

Initial Psychometric Properties of the Perceived Stress Scale for Kids (PeSSKi) in a Sample of Polish Children

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Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki, and was approved by the Ethics Review Board of the University of Maria Curie-Skłodowska in Lublin in March 2023 (ID: 04/2023).

Consent to Participate

Written informed consent was obtained from the parents and children who participated in this study.

Conflict of interests

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Consent for publication

Consent for publication is not applicable to this article as it does not contain any identifiable data.

Data availability statement

The dataset generated and analyzed during the current study is available from the corresponding author on reasonable request.

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Abstract

The aim of this study was to establish the psychometric properties of the Polish version of the Perceived Stress Scale for Kids (PeSSKi). The procedure included assessment of the PeSSKi's theoretical and discriminant validity. A total of 334 child-guardian dyads were recruited from public elementary schools. Children were in the age range 9-11 years (*Mean* = 10 years). Participants completed the following questionnaires: the self-report and parent-report version of the Strengths and Difficulties Questionnaire, parent-report version of the Profile of Emotional and Social Development and Student Integration Questionnaire. Analyses indicated that although specific valence facets were present, the Polish version of the PeSSKi was essentially unidimensional. Correlational analysis of the Polish PeSSKi with related constructs suggested satisfactory convergent and discriminant validity supporting its potential usefulness as a unidimensional measure of perceived stress in children aged 9-11 years.

Initial Psychometric Properties of the Perceived Stress Scale for Kids (PeSSKi) in a Sample of Polish Children

Reports from organisations such as the United Nations Children’s Fund (UNICEF) and the World Health Organization (WHO) (UNICEF, 2021; UNICEF & WHO, 2024) indicate a significant increase in stress and mental health challenges among children and adolescents in recent years. Several potential contributors to this trend have been identified, including an increase in environmental pressures (Núñez-Regueiro & Núñez-Regueiro, 2021), risks associated with the use of cyber technologies (Halliday et al., 2024), unforeseen global events such as the COVID-19 pandemic (Hossain et al., 2022), and exposure to stressful life circumstances such as poverty or war (UNICEF & WHO, 2024). Exposure to stress during childhood is associated with negative health outcomes both in childhood and across the lifespan (Andrei et al., 2025; Lucente & Guidi, 2023; Zisopoulou & Varvogli, 2023). Consequently, greater attention should be directed towards recognising and addressing the symptoms of emotional distress in children and adolescents (Abreu et al., 2018; Anniko et al., 2019; Halliday

et al., 2024). The WHO and UNICEF (2021; 2024) increasingly emphasise the importance of early identification of emotional problems in children and adolescents, highlighting this developmental period as critical from a public health perspective, particularly for the prevention of mental health problems (Abreu et al., 2018; Andrei et al., 2025; Burns & Rapee, 2022).

Puberty, typically commencing between 8–13 years of age in Caucasian girls and 9–14 years of age in boys (Abreu & Kaiser, 2006; Mancini et al., 2022), constitutes a period of heightened sensitivity for stress exposure due to a range of biological, psychological, and social changes. From a neurobiological perspective, the maturation of neuroendocrine systems during puberty, particularly the hypothalamic-pituitary-gonadal (HPG) and hypothalamic-pituitary-adrenal (HPA) axes (Romeo, 2017; Smith et al., 2023), plays a pivotal role in sculpting stress reactivity. Prolonged or chronic exposure to stress and stress-related hormones, particularly during critical periods of cortical development, can lead to allostatic overload, resulting in negative effects on neurobiological and emotional functioning (Lucente & Guidi, 2023; Romeo, 2017; Sinclair et al., 2014; Smith et al., 2023).

Alongside biological changes, early adolescence is characterised by a marked increase in social stressors arising from interactions within the family, peer relationships, and the school environment (Aanniko et al., 2019; Núñez-Regueiro & Núñez-Regueiro, 2021; Simpson et al., 2020). Children with persistent and undiagnosed emotional problems are at heightened risk of negative educational outcomes, including school drop-out and poorer employment prospects (Abreu et al., 2018; Burns & Rapee, 2022; Steinsbekk et al., 2022). Stress experienced during early adolescence may increase sensitivity to subsequent stressors, elevating the risk of developing stress-related psychopathology in adulthood (Sisk & Gee, 2022; Zisopoulou &

Varvogli, 2023). These developmental pathways underscore the broader implications for long-term well-being and mental health (Abreu et al., 2018; Bishop et al., 2022; Smith et al., 2023).

Assessing perceived stress is an important response to the urgent need to support children in developing effective coping strategies and resilience (Davis & Turner-Cobb, 2023; Simpson et al., 2020), enabling them to manage their stress more effectively (Davis & Soistmann, 2022) and ultimately protect their future health (Harwood & Finlayson, 2026). Furthermore, research indicates that adults often misjudge children's stress levels and adult reports frequently diverge from children's self-assessments (Lyneham et al., 2013), suggesting that adult-based evaluations may fail to capture the child's subjective experience (Allwood et al., 2017). Despite the clear need for action, tools available to specifically assess global perceived stress in middle childhood and early adolescence have until recently been limited. The few existing measures are limited, because of several reasons. Some of them include mostly items related to somatic symptoms (Osika et al., 2007), health problems (Osika et al., 2007; Sonoren & Hoefnagels, 2014), or school stressors and parental attachment. Moreover, they are typically designed for a broader and less specific age range, thereby lacking the cognitive specificity of measures designed for children aged 9-11 (Kornienko et al., 2024; White et al., 2014). Polish measures are primarily designed for adults, such as the *Skala Odczuwanego Stresu* (Cohen et al., 1983; Polish adaptation by Juczyński & Ogińska-Bulik, 2010) and the *Kwestionariusz Poczucia Stresu* for individuals aged over 16 years (Plopa & Makarowski, 2010). The only available tool specifically targeting children is *Jak sobie radzisz* (Juczyński & Ogińska-Bulik, 2010), but is designed for children aged 11-17 years and focuses on coping strategies rather than global perceived stress.

One recent scale developed and tested in a United Kingdom (UK) sample, the Perceived Stress Scale for Kids (PeSSKi) (Davis & Turner-Cobb, 2023), was the first scale to directly

assess global, domain-free, self-reported perceived stress in 7-11 year olds and has shown good reliability and validity in a UK sample (Davis & Turner-Cobb, 2023). The PeSSKi uniquely captures the generalised perception of stress which is typical for children, during which stress is often difficult to attribute to a specific source or evaluate in terms of its severity. Given their stage of cognitive development, children aged 9–11 may perceive and evaluate stressors differently, as they are still developing the knowledge and skills needed to assess complex situations. Consequently, their perception of stress is more emotional, as cognitive control, self-awareness, and self-regulation skills are still developing (Halse et al., 2024; Vink et al., 2020). Stress can often be experienced as an overwhelming feeling without the ability to identify or verbalise the stressor (Nook et al., 2020).

A comparable measure of global perceived stress for use with Polish children is currently unavailable. Adapting the PeSSKi and evaluating its psychometric properties in Polish children would address this gap. Preliminary screening using the Polish version of the PeSSKi could facilitate the differentiation of children with and without significant stress experiences, as well as identify those at risk of developing stress-related emotional difficulties. Such screening would enable the implementation of additional, in-depth diagnostic assessments where needed. Early prevention for emotional difficulties within the school setting can also reduce pressure on other public services, where timely and adequate support for children becomes more challenging and costly to provide (Burns & Rapee, 2022; Guo & Jhe, 2021).

Theoretical Background of the PeSSKi

The PeSSKi (Davis & Turner-Cobb, 2023) is grounded in the biopsychosocial model of stress and adapts adult perceived stress theory (Cohen et al., 1983) to the developmental context of middle childhood. The PeSSKi aims to reflect the subjective experience of stress,

shaped by cognitive appraisal and response. It draws on the Transactional Model (Lazarus & Folkman, 1984), where stress arises from an imbalance between the individuals' appraisal of environmental demands and their own perceived coping resources. As a result, perceived stress is fundamentally subjective and may not necessarily be linked with a clear identifiable origin. Perception is internal and not always observable, making it hard for others to reliably quantify for someone else. This is particularly true for children, who may not accurately verbalise their experiences of stress to adults (Nook et al., 2020). Thus, self-report methods may be beneficial in helping adults understand and interpret perceived stress in children (Gillespie, 2019). The PeSSKi is underpinned by developmental theories that acknowledge developmental capacities in appraisal and regulation (Rew et al., 2012; Halse et al., 2024; Vink et al., 2020), but also children's changing capabilities in understanding and responding to questionnaires (Bevans et al., 2010). Under this framework, child-perceived stress is seen as context-sensitive and relationally embedded and subtly distinct from adult perceived-stress constructs (Davis & Soistmann, 2022). The PeSSKi uses simple, concrete language that focuses on feelings of emotional regulation and self-efficacy in coping. Hence, child stress perception is not seen as a scaled-down version of adult stress, but a unique concept (Bevans et al., 2010) that captures developmental considerations in appraisal and coping, as well as potentially heightened sensitivities to social situations (Pequet et al., 2021).

Method

The aim of this study was to develop a Polish version of the PeSSKi (Davis & Turner-Cobb, 2023) and assess its psychometric properties, including internal structure, reliability, and initial data on validity. The study was approved by the Ethics Review Board of the University of Maria Curie-Skłodowska in Lublin (ID: 04/2023). The study involved three stages: (1) translating the original version of the PeSSKi into Polish; (2) conducting cognitive interviews

with eight children and three teachers to refine items wording; and (3) pilot-testing the final scale.

The PeSSKi was originally developed to measure perceived stress in British children aged 7-11 years. In this study we focused on Polish children aged 9-11 years (third– to fifth-graders). Grade 3 is typically the stage at which the technical aspects of reading (i.e., fluency, speed) among Polish children are largely mastered. To enable quick screening and minimise teacher assistance in reading the items, we therefore, focused on children with sufficient reading ability (Grades 3 to 5).

Translation Procedure

The Polish version of the PeSSKi was developed following guidelines for cultural test adaptation (Van Widenfeld et al., 2005). The process included theoretical analysis of the construct of the scale, followed by linguistic and psychometric adaptations. We prepared a Polish-language version of the PeSSKi in accordance with established guidelines (Van Widenfeld et al., 2005) and using a back-translation procedure. Despite its limitations, back-translation remains widely used and recommended in cross-cultural research (Brislin & Freimanis, 2001). Three independent translators with backgrounds in English Philology and at least an MA in Psychology, translated the items into Polish, ensuring conceptual and linguistic equivalence. After discussing and reconciling discrepancies, they provided a final forward translation. Then, a fourth translator, blind to the original scale, translated it back into English. The back translation was reviewed and approved by the authors of the original PeSSKi authors, and the final Polish version was established through a series of online sessions. However, two versions of item 1 were retained, with the final decision to be guided by empirical data. The final translation was then evaluated through cognitive interviews and a pilot study. Finally, in

the main study, we investigated the PeSSKi's psychometric properties, including reliability, internal structure, and convergent validity.

Participants and Recruitment

Cognitive Interviews and Pilot Study

The Polish PeSSKi scale underwent cognitive interviews and a pilot testing to ensure item clarity, assess instructions and determine the final format. Cognitive interviews were conducted with four primary school teachers (Grades 1–5, varied locations and school types) and eight children aged 9–10 (50% girls), from diverse socioeconomic backgrounds) to investigate the understandability of the items, instructions, and response scale. Teachers addressed the clarity of instructions, while children paraphrased each item to confirm comprehension. Interview details are provided in Table 1S and interview schedules for children and teachers are in the Supplementary Materials. The most problematic was translation of item nr 1: *"I can think clearly"*, as cognitive interviews did not provide an exact justification for item selection. Therefore, both translated versions were further tested in the pilot study.

Following the interviews, a pilot study was conducted with 82 children from Grades 3, 4, and 5 (33.3% each) at one school in Eastern Poland ($M_{age}=10.00$ years, $SD=10.7$ months; 51.39% girls; 48.61% boys). After obtaining written parental consent and child assent, students individually completed a printed version of the PeSSKi (see Supplementary Materials) during a single 45-minute school lesson (September–October 2023). Following completion of the questionnaires, focus groups were held to detect potential ambiguities, confusing instructions, translations or flaws in the response scale (e.g., omissions, skewed distributions). The pilot study also did not provide a clear answer about the two translations of item nr 1, leading to the decision to retain both versions for the main study. Both translations of the original item are similar, though differ in terms of abstract thinking demands. As children between 9-11 are

shifting from concrete to abstract reasoning (Zhang, 2022), we tested both versions: the one more abstract (*"Jestem w stanie zebrać myśli"*) and the second, which is more common and known from school experience (*"Jestem w stanie się skupić"*).

Main Study

The final analytical sample comprised 334 children and their guardian (N=346, excluding 3.47% for non-completion of the PeSSKi). The children ($M_{age}=10$ years, $SD=9.6$ months, range 9–11) were enrolled in Grades 3 (42.5%), 4 (31.1%), and 5 (25.4%), with the majority living in two-parent households (38.9%) and non-rural areas (68.6%). Girls constituted 48.5% of the sample. Guardians ($M_{age}=40$ years 4 months, $SD=4$ years 11 months, range 26–54) were predominantly mothers (82.3%) and highly educated (65.5% had a higher education diploma). According to official statistics, in 2024, 55.3% of children aged 6-11 in Poland had a parent with a higher education diploma (Eurostat, 2022) and 54.3% of Polish children aged 9-11 lived in non-rural areas (GUS, 2025). Although the sample did not entirely reflect these statistics, the study did not collect normative data. Therefore, we considered the sample's diversity sufficient.

Data collection took place in eight randomly selected public schools in Eastern Poland across two phases. The initial online phase (December 2023–February 2024) required online consent from both the parent and child. Questionnaires were distributed via the electronic school register to parents of children in Grades 3, 4, and 5. All responses were collected anonymously via the Websurvey platform (<https://www.webankieta.pl/>). Due to a low response rate (n=88 complete responses), a subsequent paper-and-pencil phase (March–May 2024) was conducted in three additional schools, with children completing questionnaires in school during one 45 minute session and parents completing them at home. Complete data was collected from 246 participants during this phase.

Measures

The Perceived Stress Scale for Kids (PeSSKi)

The PeSSKi is a 10-item self-report tool designed to assess global perceived stress in 7-11 year-old children. Developed in the UK, it consists of short statements pertaining to everyday activities of children (e.g. “*I worry when something unexpected happens*”). Participants are asked to reflect on their thoughts and feelings over the past two weeks and indicate how often they experienced each item using a 5-point Likert scale, using stars, where 1 star means “*never*” and 5 stars mean “*very often*”. The total score is calculated by adding up the item scores (including reverse scored items: 1, 3, 5, 7, 10), resulting a total score ranging from 10 to 50 points. Higher scores reflect higher perceived stress.

Correlates

To check the theoretical validity of the PeSSKI we administered several scales that measured constructs with which PeSSKI was expected to correlate. School enjoyment was assessed with a subscale from the Student Integration Questionnaire (Haeberlin et al., 1989, in Polish adaptation by Karwowski & Szumski, 2012). It consists of eight items e.g. “I like going to school”. The child responds to each statement using a four-point response scale: *yes, rather yes, rather no, no*. Cronbach’s α in the sample was .871. Emotional problems, hyperactivity, and prosocial behaviors were assessed using the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997; 2001; in Polish adaptation by Mazur et al., 2007). The SDQ comprises 25 items across five scales, with five items per scale, and can be administered in either self-report or parent-report formats. Responses are rated on a three-point Likert scale ranging from 1 (*not true*) to 3 (*certainly true*). An example item from emotional symptoms scale (a self-report form) is: “I have many fears”, whereas the corresponding parent-report item is: “is often unhappy, down-hearted or tearful”. In this sample, Cronbach’s α for a self-report was .771 and

for parents' form was .717. An example item from the hyperactivity scale for a self-report is: "I'm restless; I cannot stay still for long", with the corresponding parent-report item being: "is restless, overactive, cannot stay still for long". Cronbach's α for a self-report was .802, for parents' form was .852. An example item from the prosocial scale for a self-report is: "I am helpful if someone is hurt, upset or feeling ill", with the corresponding parent-report item being: "is kind to younger children". Cronbach's α for self-report was .794 and for parents' form was .782.

Coping strategies, antisocial behaviors, self-knowledge and self-concept were assessed with Profile of Emotional and Social Development (PREIS) (Knopik & Domagała-Zyśk, 2021). PREIS is used to assess different aspects of social and emotional functioning. A parent reads each statement and determines the extent to which the described behaviour matches - or does not match - the behaviour of the child. Responses are provided on a five-point scale: 1 - *does not match at all*, 2 - *matches to a small extent*, 3 - *matches moderately*, 4 - *matches to a large extent* and 5 - *matches completely*. Coping strategies (e.g. "in new situations gets nervous or cling to someone and easily loses his confidence"; Cronbach's α = .727), antisocial behaviors (e.g. "steals at school, at home or in other places"; Cronbach's α = .840), and self-knowledge and self-concept (e.g. "is happy with himself/herself"; Cronbach's α = .817) were used in further analysis.

In addition to these scales five other scales were used. These are not included in the present analyses due to their low reliability in the sample. Details of these scales are available in Table 2S in the Supplementary Materials).

Parents provided information on the family's socioeconomic status, including their level of education and occupation. They also supplied details about their child's school attainment

scores using their GPA from the most recent semester, the number of siblings, and the SES of the family.

Data Analysis

Cognitive interviews were analysed qualitatively. In the pilot study, we calculated descriptive statistics, inter-item correlations, item-rest correlations (as a measure of discriminatory power), and assessed the scale's internal consistency. In the main study, we also examined the scale's convergent validity by computing correlations with other measures, and evaluated its internal structure through confirmatory factor analysis (CFA). Based on the CFA results, we conducted exploratory factor analysis (EFA) and estimated bifactor models.

In all models, the scales of latent factors were fixed by setting their variances to unity. A robust maximum likelihood estimator was used. We adopted the following criteria to assess model fit: Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) values of at least .95, root-mean-square error of approximation (RMSEA) not exceeding .06, and standardized root-mean-square residual (SRMR) not exceeding .08 (Hu & Bentler, 1999). All analyses were conducted using Stata 18.0, except for the internal structure analyses, which were performed in MPlus 8.10.

Results

Cognitive Interviews

Teachers reported the instructions to be adequate for Grade 3 students and the star rating system to be child-friendly. They suggested that some items should more clearly indicate that the statements refer to how the child usually feels, rather than how they feel at the moment of responding. In addition, teachers indicated that the scale was appropriate for children in Grade 3 and above, noting that younger children might have difficulty reading the items

independently. They further advised replacing certain words with simpler or more commonly used synonyms. For instance, they recommended that the translation of Item 1 (*"I can think clearly"*) required further clarification.

Pilot Study

Generally, the pilot study did not reveal any issues with the administration procedure, response scale, or item wording. The items exhibited slight to moderate right-skewness, with a few variables being nearly symmetrical, as indicated by skewness values close to zero. Discriminatory power, assessed via item-rest correlations, ranged from .16 to .46, depending on which version of item 1 was included (.14 to .45). Reliability was borderline acceptable, with Cronbach's α ranging from .67 to .68. This was cause for concern because it could indicate that the scale's reliability might not be sufficient for use in individual diagnosis. However, the sample was small (82 students) and drawn from a single school, which may have limited variance in responses to PeSSKi items. Since α depends, among other factors, on sample variance (Nunnally & Bernstein, 1994), restricted variance could lead to a diminished α value. Therefore, we decided to proceed with the main study despite the borderline coefficient (Results detailed in Tables 3S and 4S of Supplementary Materials). The findings did not provide a clear basis for selecting one wording of item 1 over the other, therefore both versions were retained for the main study.

Main Study

Descriptive statistics for the scales used in the main study are presented in Table 6S in the Supplementary Materials. Since the analyses of internal structure turned out to be decisive for selecting which version of item 1 should be retained, we describe these results first.

Internal Structure

We estimated two unidimensional CFA models that differed in the version of item 1 they included. The unidimensional structure of the scale was based on theoretical assumptions. However, both models demonstrated poor fit to the data. Consequently, for both versions of the PeSSKi, we conducted exploratory factor analyses (EFA) with two to three oblique factors. Based on model fit indices, scree plots, the Kaiser criterion, and the interpretability of the results, we selected two-factor solutions. These solutions suggested the presence of one factor comprising positively-valenced items and another comprising negatively-valenced items.

To further examine this structure, we estimated two-factor CFA models with separate factors for positively- and negatively-valenced items. These models showed good fit to the data. However, such factors—although commonly observed in scales that include a mix of positively and negatively valenced or worded items—are often not substantive. Instead, they may reflect response styles or methodological artifacts (e.g., Horan et al., 2003). To investigate whether the two-dimensional structure was substantive, we estimated two bifactor models. In a bifactor model, each item loads on (a) a general factor that accounts for variance shared across all items, and (b) one of several specific factors that account for additional shared variance among subsets of items beyond the general factor. All factors are modeled as uncorrelated (e.g., Reise et al., 2010). In our analysis, the two specific factors corresponded to positively- and negatively-valenced items. These bifactor models also demonstrated good fit to the data (see Table 1).

Here: Table 1

To assess dimensionality, we calculated several indices that measure the strength of the general and specific factors in bifactor model, including explained common variance (ECV) and omega-type reliability coefficients (omega, omegaH, and omegaS). ECV indicates the proportion of total common variance explained by the general factor, with values above .60

suggesting unidimensionality—i.e., limited common variance beyond the general factor (Reise et al., 2010). Omega reflects the proportion of total score variance attributable to all common factors, while omegaH captures the proportion attributable specifically to the general factor. OmegaS measures the unique reliability of each subscale after controlling for the general factor (see Reise et al., 2013 for a detailed description).

ECV values equalled .67 and .72, depending on the version of item 1 included, exceeding the threshold for unidimensionality. The omega coefficients (for all items), approximately .84 in both versions, indicated that the general and specific factors reliably captured the blend of stress-related facets. The general factor also demonstrated strong reliability as a measure of a single latent construct, with omegaH values of .69 and .72, depending on the version. The omegaH-to-omega ratio showed that 83–85% of the reliable variance in the total score was attributable to the general factor.

OmegaS values for the positively- and negatively-valenced factors ranged from .13 to .16 and .24 to .30, respectively, indicating low subscale reliability after accounting for the general factor. Thus, subscale scores provided limited reliable information beyond what was captured by the general factor. Indeed, omegaS-to-omega ratios showed that 17–21% and 31–39% of the reliable variance in the positive and negative subscales, respectively, was attributable to specific factors. Detailed results, including factor loadings, ECV, and omega-type coefficients, are presented in the Supplementary Materials (Table 7S).

The results suggest that PeSSKi, although not strictly unidimensional as specific valence facets are observed, is *essentially unidimensional* (Reise et al., 2013). This means that “the dominant factor is so strong that trait level estimates are unaffected by (or are ‘robust to’) the presence of smaller specific factors and influences” (Embretson & Reise, 2013, p. 230). Moreover, we decided to retain version 2 of item one because in the bifactor solution, it had a

higher standardised factor loading, with the general factor accounting for a slightly higher share of total variance.

Reliability and Convergent Validity

Internal consistency of the selected version was good (.823). Item-rest correlations, available in Table 2 ranged between .343 and .638, which indicated that the items had adequate discriminatory power (Nunnally & Bernstein, 1994). Moreover, although the distribution of the raw score was slightly right skewed, the mean remained around the midpoint (see Table 2).

Here: Table 2

Table 3 presents correlations of the PeSSKi with other scales used to assess its convergent and discriminant validity.

Here: Table 3

A correlation analysis revealed, as expected, higher relationships for convergent validity than for divergent validity. The strongest relationships can be observed between perceived stress, emotional problems and hyperactivity symptoms reported by students themselves. and their parents. These were positive correlations, meaning that higher stress levels were associated with more symptoms of emotional difficulties and hyperactivity. Furthermore, higher perceived stress was negatively associated with students' lower enjoyment of school. Perceived stress was also linked to parents' reports of their children having lower coping strategies, self-concept, prosocial behaviours and more antisocial behaviour.

Discussion

The PeSSKi is the first instrument designed to provide an early and rapid screening of children experiencing stress (Davis & Turner-Cobb, 2023). Given the

usefulness of the tool for early and quick screening purposes, it was adapted for Polish children. The main aim of this study was to assess the psychometric properties of the Polish version of the PeSSKi. Although the analyses were conducted within a narrower age range than in the original version, namely in children aged 9 to 11 years, this range still falls within the intended application (7-11 years) of the original test version.

The analyses indicated that the Polish version of the PeSSKi, although not strictly unidimensional, was *essentially unidimensional* (Embretson & Reise, 2013). This was supported by high ECV values, demonstrating that 72% of the total common variance was attributable to the general stress factor, as well as by the omegaH-to-omega ratio, which showed that 83-85% of the reliable variance in the total score was attributable to the general factor. Although specific valence facets were present, the general factor was strong enough to be considered robust to the presence of smaller specific factors (Embretson & Reise, 2013). Despite some evidence of multidimensionality, the strength of the general factor suggests that the scale can be used as a measure of perceived stress, and that omitting additional dimensions when calculating the total score is unlikely to compromise measurement quality. Exploratory factor analysis of the original 10-item PeSSKi yielded support for both a one-factor and a two-factor solutions (negative, positive item wording); a single factor solution in addition to two subscales differentiated by negatively and positively valenced items. Since the negatively and positively worded items tended to cluster, this study tallies with past research that revealed similar effects. However, as often indicated (e.g. Horan et al., 2003), these factors in the present study were not substantive as they accounted for a small share of variance beyond the general stress factor and had low reliabilities. This yet again raises a question on the use of items differing in valence in a single scale. Some researchers have proposed that these items should not be used in younger children, as they are more difficult to understand due to

the negative wording of the items (Muris et al., 2001). Others have proposed removal of these items from the scales (Liu et al., 2022; Păsărelu et al., 2017), or argued that they can contribute to the instrument's validity (Pestle et al., 2008). Whilst this debate continues, the findings from the current analyses - which did not indicate incomprehensibility of negatively valenced items - suggest that use of them within the Polish version of the PeSSKi has some utility for children aged 9–11 years. However, the use of such items can result in statistical artifacts due to their tendency to cluster in factor analysis.

Convergent validity of the Polish version of the PeSSKi was confirmed through a satisfactory positive association between overall score in established measures of emotional and behavioural problems. Perceived stress correlated with emotional symptoms and hyperactivity as reported by students and student's parents. Furthermore, evidence for divergent validity was supported by a weak negative relationship between higher perceived stress and lower enjoyment of school. Perceived stress was also linked to parents' reports of lower coping strategies, self-knowledge and self-concept in their children, as well as higher levels of antisocial behaviour. These findings align with previous evidence suggesting that perceived stress is often a key factor in the development and exacerbation of emotional problems, and that children with emotional disorders tend to be more sensitive to stress (Davis & Soistmann, 2022). The relationship between stress and hyperactivity symptoms is also well-documented, with stress often intensifying ADHD-related behaviours (Robinson et al., 2024; Zisopoulou & Varvogli, 2023). The PeSSKi was negatively correlated with school enjoyment, consistent with evidence that poor academic achievement is a common source of stress among children aged 9–11 years (Davis & Soistmann, 2022; Davis & Turner-Cobb, 2023). In addition, the PeSSKi was negatively correlated with parent-reported coping strategies and self-

concept. This finding is consistent with evidence suggesting that perceived stress and negative emotional states may contribute to biased self-perceptions, including a heightened focus on negative feedback from adults and peers (Malamed et al., 2024), self-blame (Lucente & Guidi, 2023), overestimation of poor performance (Zhang et al., 2022), all of which may foster a more negative self-concept. In sum, correlations of the Polish version of the PeSSKi with similar constructs suggest its satisfactory validity and satisfactory reliability.

The Polish version of the PeSSKi, although it still needs further examination, is a response to an urgent need for early diagnosis of emotional difficulties resulting from perceived stress. Because chronic stress in childhood and adolescence has both short- and long-term consequences for physical and mental health (Abreu et al., 2018; Lucente & Guidi, 2023), the Polish version of the PeSSKi provides a quick, low cost way to assess perceived stress during the transition from the first stage (grades 1–3) to the second stage of education (grade 4 and above).

Limitations

We acknowledge several limitations of the study. The PeSSKi assesses overall perceived stress, without providing the capability to identify its specific sources. Therefore, its use may be more effective when combined with other diagnostic tools or structured interviews that enable clinicians to determine the origins of reported stress. Moreover, some measures intended to assess convergent and discriminant validity demonstrated low reliability and were therefore excluded from the analysis. Studies with larger samples would allow for re-evaluation of the translation of item nr 1 and a more robust examination of the scale's internal structure as well as tests of the scale's multigroup and longitudinal invariance. Furthermore, the generalizability of the current

findings is limited by the sampling procedure. The sample was restricted to a specific geographical region of Eastern Poland, and the distribution of socioeconomic status and place of residence did not entirely reflect national statistics for children of a similar age. Consequently, these findings may not fully represent children from other regions or diverse socio-economic backgrounds. Future research should implement a national, stratified sampling strategy to validate the PeSSKi, especially in respect to collecting normative data.

Conclusions and future directions

The preliminary findings for the Polish version of the PeSSKi are promising, demonstrating its potential as a reliable screening tool among Polish children aged 9-11. However, further validation in larger and more diverse samples from different parts of Poland is required to establish its psychometric robustness. It is particularly recommended for future studies to replicate this work with a more geographically and socioeconomically diverse sample, ensuring equal representations across e.g. urban vs. rural areas, as well as varying school types.

Longitudinal research is also necessary to determine the PeSSKi's test-retest reliability over longer periods and its effectiveness in the early identification of perceived stress. Assessing these trajectories will help to evaluate the PeSSKi's predictive validity regarding children's long-term mental and physical well-being.

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Table 1

Fit of the Tested Models

Model	N _p	χ^2	df	p	RMS	CFI	TLI	SRM	AIC	BIC	Abic
	ar				EA			R			
PeSSKi with version 1 of item 1											
Unidimens	30	128.	35	<	.091	.855	.814	.061	1046	1057	1047
ional CFA		93		.001					0.7	4.4	9.2
Two-factor	39	39.0	26	.048	.039	.980	.965	.030	1037	1051	1039
EFA		8							1.5	9.2	5.5
Two-factor	31	68.8	34	<	.056	.946	.929	.048	1039	1051	1041
CFA		7		.001					2.6	0.0	1.7
Bifactor	40	43.2	25	.013	.047	.972	.949	.032	1037	1052	1040
		9							7.0	8.5	1.6
PeSSKi with version 2 of item 1											
Unidimens	30	111.	35	<	.082	.883	.849	.057	1046	1058	1048
ional CFA		52		.001					7.3	0.9	5.8
Two-factor	39	40.6	26	.034	.042	.978	.961	.029	1039	1054	1042
EFA		5							8.6	6.3	2.6

Two-factor	31	67.1	34	<	.055	.949	.933	.045	1041	1053	1043
CFA		5		.001					6.9	4.3	6.0
Bifactor	40	38.3	25	.43	.040	.980	.963	.030	1039	1054	1042
		2							8.4	9.8	3.0

Note. $N = 326$. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; aBIC = Sample-size Adjusted BIC.

Table 2*Item-Test and Item-Rest Correlations, and Inter-Item Covariances in the Main Study*

PeSSKi Item	N	Item-Test Corr.	Item-Rest Corr.	Avg.Interitem Cov.
1 ver. 2	333	.72	.63	0.55
2	334	.65	.55	0.57
3	334	.65	.55	0.57
4	334	.65	.54	0.56
5	334	.49	.34	0.62
6	333	.52	.38	0.61
7	333	.58	.46	0.60
8	333	.66	.54	0.55
9	333	.71	.61	0.54
10	333	.59	.48	0.60
Test scale				0.58

1 ver. 2 - version 2 of item nr 1

Table 3*Correlations of the PeSSKi With Other Scales*

Scale	PeSSKi	Cronbach's α
Child KIU – School enjoyment	-.34**	.87
Child SDQ – Emotional symptoms	.73**	.77
Child SDQ – Hyperactivity	.64***	.81
Parent SDQ – Prosocial Behaviour	-.36**	.78
Parent SDQ – Emotional Symptoms	.60***	.72
Parent SDQ – Hyperactivity	.64***	.84
Parent PREIS – Coping strategies	-.44**	.73
Parent PREIS – Antisocial behaviour	.33*	.84
Parent PREIS – Self-knowledge and self-concept	-.44*	.82

*** $p < .001$; ** $p < 0.05$; * $p < .01$