizing symptoms) and a total pathology score can be calculated. The German version showed good reliability (Cronbach's α = .55–.77; Lohbeck et al., 2015). In the current study, the internal consistency of the internalizing subscale was α = .57, for the externalizing subscale α =.80, and for the prosocial subscale α =.83 for the child version. In the parent version, the internal consistency ranged between α =.72 and α = .85.

Additional Parent Ratings

Spence Child Anxiety Scale (SCAS, Spence, 1998)

The SCAS is an established instrument to measure anxiety in child and parent ratings on a 4-point Likert scale (*never* to *always*). The present study used the unpublished but already translated parent version of the SCAS because no German translation of the RCADS parent version was available. The questionnaire consists of 38 anxiety-related items, which measure six domains of anxiety (separation anxiety, social anxiety, obsessive-compulsive disorder, panic/agoraphobia, and generalized anxiety). The present version was adapted by using the German child version (Essau et al., 2002), which showed excellent psychometric properties in its validation (internal consistency Cronbach's α = .92). In this study, the internal consistency of the parent version was α = .96.

Statistical Analysis

We tested factor structure, reliability, validity, and the association with the parent-rated version. To analyze the hypothesized factor structure, we conducted a confirmatory factor analysis using a unidimensional model in concordance with the adult PMH scale. We conducted another confirmatory factor analysis for the caregiver scale, also testing for a unidimensional model. We used standard SEM fit indices (CFI ≥ .95, TLI ≥ .95, not significant χ^2 test, RMSEA ≤. 06 and SRMR ≤ .08; see Hu & Bentler, 1999) to check model fit. For reliability analysis, we analyzed Mcdonald's Omega. To test for convergent and divergent construct validity as well as associations with the parent version, we conducted Pearson correlations with Holm-adjusted *p*-values. To further analyze parent-child consensus, we drew and interpreted a Bland-Altman plot. We conducted all analyses using R Studio with the packages lavaan (Rossel, 2012), BlandAltmanLeh (Lehnert, 2015), and psych (Revelle, 2019) as well as IBM SPSS Statistics 24 (IBM Corp., 2016).

Results

Factor Structure

Child Version

We conducted a confirmatory factor analysis to analyze whether the PMH-Kids shares the same unidimensional factor structure of the adult version. The results showed an excellent model fit, $\chi^2(27, 83) = 27.78$ $p = .42$, CFI = 1.0, TLI = 1.0, RMSEA = .02, and SRMR =.06.

Parent Version

We also conducted a confirmatory factor analysis for the parallel parent version questionnaire. The results showed an almost acceptable model fit for the one-factor solution, $\chi^2(27, 77) = 63.45$ $p < .001$, CFI = .89, TLI = .86, RMSEA = .13 and SRMR = .07. Respecification using modification indices led to a similar model defining covariances between Item 5 ("child can fulfill its needs") and Item 6 ("good physical and mental health"), as well as Item 5 ("child can fulfill its needs") and Item 7 ("child handles challenges typical for its age"). That led to an excellent model fit with $\chi^2(25, 77) = 31.96$ $p = .16$, CFI = .98, TLI = .97, RMSEA = .06 and SRMR = .05.

Reliability and Item Analysis

Child Version

The 9-item, unidimensional questionnaire showed very good internal consistency with McDonald's ω = .85. All items showed discriminatory power > .30. The analyses of item difficulty showed almost all items in the acceptable

Table 3. Correlations of the PMH-Kids self-ratings and caregiver ratings with measures of self-efficacy, life satisfaction, prosocial behavior, and psychopathology

Positive Mental Health Scale for Children and Adolescents – Self-Rating							
	Self-efficacy (WIRK-ALL)	Life satisfaction (ILK)	Prosocial behavior (SDQ-C)	Anxiety symptoms (RCADS)	Depressive symptoms (SMFQ-C)	Internalizing symptoms (SDQ-C)	Externalizing symptoms (SDQ-C)
PMH-Kids Self – Total	.57***	.77***	.25*	–.71***	–.73***	–.74***	–.41***
Positive Mental Health Scale for Children and Adolescents – Caregiver Rating							
			Prosocial behavior (SDQ-P)	Anxiety symptoms (SCAS-P)	Depressive symptoms (SMFQ-P)	Internalizing symptoms (SDQ-P)	Externalizing symptoms (SDQ-P)
PMH-Kids Caregiver – Total			.44***	–.60***	–.69***	–.75***	–.56***

Note. WIRK-ALL: Self-Efficacy Questionnaire, ILK: Quality of Life Inventory, RCADS: Revised Child Anxiety and Depression Scale; SMFQ-C: Short Mood and Feelings Questionnaire Children-Version; SMFQ-P: Short Mood and Feelings Questionnaire Parent-Version; SCAS-P: Spence Children Anxiety Scale-Parent Version, SDQ-C: Strength and Difficulties Questionnaire-Children Version, SDQ-P: Strength and Difficulties Questionnaire-ParentVersion. *$p < .05$, **$p < .01$, ***$p < .001$. $r \leq .40$ = weak, $r < .80$ = moderate, $r \geq .80$ = strong. All p-values were adjusted using the Holm correction for multiple comparisons.

range of .35 to .85 (Doran, 1976; Table 1). The analysis of skewness showed all items to be moderately skewed.

Parent Version

The parallel parent version also showed very good internal consistency with McDonald's ω = .90. All items showed discriminatory power > .30. The analyses of item difficulty showed almost all items in the acceptable range of .35 to .85 (Doran, 1976; Table 2). All items were moderately skewed.

Convergent and Divergent Construct Validity

Child Version

For construct validity, we calculated Pearson correlations between the PMH-Kids and self-efficacy and life satisfaction for convergent validity and depression and anxiety symptoms for divergent validity (Table 3). The PMH-Kids score correlated significantly with self-efficacy ($r = .57$, $p < .001$), life satisfaction ($r = .77$, $p < .001$), and prosocial behavior ($r = .25$, $p < .05$). We found significant negative correlations with depressive symptoms ($r = –.73$, $p < .001$) and anxiety symptoms ($r = –.71$, $p < .001$), as well as the internalizing scales ($r = –.74$, $p < .001$) and the externalizing scales ($r = –.41$, $p < .001$) of the SDQ (Goodman et al., 2001).

Parent Version

PMH-Parent scores showed significant correlations with the internal ($r = –.68$, $p < .001$), external ($r = –.29$, $p = .012$), and prosocial ($r = .45$, $p < .001$) scales of the SDQ (Goodman et al., 2001). Additionally, there were highly significant correlations between the PMH-Parent and the overall score of the SCAS parent version ($r = –.59$, $p < .001$) and each individual SCAS score (correlations between $r = –.35$ and $r = –.62$, all $p < .003$). Furthermore, correlations with the parent version of the SMFQ were significant ($r = –.69$, $p < .001$).

Retest Reliability and Child-Parent Agreement

Child Version

Pearson correlations between the PMH-Kids' two different measurement points were significant, $r = .85$, $p < .001$, $n = 36$.

Parent Version

Pearson correlations between the PMH parent version at measurements points 1 and 2 were also highly significant, $r = .91$, $p < .001$, $n = 35$.

Child-Parent-Agreement

The Pearson correlations between PMH-Kids and PMH-Kids-P were significant, $r = .41$, $p = .001$. A descriptive comparison of mean scores (PMH-Kids $M = 21.08$; PMH-Kids-P $M = 21.19$) showed very similar ratings. We generated a Bland-Altman plot (Figure 1) which plots the relationship between the differences and means: The closer the data points are to 0, the better the agreement. The plot shows that almost all data points are within the acceptable threshold of +/– 2 *SD*s. Six data points show differences higher than the acceptable threshold. Four data pairs are below the threshold, which means that children rated their positive mental health lower than their parents. Two data pairs are above the threshold, revealing that, in these pairs, children rated their positive

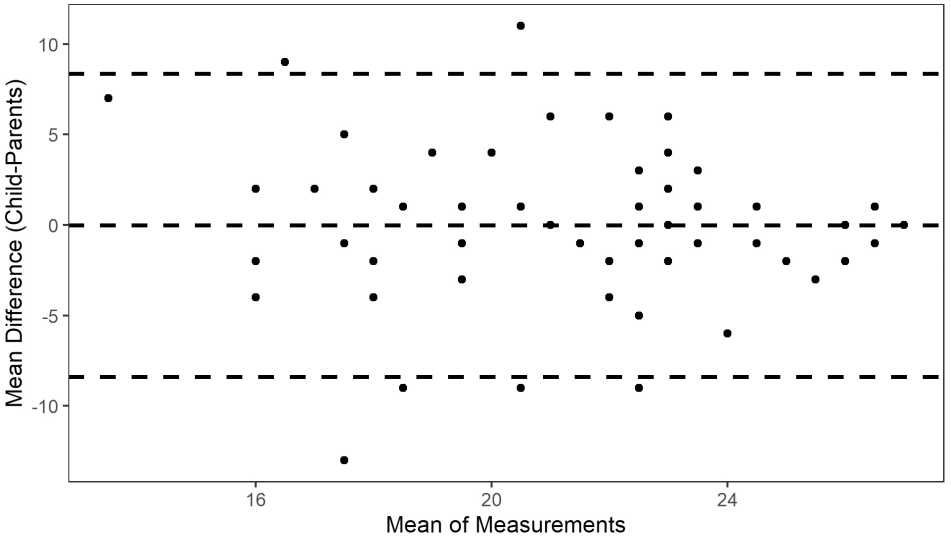

Figure 1. Bland-Altman plot child-caregiver consensus.

mental health higher than their parents did. The higher both parents and children rate positive mental health, the better the agreement. The median of the mean differences between child and parent ratings is 0.

Discussion

The present study introduced the PMH-Kids both as a self-report and caregiver report and described the development of this age-adapted scale. In an initial attempt to evaluate the questionnaire, factor structure and reliability, including retest reliability and validity, proved to be good to excellent for a small sample of 6- to 18-year-old children and adolescents. The PMH-Kids can therefore be used in nonclinical settings.

During the developmental process, we altered the items of the original PMH scale to make it more comprehensible and adequate for children and adolescents. Thus, the PMH Kids now differs slightly from the adult short version but is a comprehensible and adequate instrument for children and adolescents to measure positive mental health.

Factor structure revealed a unidimensional structure for both self-report and caregiver report, making the PMH-Kids brief and easy to interpret. The discriminant validity was moderately high with internal symptoms (depressive symptoms, anxiety symptoms), and moderate with external symptoms. Convergent validity with prosociality was weak but significant for children and moderate for parents. The results indicate a good fit for measuring positive mental health. Internal consistencies, excellent retest reliabilities for the parent report, and good retest-reliabilities for the self-report suggest that the scale is stable over time. Thus, in its first evaluation, the PMH-Kids is comparable to the excellent psychometric properties of the adult version of the PMH Scale (Lukat et al., 2016). Additionally, we examined parent-child agreement. The correlation and the Bland-Altman plot showed acceptable agreement between the two measures. Nonetheless, six data points in the plot lay beyond the acceptable threshold, which is in line with other measures of quality of life (Rajmil et al., 2013), which also shows slight disagreement. Despite the small sample size, the dataset included young children and adolescents and could depict children from many school forms. The present version of the PMH-Kids scales measured only PMH in children and adolescents 6+ years, though PMH may also be a relevant construct for younger children. Future research could therefore also take into account a younger sample. First findings on a newly developed parent-report version of the PMH for children between 3 and 7 years of age by Marks et al. (2023) showed good internal consistency ($\alpha = .82$).

One clear limitation of the present study was the small sample size. To increase the sample size, we took several actions: repeated announcements in different social media channels, personal phone calls to several institutions hosting youths in different cities, a 10 € voucher for every dyad completing the questionnaires, calls to various schools, and repeated announcements in the authors' private circles. Nevertheless, many institutions reported very high family stress because of the COVID-19 pandemic (see Asbrand & Brinkmann, 2022). Additionally, many children and adolescents reported being interested in participating but unable to obtain parental consent because of their parents not finding the time. This is supported by the fact that 54 % of parents who started the assessment quit after an average time of 4 minutes. The

mean total completion time for adults was 23.5 minutes. So, it is rather probable that the fatigue from participating in online studies during and after the COVID-19 pandemic might be responsible, although online fatigue so far is mostly described in an academic or teaching setting (e.g., Bonanomi et al., 2021). Because of the recruitment problems, we decided to include adolescents up to 18 years. Some German translations of the questionnaires used (e.g., the SDQ) are validated only for children up to 16 years. In contrast, the original questionnaire can also be used in adolescents 16+ (Bøe et al., 2016; Vugteveen et al., 2022), so we decided to keep the data in the set to not further reduce the already small sample size. Nonetheless, the results must be interpreted with caution. Future studies should invite participants to the lab to fill out the questionnaire or find other ways, such as creating outreach concepts to bring research to the daily life of families.

The present study is a first important step toward validation. Further validation should occur in future studies, including a larger convenience sample with different age groups to measure invariance, clinical samples to measure potential differences regarding diagnoses, and sensitivity for change during treatment.

Although the underlying structure of the new PMH-KIDS is comparable to that of the adult version, future studies should explore whether other PMH constructs might be equally important for children and adolescents. As children age, they tend to spend more and more time with peers than with family members, and maintaining positive close relationships with peers is highly important for adolescents (Rutter et al., 1979). However, we had to exclude our proposed item focusing on positive social interactions during this study because of insufficient model fit. Nonetheless, future research should include peer relationships in the analysis of PMH, especially in this age group, in a larger sample.

Nonetheless, the present study already shows very promising first data suggesting the direct implementation of the PMH-Kids in research and clinical application. The PMH-Kids can be used as a brief, unidimensional measure in research, prevention, and therapy to measure and promote positive mental health in children and adolescents. It enables researchers to expand their research on positive mental health towards children and adolescents and to replicate important results from adult research. Positive mental health has been identified as a predictor of academic achievement in elementary schools (O'Connor et al., 2019) and was furthermore associated with indicators of career progression for adolescents of 15–16 years of age and taking on citizenship responsibilities over a decade later (O'Connor et al., 2017). The study provides some first indications of the role PMH might have on child, youth, and adult development, though further research is needed to understand and promote PMH even better. The PMH-Kids may be a useful tool to support these undertakings.

In sum, the PMH-Kids demonstrated initial promising results in a small sample. It proved to be a reliable and valid instrument but should be further investigated in larger samples, including clinical subgroups, and tested regarding its sensitivity to therapeutic change. Introducing the PMH-Kids may lead to more research and a larger therapeutic focus on positive mental health in children and adolescents.

Electronic Supplementary Materials

The electronic supplementary material is available with the online version of the article at https://doi.org/10.1026/0942-5403/a000439

ESM 1. Semistructured protocol. This file contains the semistructured protocol used in the qualitative assessment in the early stages of the PMH-Kids development

ESM 2. Table with model comparison. This file contains an additional table showing differences in the CFA models with the items regarding peer relations and being calm

References

Asbrand, J., & Brinkmann, F. (2022). Die Auswirkungen der COVID-19 Pandemie auf Kinder, Jugendliche und Familien in deutschsprachigen Ländern [The Impact of the COVID-19 Pandemic on Children, Adolescents, and Their Families in German Speaking Countries]. *Kindheit und Entwicklung, 31*, 76–80. https://doi.org/10.1026/0942-5403/a000372

Bieda, A., Hirschfeld, G., Schönfeld, P., Brailovskaia, J., Zhang, X. C., & Margraf, J. (2017). Universal happiness? Cross-cultural measurement invariance of scales assessing positive mental health. *Psychological Assessment*, *29*(4), 408–421. https://doi.org/10.1037/PAS0000353

Bøe, T., Hysing, M., Skogen, J.C., & Breivik, K. (2016). The Strengths and Difficulties Questionnaire (SDQ): Factor structure and gender equivalence in Norwegian adolescents. *PLoS ONE, 11*(5), e0152202. https://doi.org/10.1371/journal.pone.0152202

Bonanomi, A., Facchin, F., Barello, S., & Villani, D. (2021). Prevalence and health correlates of Onine Fatigue: A cross-sectional study on the Italian academic community during the COVID-19 pandemic. *PLOS ONE, 16*(10), e0255181. https://doi.org/10.1371/journal.pone.0255181

Brailovskaia, J., & Margraf, J. (2020). Predicting adaptive and maladaptive responses to the Coronavirus (COVID-19) outbreak: A prospective longitudinal study. *International Journal of Clinical and Health Psychology*, *20*(3), 183–191. https://doi.org/10.1016/J.IJCHP.2020.06.002

Brailovskaia, J., Rohmann, E., Bierhoff, H. W., Schillack, H., & Margraf, J. (2019). The relationship between daily stress, social support and Facebook addiction disorder. *Psychiatry Research*, *276*, 167 – 174. https://doi.org/10.1016/J.PSYCHRES.2019.05.014

Chorpita, B. F., Moffitt, C. E., & Gray, J. (2005). Psychometric properties of the Revised Child Anxiety and Depression Scale in a clinical sample. *Behaviour Research and Therapy*, *43*(3), 309 – 322. https://doi.org/10.1016/J.BRAT.2004.02.004

Doran, R.L. (1976), Implications for measurement and evaluation from the trends of science education. *Science Educatrion*, 60, 199 – 209. https://doi.org/10.1002/sce.3730600207

Erhart, M., Ottova, V., Gaspar, T., Jericek, H., Schnohr, C., Alikasifoglu, M., Morgan, A., Ravens-Sieberer, U., & HBSC Positive Health Focus Group (2009). Measuring mental health and well-being of school-children in 15 European countries using the KIDSCREEN-10 Index. *International Journal of Public Health, 54*(Suppl. 2), 160 – 166. https://doi.org/10.1007/S00038-009-5407-7

Essau, C. A., Muris, P., & Ederer, E. M. (2002). Reliability and validity of the Spence Children's Anxiety Scale and the Screen for Child Anxiety Related Emotional Disorders in German children. *Journal of Behavior Therapy and Experimental Psychiatry*, *33*(1), 1 – 18. https://doi.org/10.1016/S0005-7916(02)00005-8

Goodman, R. (2001). Psychometric properties of the Strengths and Difficulties Questionnaire. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40*(11), 1337 – 1345. https://doi.org/10.1097/00004583-200111000-00015

Grothus, S., Sommer, A., Claus, B. B., Stahlschmidt, L., Chorpita, B. F., & Wager, J. (2023). The German version of the Revised Children's Anxiety and Depression Scale: Psychometric properties and normative data for German 8- to 17-year-olds. *International Journal of Methods in Psychiatric Research, 32*(4), e1965. https://doi.org/10.1002/MPR.1965

Holler, A., Maldei-Gohring, T., Reiß, F., Opdensteinen, K. D., Kaman, A., Ravens-Sieberer, U., & Hechler, T. (2023). COVID statt Kita. Der anhaltende Einfluss der COVID-19 Pandemie auf die psychische Gesundheit von Vorschulkindern [COVID Instead of Daycare. The Ongoing Impact of the COVID-19 Pandemic on Preschoolers' Mental Health]. *Zeitschrift für Klinische Psychologie und Psychotherapie, 52*(2), 77 – 86. https://doi.org/10.1026/1616-3443/a000692

Hu, L., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1 – 55.

IBM Corp. (2016). *IBM SPSS statistics for Windows*. Author.

Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, *73*(3), 539 – 548. https://doi.org/10.1037/0022-006X.73.3.539

Keyes, C. L. (2007). Promoting and protecting mental health as flourishing: A complementary strategy for improving national mental health. *American Psychologist, 62*(2), 95 – 108. https://doi.org/10.1037/0003-066X.62.2.95

Keyes, C. L. M., & Lopez, S. J. (2002). Toward a science of mental health: Positive directions in diagnosis and interventions. In C. R. Snyder, & S. J. Lopez (Eds.), *Handbook of positive psychology* (pp. 45 – 59). Oxford University Press.

Kraemer, H. C., Measelle, J. R., Ablow, J. C., Essex, M. J., Boyce, W. T., & Kupfer, D. J. (2003). A new approach to integrating data from multiple informants in psychiatric assessment and research: mixing and matching contexts and perspectives. *The American Journal of Psychiatry*, *160*(9), 1566 – 1577. https://doi.org/10.1176/APPI.AJP.160.9.1566

Lamers, S. M. A., Bolier, L., Westerhof, G. J., Smit, F., & Bohlmeijer, E. T. (2012). The impact of emotional well-being on long-term recovery and survival in physical illness: A meta-analysis. *Journal of Behavioral Medicine*, *35*(5), 538 – 547. https://doi.org/10.1007/S10865-011-9379-8

Lehnert, B. (2015). *BlandAltmanLeh* [R Package]. University Greifswald, Germany. Retrieved from https://cran.r-project.org/package=BlandAltmanLeh

Lohbeck, A., Schultheiß, J., Petermann, F., & Petermann, U. (2015). Die deutsche Selbstbeurteilungsversion des Strengths and Difficulties Questionnaire (SDQ-Deu-S) [The German Self-Report Version of the Strengths and Difficulties Questionnaire (SDQ-Deu-S): Psychometric Properties, Factor Structure, and Critical Values]. *Diagnostica, 61*(4), 222 – 235. https://doi.org/10.1026/0012-1924/a000153

Lukat, J., Margraf, J., Lutz, R., Der Veld, W. M., & Becker, E. S. (2016). Psychometric properties of the Positive Mental Health Scale (PMH Scale). *BMC Psychology*, *4*(1), 1 – 14. https://doi.org/10.1186/S40359-016-0111-X/TABLES/6

Luszczynska, A., Gutiérrez-Doña, B., & Schwarzer, R. (2009). General self-efficacy in various domains of human functioning: Evidence from five countries. *International Journal of Psychology, 40*(2), 80 – 89. https://doi.org/10.1080/00207590444000041

Lutz, R., Heyn, C., Schmid, S., Sick, U., & Steinl, B. (1992). *Questionnaire about mental health, scale of the Marburg (Germany) Health Study I.* Unpublished manuscript. University Marburg.

Marks, J., Schneider, S., & Voigt, B. (2023). Future-oriented cognition: Links to mental health problems and mental well-being in preschool-aged and primary-school-aged children. *Frontiers in Psychology*, *14*, 1211986. https://doi.org/10.3389/fpsyg.2023.1211986

Mattejat, F., & Remschmidt, H. (2006*). Inventar zur Erfassung der Lebensqualität bei Kindern und Jugendlichen: ILK. Ratingbogen für Kinder, Jugendliche und Eltern. Marburger System zur Qualitätssicherung und Therapieevaluation bei Kindern und Jugendlichen (MARSYS). Manual.* [Children's life satisfaction inventory]. Huber. Children's life satisfaction inventory

Messer, S. C., Angold, A., Costello, E. J., Loeber, R., Van Kammen, W., & Stouthamer-Loeber, M. (1995). Development of a short questionnaire for use in epidemiological studies of depression in children and adolescents: Factor composition and structure across development. *International Journal of Methods in Psychiatric Research*, *5*, 251 – 262.

Newlove-Delgado, T., McManus, S., Sadler, K., Thandi, S., Vizard, T., Cartwright, C., & Ford, T. (2021). Child mental health in England before and during the COVID-19 lockdown. *Lancet Psychiatry*, *8*(5), 353 – 354. https://doi.org/10.1016/S2215-0366(20)30570-8

O'Connor, M., Cloney, D., Kvalsvig, A., & Goldfeld, S. (2019). Positive mental health and academic achievement in elementary school: New evidence from a matching analysis. *Educational Researcher*, *48*(4), 205 – 216. https://doi.org/10.3102/0013189X19848724

O'Connor, M., Sanson, A. V., Toumbourou, J. W., Norrish, J., & Olsson, C. A. (2017). Does positive mental health in adolescence longitudinally predict healthy transitions in young adulthood? *Journal of Happiness Studies*, *18*(1), 177 – 198. https://doi.org/10.1007/S10902-016-9723-3

Panchal, U., Salazar de Pablo, G., Franco, M., Moreno, C., Parellada, M., Arango, C., & Fusar-Poli, P. (2023). The impact of COVID-19 lockdown on child and adolescent mental health: Systematic review. *European Child and Adolescent Psychiatry, 32*, 1151 – 1177. https://doi.org/10.1007/S00787-021-01856-W

Rajmil, L. & López, A. & López-Aguilà, S. & Alonso, J. (2013). Parent-child agreement on health-related quality of life (HRQOL): A longitudinal study. *Health and Quality of Life Outcomes, 11*, 101. https://doi.org/10.1186/1477-7525-11-101

Ravens-Sieberer, U., Kaman, A., Erhart, M., Devine, J., Schlack, R., & Otto, C. (2022). Impact of the COVID-19 pandemic on quality of life and mental health in children and adolescents in Germany. *European Child and Adolescent Psychiatry, 31*, 879–889. https://doi.org/10.1007/s00787-021-01726-5

Revelle, W. (2019). *psych: Procedures for Psychological, Psychometric and Personality Research.* Northwestern University, Evanston, Illinois. Retrieved from https://cran.r-project.org/package=psych

Rivera-Riquelme, M., Piqueras, J. A., & Cuijpers, P. (2019). The Revised Mental Health Inventory-5 (MHI-5) as an ultra-brief screening measure of bidimensional mental health in children and adolescents. *Psychiatry Research*, *274*, 247–253. https://doi.org/10.1016/J.PSYCHRES.2019.02.045

Rossel, 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

Rutter, M., Maughan, B., Mortimore, P., & Ouston, J. (1979). *Fifteen thousand hours: Secondary schools and their effects on children.* Open Books.

Schwarzer, R., & Jerusalem, M. (2003). SWE. Skala zur Allgemeinen Selbstwirksamkeitserwartung: Verfahrensdokumentation, Autorenbeschreibung und Fragebogen [General Self-Efficacy Scale]. In Leibniz-Institut für Psychologie (ZPID) (Ed.), *Open test archive.* ZPID.

Spence, S. H. (1998). A measure of anxiety symptoms among children. *Behaviour Research and Therapy*, *36*(5), 545–566. https://doi.org/10.1016/S0005-7967(98)00034-5

Suldo, S. M., & Shaffer, E. J. (2008). Looking beyond psychopathology: The dual-factor model of mental health in youth. *School Psychology Review*, *37*, 52–68. https://doi.org/10.1080/02796015.2008.12087908

Trumpf, J., Margraf, J., Vriends, N., Meyer, A. H., & Becker, E. S. (2010). Predictors of specific phobia in young women: A prospective community study. *Journal of Anxiety Disorders*, *24*(1), 87–93. https://doi.org/10.1016/J.JANXDIS.2009.09.002

Trumpf, J., Vriends, N., Meyer, A. H., Becker, E. S., Neumer, S.-P., & Margraf, J. (2010). The Dresden Predictor Study of anxiety and depression: Objectives, design, and methods. *Social Psychiatry and Psychiatric Epidemiology*, *45*(9), 853–864. https://doi.org/10.1007/s00127-009-0133-2

Velten, J., Brailovskaia, J., & Margraf, J. (2022). Positive Mental Health Scale: Validation and measurement invariance across eight countries, genders, and age groups. *Psychological Assessment*, *34*(4), 332–340. https://doi.org/10.1037/pas0001094

Vugteveen, J., de Bildt, A., & Timmerman, M.E. (2022). Normative data for the self-reported and parent-reported Strengths and Difficulties Questionnaire (SDQ) for ages 12–17. *Child and Adolescent Psychiatry and Mental Health, 16*(5). https://doi.org/10.1186/s13034-021-00437-8

Waterman, A. S. (2007). On the importance of distinguishing hedonia and eudaimonia when contemplating the hedonic treadmill. *American Psychologist, 62*(6), 612–613. https://doi.org/10.1037/0003-066X62.6.612

Published online March 21, 2024

Acknowledgments
We would like to thank all the children, parents, and teachers who supported this research.

Ethical Guidelines
The research project was reviewed ethically and legally by the responsible ethics committee. It has been determined to be harmless. A written declaration of consent was from all families (children and parents) involved in the survey.

Authorship
Michael W. Lippert, Johanna Schoppmann, and Anna-Luisa Kranhold adapted the questionnaire, conducted the validation study, and wrote the article. Lena Liedtke assisted with data collection and data analysis. Jessica Mark assisted with the manuscript design. Jürgen Margraf and Silvia Schneider supervised the entire project, from adapting the questionnaire to writing the manuscript.

Funding
Open access publication enabled by Ruhr University Bochum.

ORCID
Michael W. Lippert
https://orcid.org/0000-0002-5223-0137
Johanna Schoppmann
https://orcid.org/0000-0002-1786-7642
Anna-Luisa Kranhold
https://orcid.org/0000-0002-6151-8132
Jessica Marks
https://orcid.org/0000-0001-8862-0420
Lena Marie Liedtke
https://orcid.org/0009-0006-9219-6347
Jürgen Margraf
https://orcid.org/0000-0001-5207-7016
Silvia Schneider
https://orcid.org/0000-0003-0698-8411

Michael W. Lippert
Research and Treatment Center for Mental Health
Faculty of Psychology
Ruhr University Bochum
Massenbergstr. 9–13
44787 Bochum
Germany
michael.lippert@rub.de