

# Personality and temperament instruments in childhood and adolescence: a systematic review and text mining

Pedro Saulo Rocha Martins<sup>1</sup> e Marcela Mansur-Alves<sup>1</sup>

<sup>1</sup> Department of Psychology, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil

**Received:** March 18<sup>th</sup>, 2024.

**Accepted:** August 7<sup>th</sup>, 2024.

**Section editor:** Jessica Mayumi Maruyama.

## Author Note

Pedro S. R. Martins  <https://orcid.org/0000-0002-6555-7649>

Marcela Mansur-Alves  <https://orcid.org/0000-0002-3961-3475>

Financial support: The first author receives a scholarship from the Coordination for the Improvement of Higher Education Personnel (Capes). The last author holds a productivity research grant from CNPq (PQ2).

Correspondence concerning this article should be addressed Pedro Martins Universidade Federal de Minas Gerais, Department of Psychology, Faculty of Philosophy and Human Sciences. Avenida Antônio Carlos, 6627, Campus Pampulha, Belo Horizonte, MG, Brazil, CEP 31270901. Email: pedrosaulo95@gmail.com

**Conflict of Interest:** None declared.

### Abstract

The study of personality traits and temperament in children and adolescents has been a relevant topic in the last two decades. One of the main challenges is related to how to measure these traits. This study aimed to conduct a systematic literature review to understand how personality traits and temperament are assessed in childhood and adolescence. In addition, text mining techniques were employed to analyze the items of the questionnaires found. The search was conducted on the following electronic literature databases: APA, Scopus, Pubmed, Web of Science, and BVS. Studies with evidence of internal structure validity for personality and temperament questionnaires for individuals aged 6 to 17 were included. Only samples with typical development were considered. Historical trends suggesting the use of personality traits in more recent studies were observed. Overall, the most commonly used model for personality was the five-factor model, and for temperament, the three-dimensional model. The most common terms for personality traits and their patterns of co-occurrence were identified. The results obtained can assist in identifying the most common themes for assessing traits in children and adolescents. Consequently, instrument construction studies can attempt to maintain comparability with the literature or explore the evaluation of less explored characteristics.

**Keywords:** personality tests, temperament, child, adolescent, text mining

### INSTRUMENTOS DE PERSONALIDADE E TEMPERAMENTO NA INFÂNCIA E ADOLESCÊNCIA: UMA REVISÃO SISTEMÁTICA DA LITERATURA E MINERAÇÃO DE TEXTO

#### Resumo

O estudo dos traços de personalidade e temperamento de crianças e adolescentes tem sido tema relevante nas últimas duas décadas. Um dos principais desafios está relacionado a como medir os traços. O presente estudo teve como objetivo realizar uma revisão sistemática da literatura buscando compreender como traços de personalidade e temperamento são avaliados na infância e adolescência. Além disso, o foram utilizadas técnicas de mineração de texto para analisar os itens dos questionários encontrados. A busca foi realizada nos bancos de dados eletrônicos: APA, Scopus, Pubmed, Web of Science e BVS. Foram incluídos estudos com evidências de validade da estrutura interna para questionários de personalidade e temperamento para idades entre 6 e 17 anos. Foram consideradas apenas amostras com desenvolvimento típico. Foram observadas tendências históricas sugerindo que traços de personalidade são utilizados em estudos mais recentes. No geral, o modelo mais utilizado para personalidade foi o dos cinco grandes fatores e para temperamento o modelo com três dimensões. Foram identificados os termos mais comuns para os traços de personalidade e seu padrão de coocorrência. Os resultados encontrados podem auxiliar na identificação dos temas mais comuns para avaliação dos traços de crianças e adolescentes. Com isto, estudos de construção de instrumentos podem tentar manter comparabilidade com a literatura ou buscar a avaliação de características menos exploradas.

**Palavras-chave:** testes de personalidade, temperamento, criança, adolescente, mineração de texto

### INSTRUMENTOS DE PERSONALIDAD Y TEMPERAMENTO EN LA INFANCIA Y LA ADOLESCENCIA: REVISIÓN SISTEMÁTICA DE LA LITERATURA Y MINERÍA DE TEXTO

#### Resumen

El estudio de los rasgos de personalidad y el temperamento en niños y adolescentes ha sido un tema relevante en las últimas dos décadas. Uno de los principales desafíos está relacionado con cómo medir estos rasgos. Este estudio tuvo como objetivo llevar a cabo una revisión sistemática de la literatura para comprender cómo se evalúan los rasgos de personalidad y el temperamento en la infancia y la adolescencia. Además, se emplearon técnicas de minería de texto para analizar los elementos de los cuestionarios encontrados. La búsqueda se realizó en las siguientes bases de datos de literatura electrónica: APA, Scopus, Pubmed, Web of Science y BVS. Se incluyeron estudios con evidencia de validez de la estructura interna para cuestionarios de personalidad y temperamento en individuos de 6 a 17 años. Solo se consideraron muestras con desarrollo típico. Se observaron tendencias históricas que sugieren el uso de rasgos de

personalidad en estudios más recientes. En general, el modelo más utilizado para la personalidad fue el modelo de los cinco grandes factores, y para el temperamento, el modelo tridimensional. Se identificaron los términos más comunes para los rasgos de personalidad y sus patrones de coocurrencia. Los resultados obtenidos pueden ayudar a identificar los temas más comunes para evaluar los rasgos en niños y adolescentes. En consecuencia, los estudios de construcción de instrumentos pueden intentar mantener la comparabilidad con la literatura o explorar la evaluación de características menos exploradas.

*Palabras clave:* pruebas de personalidad, temperamento, niño, adolescente, minería de texto

The study of personality is a prominent and well-explored subject in psychology (Roberts & Yoon, 2022). Over the past two decades, research has consistently demonstrated that personality can be understood as a broad set of characteristics integral to an individual's overall functioning (Roberts & Yoon, 2022). Personality traits, which describe relatively stable patterns of behavior, emotions, and thoughts throughout life, have garnered significant interest (Shiner & DeYoung, 2013). However, despite the growing interest and increasing volume of studies, the quality and measurement of personality traits continue to be central concerns in current research (Möttus et al., 2020).

In the realm of childhood and adolescence, research into personality traits has similarly increased in popularity over the past two decades (Slobodskaya, 2021). Historically, studies of childhood traits have predominantly focused on temperament models (Shiner & DeYoung, 2013). Contemporary approaches, however, aim to integrate temperament traits with personality traits, acknowledging the substantial similarities between them (De Pauw, 2017; Shiner, 2015; Soto & John, 2014). Efforts to unify these perspectives have become increasingly evident (Shiner et al., 2021; Shiner & DeYoung, 2013). Accurate measurement of these characteristics is crucial, as personality and temperament traits in childhood and adolescence are linked to numerous significant life outcomes (Soto & Tackett, 2015). For example, the developmental trajectories of temperament traits during adolescence are associated with anxiety and depression symptoms in adulthood (Lawson et al., 2023). Additionally, personality traits influence academic performance through various mechanisms (Poropat, 2009; Tetzner et al., 2023).

The measurement of traits in childhood and adolescence remains a pertinent issue (Shiner et al., 2021). In childhood, there is considerable variability in the methodology employed (Peralta et al., 2021). However, a key question concerns the conceptual meaning of these traits. Typically, strategies involve either simplifications of behaviors observed in adults or simply modifications of items to facilitate response processes in younger populations (Maćkiewicz et al., 2016; Peralta et al., 2021). In adolescence, methodologies generally mirror those used with adults, relying heavily on self-report measures, often with only minor language adaptations (e.g., simplifications and removal of irrelevant content like work-related content, McCrae et al., 2005; Soto et al., 2011). Despite these efforts, no systematic attempts have been made to understand the content used to assess traits in childhood and adolescence.

Language accessibility concerns permeate all survey methods (Bradburn et al., 2004). In personality assessments, language modifications are often made to address readability in individuals with varying socioeconomic or educational backgrounds (Rammstedt et al., 2022). For childhood and adolescence, items are expected to represent simpler behaviors (Shiner & DeYoung, 2013). However, simplifying items can impact the measurement of traits by potentially reducing the breadth of assessed characteristics. The actual impact of such modifications remains underexplored. While more complex items may increase nonresponse rates (Lenzner, 2012), recent evidence suggests that simplified questionnaires may suffer from poorer psychometric properties (Rammstedt et al., 2022). Therefore, there is a need to deepen our understanding of

both the conceptual definitions of traits and their operationalization in questionnaire items. Rammstedt et al. (2022) suggested that using double-barreled items with synonyms (e.g., “is outgoing, sociable”) could enhance comprehension. This warrants further exploration of how personality items for children and adolescents are constructed and how language is employed within these items.

The use of language to understand personality is deeply rooted in trait studies and the lexical hypothesis, which posits that language encodes essential information about individuals (John, 2021). Traditionally, natural language and dictionaries have been crucial in personality studies. More recently, text mining has emerged as a novel approach for investigating the structure and frequency of words in texts (Peres, 2021). Text mining encompasses a range of techniques for collecting and analyzing large volumes of textual data from sources such as newspapers, magazines, books, social media comments, or essentially any other large textual data sources (Kao & Poteet, 2007). Its application in personality research is based on the premise that language can reveal significant aspects of personality. A common example is an analysis of social media usage patterns to infer personality traits (Tay et al., 2020). These studies employ various techniques to objectively uncover patterns in data.

Given the importance of questionnaire characteristics in personality research, a promising approach is to use text mining models to analyze personality research in childhood and adolescence. A common technique involves descriptively analyzing the most frequent terms through word counting (Silge & Robinson, 2017). Understanding these terms, combined with qualitative analysis, can help identify common themes in trait measurement. This can be achieved through a literature review (Suh et al., 2021).

In addition to analyzing individual terms, there are opportunities to examine word pair behavior through co-word analysis. The proposed method can be applied in various ways, often using large databases (see Peres, 2021 for a review). Two straightforward approaches to analyze word pairs are through frequency of co-occurrence and the correlation between terms. These complementary measures can help identify meaningful relationships and frequent themes. Co-occurrence is a numerical measure of how often two terms appear next to each other, while terms correlation assesses the likelihood of two terms appearing together compared to other terms (Silge & Robinson, 2017). Network plots are commonly used to visualize these results, with words that co-occur more frequently or have stronger correlations represented by thicker nodes (Peres, 2021; Suh et al., 2021). Combining insights from text mining can offer valuable perspectives on prevalent themes when assessing personality in childhood and adolescence.

This study provides a comprehensive overview of personality and temperament assessment in children and adolescents by reviewing the most targeted age groups, commonly used questionnaires, and prevalent models. Given the limited availability of assessment instruments in this field (De Pauw, 2017; Shiner et al., 2021), a literature review could contribute to the development or adaptation of instruments for different contexts. To the best of our knowledge, only three studies have examined personality instruments for childhood and

adolescence (De Pauw, 2017; Shiner et al., 2021; Martins et al., 2024). The reviews by De Pauw (2017) and Shiner et al. (2021) offer a narrative overview of instruments with general considerations about their uses, while Martins et al. (2024) focused exclusively on instruments measuring the Big-Five in children, excluding other models and age groups. Therefore, this study sought to advance the literature by providing a more systematic review of personality and temperament assessment in childhood and adolescence. Based on previous findings, we expect that older studies will assess temperament traits more frequently, whereas newer studies are likely to rely on self-reported measures of personality. Additionally, the study will apply text mining analyses to the available questionnaire items, specifically, considering that the generated text database may be smaller compared to other studies, utilizing these techniques, focusing on analyzing the most frequent terms, their co-occurrence frequencies, and correlation indices. These findings can help identify strengths and weaknesses in themes commonly used in studies involving children and adolescents, such as characteristics not frequently assessed or themes that may not be conceptually appropriate for these age groups.

### Method

To identify relevant literature, we conducted a comprehensive search across five databases: APA, Scopus, PubMed, Web of Science, and BVS. A tailored search syntax was developed for each database, targeting studies on questionnaires and their psychometric properties, as well as the relevant sample population and traits of interest. The search terms included “questionnaire,” “scale,” “inventory,” or “measure” for identifying studies on psychometric properties; “adolescent,” “child,” “children,” or “adolescents” for the target sample; and “five-factor model,” “personality trait,” “Big Five,” “Little Six,” “temperament traits,” or “activity level” for the traits under investigation. To refine our search, we excluded terms such as “disorders,” “abuse,” “callous,” “sexual,” or “disabilities,” based on prior research. Detailed search syntax and the number of studies retrieved from each database are presented in Table S1 in Supplemental Material. The search was conducted on January 9, 2024, and the protocol was not preregistered.

The inclusion analysis was conducted exclusively by the first author. The main inclusion criterion was the investigation of the structural validity of personality or temperament questionnaires, such as studies using factor analysis or item response theory. Additional criteria included studies focusing on the typical development of children or adolescents. Studies were excluded if they did not focus on psychometric properties, involved data from different age groups (e.g., adults or elderly individuals), were book chapters that had not undergone peer review, or focused solely on physical activity measures unrelated to temperament traits like activity level. The duplicate screening was performed using Rayyan, and potential duplicates were manually verified and removed. Data extracted from the primary studies included the instrument used, main rater, country where the study was conducted, and dimensions assessed.

To ensure a rigorous and consistent analysis of the personality assessment scales, we established specific criteria for text processing. Out of the 62 scales initially identified, only 34

met the inclusion criteria. We included scales available in English or with an English version and those that provided items either within the articles or in supplementary materials. This decision was made to enhance the representativeness of the included scales and facilitate item analysis, especially given the limited availability of scales in other languages.

For text mining analyses, we implemented standard text processing procedures (Peres, 2021). These procedures included the removal of accents and diacritical marks, retention of alphanumeric elements, elimination of extra spaces, and exclusion of English stop words using the stop words data frame from the tidytext package (Silge & Robinson, 2016). Additionally, stop words identified during this study such as “lot,” “likes,” “easily,” “ve,” and “don,” were also excluded. The analyses proceeded in three stages. The first stage involved determining the most frequently occurring terms (Silge & Robinson, 2017). The second stage focused on analyzing term co-occurrence, which aimed to identify terms that commonly appear together (Silge & Robinson, 2017). Finally, we examined the correlation patterns between terms in the questionnaires, generating a phi coefficient, a standardized measure of the co-occurrence of two terms relative to their independent occurrence. These analyses were conducted using R programming language with the tidytext (Silge & Robinson, 2016) and widyr (Robinson & Silge, 2022) packages.

### **Bias Risk Assessment**

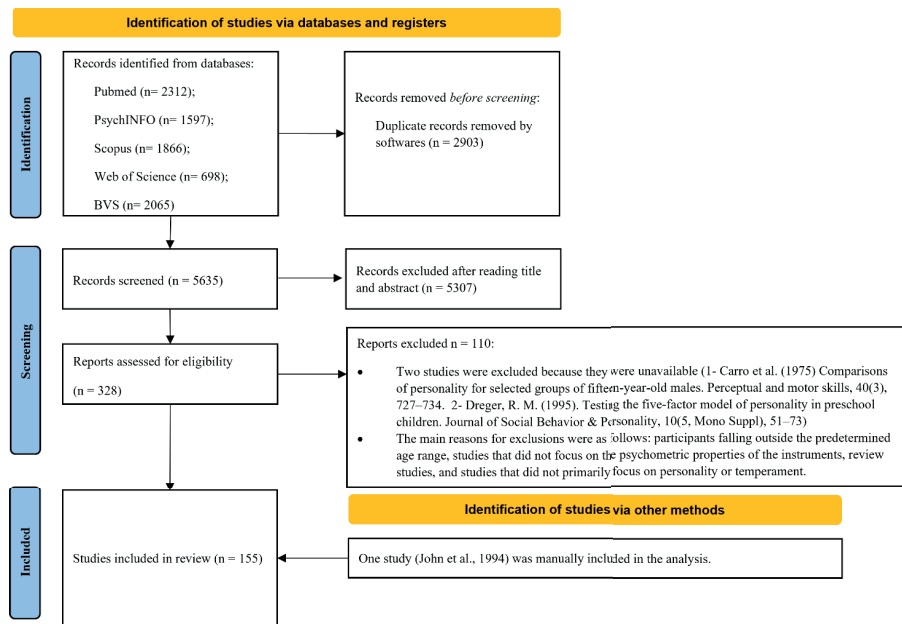
To assess potential bias in the studies included in this review, we evaluated each study using a questionnaire developed by Downs and Black (1998). We selected a sample of 10 items from their original pool, focusing only on questions relevant to observational and cross-sectional studies. These items were chosen based on previous literature reviews that used the same questionnaire (Duch et al., 2013, Zeferino et al., 2024). The scoring procedure, conducted solely by the first author, resulted in a maximum score of 10 points, with higher scores indicating less bias.

## **Results**

The process of article inclusion and evaluation, following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines, is outlined in Figure 1. A total of 8,538 studies were initially identified. After removing duplicates, 5,635 papers were remaining for title and abstract screening. Subsequently, 328 studies were selected for full-text review after further exclusion. Ultimately, 155 studies were included in the final analysis. A complete list of these studies is presented in Supplemental Material 1, which also includes the risk of bias analyses. Overall, the studies received acceptable scores ( $M = 6.98$ ,  $SD = 1.12$ ). However, the main shortcomings were related to items 6, 7, and 8 of the questionnaire, which assess reporting of actual  $p$ -values (e.g., reporting  $p = .048$  rather than  $p < .05$ ), random sampling, and proportional random sampling, respectively. The main limitation of the selected studies was the lack of sample representativeness, as indicated by the low mean scores for items 7 and 8 (0.19 and 0.08, respectively).

**Figure 1**

Flowchart of the article inclusion and evaluation process



Among the 155 studies included in the final analysis, most (78.1%) employed instruments focused on assessing personality traits. Only a small percentage (3.9%) used measures that encompassed both temperament and personality traits. An examination of historical trends in instrument usage revealed a significant shift: earlier studies predominantly emphasized temperament traits, whereas, from the mid-1990s onward, there was an increasing focus on the prevalence of personality traits (see Figure S1 in Supplemental Material 2). To better understand the target populations of these studies, we analyzed the participants' ages. Studies focusing on temperament primarily involved younger children (Mean lower age = 4.42, Mean upper age = 8.72), while those focusing on personality covered a broader age range (Mean lower age = 10.41, Mean upper age = 23.76). Notably, the age ranges suggest that personality studies frequently included more heterogeneous samples, with an average age range of 13.09, compared to 4.08 for personality studies.

Among the 34 studies that assessed temperament, 30 (88.2%) relied exclusively on ratings provided by others, such as parents and/or teachers. Twelve instruments were identified for assessing temperament using the three-factor model (encompassing positive emotions, negative emotions, and effortful control) used in nine studies. The instruments included the Infant Behavior Questionnaire, the Child Behavior Questionnaire, and the Early Adolescent Temperament Questionnaire, both in their full and shortened versions. Additionally, a wide range



of other temperament dimensions was investigated across the remaining studies, including traits such as energy, flexibility–rigidity, and dimensions aligned with the Cloninger model (namely harm avoidance, novelty seeking, reward dependence, persistence, self-directedness, cooperativeness, and self-transcendence).

Among the 127 studies that assessed personality, the majority of 83 (65.4%) utilized self-ratings, while 35 (27.6%) relied on ratings provided by others, such as parents and/or teachers. In a smaller subset of nine studies (7.1%), both self-ratings and ratings from others were utilized. Sixty-four instruments were identified for personality assessment, with most focusing on the Big-Five traits (neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness), used in 101 studies. Additionally, 10 studies focused on the measurement of at least one of these factors. Fewer studies examined traits aligned with other personality models, such as the HEXACO model (honesty–humility, emotionality, extraversion, agreeableness, conscientiousness, and openness to experience), the Little Six model (neuroticism, extraversion, openness to experience, agreeableness, conscientiousness, and activity level), and the Eysenck PEN model (psychoticism, extraversion, and neuroticism).

From the total instruments identified, 34 scales were selected for text mining analysis. These scales were chosen based on their availability in English or having an English version, as well as the inclusion of items provided in the articles or supplementary materials. A complete list of the analyzed scales is presented in Table S2 in Supplemental Material 2. The item pool consisted of 1,557 items. For a more robust analysis, we specifically focused on the Big-Five traits. These traits were well represented, with openness having the fewest items (248) and conscientiousness the most (331). Other dimensions had fewer items, limiting our ability to analyze them comprehensively. For instance, the psychoticism dimension, despite having the highest number of items outside the Big-Five traits, was still limited to only 25 items.

Figure 2 shows the most frequently occurring terms within each dimension, with a minimum frequency of three occurrences. The top five terms for each dimension are as follows: for agreeableness, “people,” “helpful,” “warm,” “rude,” and “feel”; for extraversion, “people,” “friends,” “talk,” “shy,” and “person”; for conscientiousness, “time,” “people,” “tasks,” “rules,” and “lazy”; for neuroticism, “feel,” “nervous,” “upset,” “afraid,” and “worry”; and for openness, “ideas,” “imagination,” “art,” “learn,” and “creative.” Figure 3 illustrates the co-occurrence of terms that occurred at least twice among the traits. The connections between the nodes representing each trait indicate the terms that cooccurred between traits. For example, the term “people” was significant for agreeableness, extraversion, and conscientiousness. Figure 4 depicts the correlation network of terms categorized by each trait. Each panel in Figure 4 represents a specific trait and displays the most correlated terms, which are indicated by darker shades of gray. This visual representation suggests that certain terms are more likely to co-occur. For instance, in the extraversion panel, there is a moderate correlation ( $- .4$ ) between the terms “shy” and “reserved.”

**Figure 2**

Most frequent terms (at least three occurrences) for each dimension

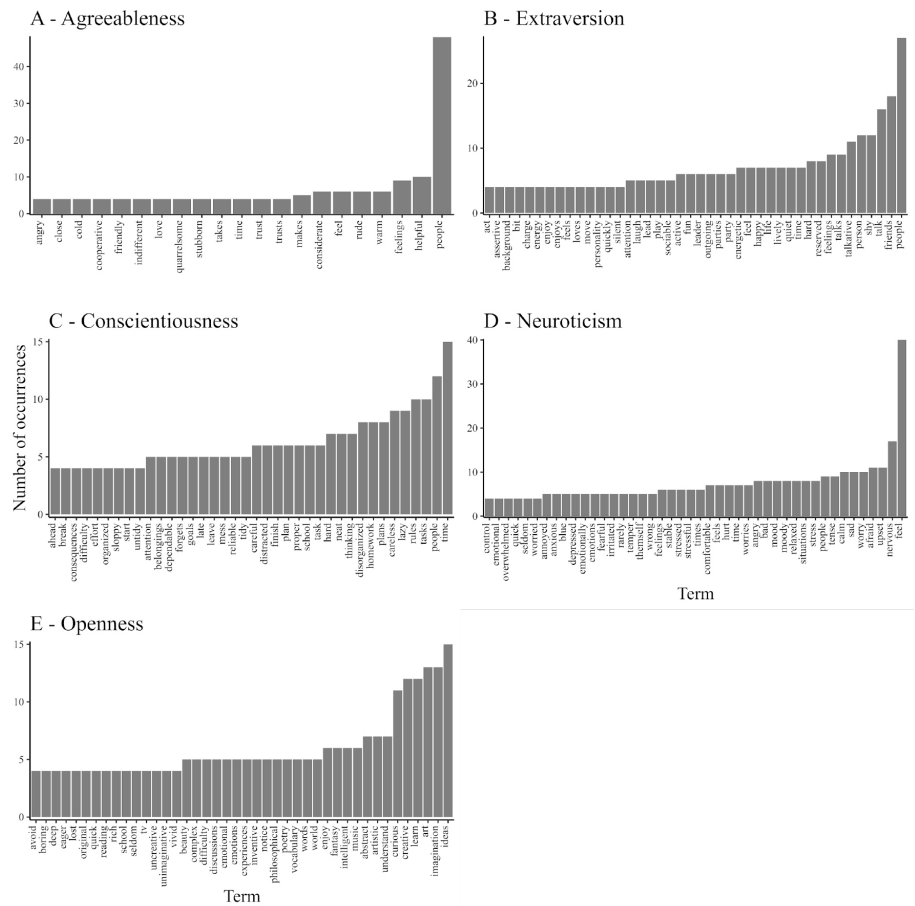


Figure 3

Co-occurrence (at least two co-occurrences) of terms among the traits.

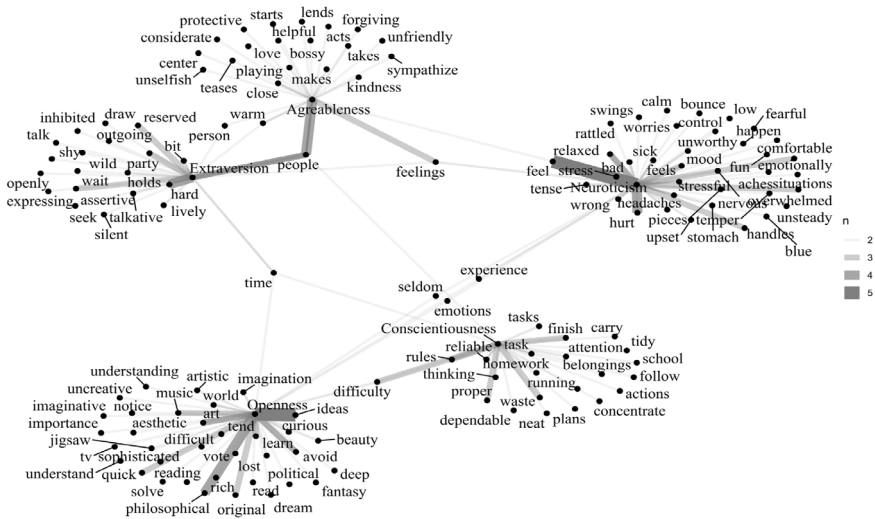
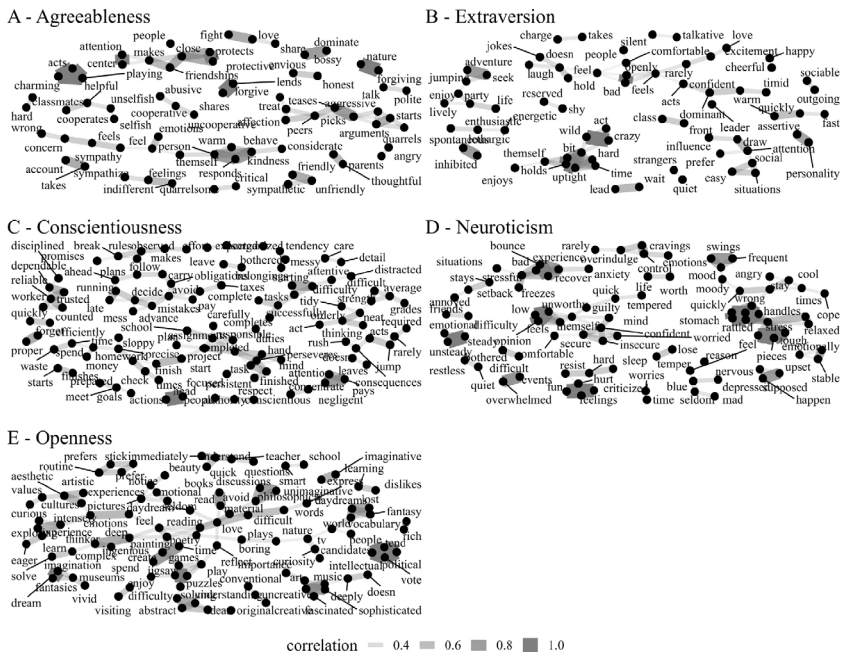


Figure 4

Term correlation network by trait (correlation cutoff = 0.4)



## Discussion

This study provides a comprehensive literature review of personality and temperament assessments in childhood and adolescence. It was found that the Big-Five is the most prevalent for assessing personality traits, while the three-dimensional is most commonly used for temperament. Additionally, text mining analyses were conducted on personality item questionnaires, which represent a significant milestone in the study of human personality by analyzing language and its impact on personality assessment (John, 2021). Text mining offers a systematic approach to analyzing language in personality questionnaires, particularly for children and adolescents. The findings illuminate prevalent themes within the Big-Five framework, facilitating the development of new assessment methods and shedding light on historical differences in how temperament and personality traits have been studied in childhood and adolescence.

The psycholexical approach, which initiates the study of personality, has traditionally focused on investigating natural language and conducting dictionary analyses (De Raad & Mlačić, 2017). Initially, the main focus of these studies was on identifying relevant traits and characteristics of adult personality (John, 2021). However, systematic investigation into relevant language and guidelines for researching childhood and adolescence remains limited (De Pauw, 2017). Consequently, personality assessment in these age groups often relies on three main strategies: theory-driven (applying theories from other age groups), bottom-up (creating taxonomies from free descriptions), and top-down (adapting adult instruments for children) approaches (De Pauw, 2017). At least one of these strategies was present in the reviewed studies. The language analysis conducted here aligns with the theory-driven approach because it remains confined to previously established trait taxonomies. However, exploring the language used revisits the origins of personality research and provides opportunities to address weaknesses and innovate measurement formats.

The information presented can inform the development of new questionnaires for assessing the personality of childhood and adolescence. Familiarizing oneself with the existing literature is a crucial step in this endeavor (Clark & Watson, 2019). Given space constraints, it is impractical to analyze all themes presented in the results comprehensively. Nonetheless, various approaches can be utilized based on the information presented in this study. For instance, when constructing a measure for a non-English-speaking country, terms can be translated, and equivalent words are sought to maintain comparability with international research. Additionally, highly correlated terms can be identified to create double-barreled items with synonyms (Rammstedt et al., 2022). Moreover, breadth in assessment can be achieved by using less commonly used terms, addressing the apparent lack of representation of negative or opposite poles in all traits. Finally, it is essential to consider the target audience for the assessment (Clark & Watson, 2019) and to critically evaluate which words are appropriate in each situation. The relevant characteristics for each trait are individually analyzed below.

Agreeableness is commonly defined by two opposing poles, especially in childhood and adolescence (Tackett et al., 2012), and encompasses compassion, empathy, aggressiveness, callousness, and hostility (Tackett et al., 2019). The findings of this study support these themes, as “rude” emerges as one of the most frequent terms. Additionally, the frequent occurrence of the word “people” suggests that most items involve some aspect of interpersonal relationships. The co-occurrence and correlation graphs further indicate this relationship. Previous proposals suggest that agreeableness is closely related to conscientiousness and neuroticism (Slobodskaya, 2021), with similar developmental trends (Tackett et al., 2019). Interestingly, the co-occurrence of terms indicates a similarity in the operationalization of questionnaires for these traits, with some proximity to terms related to extraversion. Empirical studies have revealed that the correlation between these traits is higher in childhood (Peralta et al., 2021) than in adolescence (Ortet et al., 2022; Tetzner et al., 2022).

Extraversion is commonly defined as the tendency to be sociable, outgoing, and to experience enthusiasm and positive emotions (Shiner et al., 2021). Similar to other traits, the presence of the opposite pole (shyness) is found in frequent definitions and terms. The pattern of term co-occurrence reflects these themes, with the mention of positive emotions and expressions. However, terms like “reserved” may be more applicable to adolescents or older children, reflecting the development of this trait (De Fruyt & Karevold, 2021). In hierarchical models, openness and extraversion are considered closer (Slobodskaya, 2021), although co-occurrence analysis revealed a small number of shared terms between these traits.

Openness is one of the most challenging traits to measure reliably in childhood (Slobodskaya, 2021). It typically involves aspects of creativity and intellect (Shiner et al., 2021), which are supported by the most frequent terms. However, when the correlations between terms are examined, it becomes clear that this trait is operationalized with themes that may not be suitable for childhood and early adolescence, such as politics, culture, and poetry. Future studies should establish a robust measure of openness that considers themes more appropriate for the age group under assessment.

Conscientiousness is well represented in this study, having the most significant number of items. In childhood and adolescence, this trait is marked by self-control, rule-following, and planning ability (Shiner et al., 2021). These definitions are reflected in the terms characterizing the operationalization of the trait, both individually and in their pairwise occurrence. Frequent themes include concentration, attention, and task completion, which are also indicators of the temperament trait “effortful control” (Shiner & DeYoung, 2013), reinforcing their conceptual similarity. However, similar to openness, some themes may not apply to childhood and adolescence, such as work and taxes (McCrae et al., 2005).

Neuroticism is primarily defined in childhood and adolescence by the tendency to experience negative emotions and emotional instability (Shiner et al., 2021). While specific characteristics of the trait may differ across developmental stages (Tackett et al., 2012), the conceptual definition remains similar to that of adults (John, 2021). Therefore, frequent terms

and their pairwise relationships appear suitable for childhood and adolescence. Notably, “feelings” co-occur between neuroticism, extraversion, and agreeableness, indicating shared emotional themes across these traits, with extraversion being related to positive emotionality and agreeableness primarily linked to others’ feelings (Shiner et al., 2021).

Regarding temperament traits, the integration of trait types (Shiner et al., 2021) is evident in more recent research, which uses the label “temperament” less frequently in questionnaires. However, the differences between the areas have been supported (Shiner et al., 2021). For instance, temperament trait studies often focus on younger children within a narrower age range. This focus can be explained by historical trends in which temperament studies relied on measures independent of language, such as behavioral observation and tasks (Shiner, 2015). These methodologies, together with parent reports, facilitated the assessment of younger children. Conversely, personality trait studies were initially proposed for adults and the elderly, relying on self-reported data and verbal questionnaires (Martins et al., 2024; Roberts & Yoon, 2022). Additionally, temperament traits were historically narrower in scope and were restricted to developmental psychologists (DePauw, 2017). However, in the last 20 years there was a growing interest in the personality literature in integrating trait types (Shiner et al., 2021). These historical reasons may explain the general trend of earlier studies exploring temperament traits with a focus on younger age ranges (Shiner & DeYoung, 2013).

Other models besides the Big-Five were found to assess personality in childhood and adolescence through fewer studies. This finding aligns with the notion that the five-factor model is most commonly used in this age group, as it is in adults (Roberts & Yoon, 2022; Slobodskaya, 2021). However, this does not imply that other models should not be investigated. Further research using alternative models is necessary to understand their performance in different contexts and methodologies.

This study has several limitations and methodological constraints that should be addressed. Employing stronger methodological approaches would enhance the inferences drawn from this study. For instance, future studies could be conducted as preregistered reports, thus improving transparency. Incorporating time constraints into the analysis could also reduce the bias in individual studies. Although the bias assessment indicated relatively low levels of bias, likely due to inclusion criteria related to the studies’ methodological aspects, more recent studies may provide stronger methodological foundations and more up-to-date insights into how traits are currently being measured. Moreover, the risk bias assessment was a short version of an instrument designed for intervention research, which may necessitate a cautious interpretation of the low bias. The text mining analysis was limited to items that were independent of their psychometric qualities. Frequent terms in many questionnaires may be present in poorly performing items (e.g., low factor loading, low discrimination, or theta coverage). Future studies employing similar strategies could address this issue by restricting the analysis to high-quality items that more accurately represent traits and their associated content.

This approach will enable a better understanding of the items that more accurately represent traits and the content associated with them. However, the analysis did not differentiate between more commonly used questionnaires and those less frequently utilized. As a result, even less popular instruments were analyzed with the same weight as more widely used ones. This is significant because some instruments are more popular for personality assessment in this age group, and different trait conceptualizations can lead to different operationalization. Additionally, traits such as neuroticism and extraversion are consistently represented across multiple models, including the Big-Five, PEN, and HEXACO. Restricting the analysis to questionnaires designed for different models may reveal distinct aspects of traits in childhood and adolescence, although this limitation might also impede the effectiveness of text mining, necessitating a more qualitative review of the content covered.

Building on these methodological considerations, future studies could further refine the research through additional analyses. For instance, categorizing the identified instruments according to their use in different age groups could help determine whether there is a differential usage of terms according to developmental stages. Moreover, this study was limited to questionnaires with freely accessible items, whereas some of the most popular personality questionnaires are available only behind paywalls. Including these instruments could improve the comprehensiveness of the results.

Alternative strategies can also be employed when conducting literature reviews on personality themes in childhood and adolescence. One such approach, as suggested by Suh et al. (2021), involves inspecting article content. This strategy allows for a larger corpus, enabling more robust text mining analyses that go beyond test content to explore how traits are associated with external variables in the literature. This approach can provide deeper insights into the nuances of personality trait measurement across different contexts.

Overall, this study contributes to the field of personality research in childhood and adolescence by introducing the potential of utilizing text mining techniques to enhance questionnaire analysis. To the best of our knowledge, this study is the first to apply such techniques across a wide range of personality items. Given that language analysis is currently a trending topic (Suh et al., 2021), innovations in the available models and their combination could offer a new perspective on how personality is measured in childhood and adolescence. Additionally, as mentioned earlier, this study can serve as a foundation for developing new instruments. The findings have the potential to assist researchers focused on assessing this age group and can also be applied to other constructs.

## References

- Bradburn, N. M., Sudman, S., & Wansink, B. (2004). *Asking questions: the definitive guide to questionnaire design—for market research, political polls, and social and health questionnaires*. John Wiley & Sons.
- Clark, L. A., & Watson, D. (2019). Constructing validity: New developments in creating objective measuring instruments. *Psychological Assessment, 31*(12), 1412–1427. <https://doi.org/10.1037/PAS0000626>
- De Fruyt, F., & Karevold, E. B. (2021). Personality in adolescence. In *Handbook of personality: Theory and research, 4th ed.* (pp. 303–321). The Guilford Press.
- De Pauw, S. S. W. (2017). Childhood Personality and Temperament. In T. A. Widiger (Ed.), *The Oxford Handbook of the Five Factor Model* (Vol. 1). Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199352487.013.21>
- De Raad, B., & Mlačić, B. (2017). The Lexical Foundation of the Big Five Factor Model. In *The Oxford Handbook of the Five Factor Model* (Vol. 1, Issue January, pp. 191–216). <https://psycnet.apa.org/record/2017-30849-010>
- Downs, S. H., & Black, N. (1998). The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology and Community Health, 52*(6), 377–384. <https://doi.org/10.1136/jech.52.6.377>
- Duch, H., Fisher, E. M., Ensari, I., & Harrington, A. (2013). Screen time use in children under 3 years old: A systematic review of correlates. *International Journal of Behavioral Nutrition and Physical Activity, 10*(1), 1–10. <https://doi.org/10.1186/1479-5868-10-102>
- John, O. P. (2021). History, Measurement, and Conceptual Elaboration of the Big-Five Trait Taxonomy. In O. P. John & R. W. Robins (Eds.), *Handbook of personality: Theory and Research* (4th ed.). Guilford Press.
- Kao, A., & Poteet, S. R. (2007). Natural language processing and text mining. *Natural Language Processing and Text Mining, 1*–265. <https://doi.org/10.1007/978-1-84628-754-1/COVER>
- Lenzner, T. (2012). Effects of Survey Question Comprehensibility on Response Quality. *Field Methods, 24*(4), 409–428. <https://doi.org/10.1177/1525822X12448166>
- Maćkiewicz, M., Ciecuch, J., Mackiewicz, M., & Ciecuch, J. (2016). Pictorial Personality Traits Questionnaire for Children (PPTQ-C)—a new measure of children's personality traits. *Frontiers in Psychology, 7*(APR), 1–11. <https://doi.org/10.3389/fpsyg.2016.00498>
- Martins, P. S. R., Alves, J. M., Vital, V. H. do P., Amorim, L. da S., & Mansur-Alves, M. (2024). Revisão sistemática de instrumentos de personalidade usando o big-five em crianças. *Cadernos de Psicologia, 4*(1), 24–24. <https://doi.org/10.9788/CP2024.1-04>
- McCrae, R. R., Costa, P. T., & Martin, T. A. (2005). The NEO-PI-3: a more readable revised NEO Personality Inventory. *Journal of Personality Assessment, 84*(3), 261–270. [https://doi.org/10.1207/S15327752JPA8403\\_05](https://doi.org/10.1207/S15327752JPA8403_05)
- Möttus, R., Wood, D., Condon, D. M., Back, M. D., Baumert, A., Costantini, G., Epskamp, S., Greiff, S., Johnson, W., Lukaszewski, A., Murray, A., Revelle, W., Wright, A. G. C., Yarkoni, T., Ziegler, M., & Zimmermann, J. (2020). Descriptive, Predictive and Explanatory Personality Research: Different Goals, Different Approaches, but a Shared Need to Move Beyond the Big Few Traits. *European Journal of Personality, 34*(6), 1175–1201. <https://doi.org/10.1002/per.2311>
- Ortet, G., Mezquita, L., Morizot, J., Ortet-Walker, J., & Ibáñez, M. I. (2022). Assessment of “Los Pequeños” Big Five: The Spanish Version of the Big Five Personality Trait Short Questionnaire in Adolescents. *Psychological Assessment, 34*(5), 32–44. <https://doi.org/10.1037/PAS0001119>
- Peralta, Y., Aguilar-Rodríguez, A., González Dávila, O., & Miranda, A. (2021). Dimensionality and Reliability Assessment of a Field Implementation of the Big Five in Mexican Children. *Journal of Psychoeducational Assessment, 39*(5), 579–592. <https://doi.org/10.1177/07342829211002581>
- Peres, A. J. S. (2021). Processamento da linguagem natural: Modelagem de tópicos. In C. Faiad, M. N. Baptista, & R. Primi (Eds.), *Tutoriais em análise de dados aplicados a psicometria* (1st ed., pp. 436–459). Vozes.

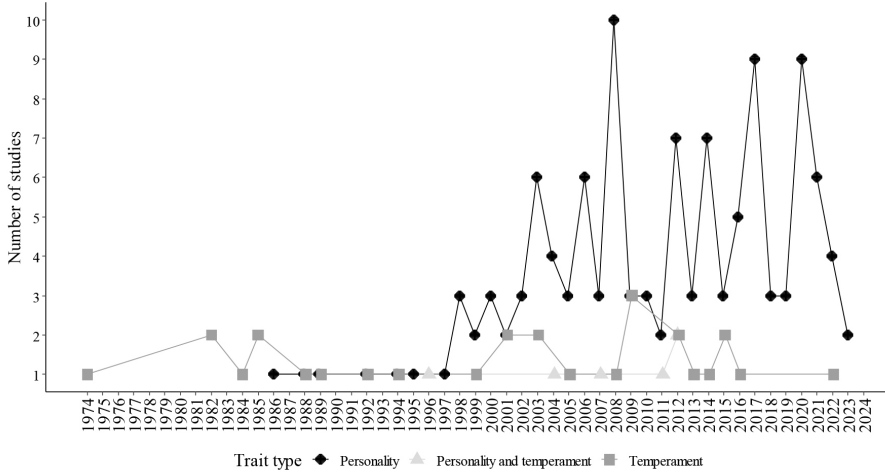


- Rammstedt, B., Roemer, L., Danner, D., & Lechner, C. M. (2022). Don't Keep It Too Simple: Simplified Items Do Not Improve Measurement Quality. *European Journal of Psychological Assessment*. <https://doi.org/10.1027/1015-5759/a000741>
- Roberts, B. W., & Yoon, H. J. (2022). Personality Psychology. *Annual Review of Psychology*, 73, 489–516. <https://doi.org/10.1146/ANNUREV-PSYCH-020821-114927>
- Robinson, D., & Silge, J. (2022). *widyr: Widen, Process, then Re-Tidy Data*. <https://cran.r-project.org/package=widyr>
- Shiner, R. L. (2015). The development of temperament and personality traits in childhood and adolescence. In *APA handbook of personality and social psychology, Volume 4: Personality processes and individual differences*. (pp. 85–105). American Psychological Association. <https://doi.org/10.1037/14343-004>
- Shiner, R. L., & DeYoung, C. G. (2013). The Structure of Temperament and Personality Traits. In P. D. Zelazo (Ed.), *The Oxford Handbook of Developmental Psychology: Vol. 2: Self an* (pp. 1–56). Oxford Handbooks Online. <https://doi.org/10.1093/oxfordhb/9780199958474.013.0006>
- Shiner, R. L., Soto, C. J., & De Fruyt, F. (2021). Personality Assessment of Children and Adolescents. *Annual Review of Developmental Psychology*, 3(1), 113–137. <https://doi.org/10.1146/annurev-devpsych-050620-114343>
- Silge, J., & Robinson, D. (2016). tidytext: Text Mining and Analysis Using Tidy Data Principles in R. *Journal of Open Source Software*, 1(3), 37. <https://doi.org/10.21105/JOSS.00037>
- Silge, J., & Robinson, D. (2017). *Basic Text Mining with R* (Issue June). O'Reilly. <https://www.tidytextmining.com/index.html>
- Slobodskaya, H. R. (2021). Personality development from early childhood through adolescence. *Personality and Individual Differences*. <https://doi.org/10.1016/j.paid.2020.110596>
- Soto, C. J., & John, O. P. (2014). Traits in Transition: The Structure of Parent-Reported Personality Traits from Early Childhood to Early Adulthood. *Journal of Personality*, 82(3), 182–199. <https://doi.org/10.1111/jopy.12044>
- Soto, C. J., John, O. P., Gosling, S. D., & Potter, J. (2011). Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. *Journal of Personality and Social Psychology*, 100(2), 330–348. <https://doi.org/10.1037/a0021717>
- Suh, H., Kim, S., & Lee, D. G. (2021). Review of Perfectionism Research From 1990 to 2019 Utilizing a Text-Mining Approach. *Review of General Psychology*, 25(3), 283–303. <https://doi.org/10.1177/10892680211018827>
- Tackett, J. L., Hernandez, M., & Eisenberg, N. (2019). Agreeableness. In D. P. McAdams, R. L. Shiner, & J. L. Tackett (Eds.), *Handbook of personality development* (pp. 171–185 BT-). The Guilford Press.
- Tackett, J. L., Slobodskaya, H. R., Mar, R. A., Deal, J., Halverson, C. F., Baker, S. R., Pavlopoulos, V., & Besevegis, E. (2012). The hierarchical structure of childhood personality in five countries: continuity from early childhood to early adolescence. *Journal of Personality*, 80(4), 847–879. <https://doi.org/10.1111/J.1467-6494.2011.00748.X>
- Tay, L., Woo, S. E., Hickman, L., & Saef, R. M. (2020). Psychometric and Validity Issues in Machine Learning Approaches to Personality Assessment: A Focus on Social Media Text Mining. *European Journal of Personality*, 34(5), 826–844. <https://doi.org/10.1002/per.2290>
- Tetzner, J., Becker, M., & Bihler, L.-M. (2022). Personality development in adolescence: Examining big five trait trajectories in differential learning environments. *European Journal of Personality*. <https://doi.org/10.1177/08902070221121178>
- Zeferino, G. G., Antônio, M., Alvarenga, S., & Aparecida Da Silva, M. (2024). Relação entre diferenças individuais de personalidade e agressividade em torcedores de futebol: *Revista Psicologia Em Pesquisa*, 18(3), 1–23. <https://doi.org/10.34019/1982-1247.2024.V18.36205>

**SUPPLEMENTAL MATERIAL:**

**Figure S1**

*Number of studies assessing personality or temperament according to year of publication*



The table below presents the detailed search strategy. Filters used are presented in bold in the boolean operator column. Filters were applied with the intention to reduce the volume of studies to be screened, since the final number was already elevated. Filters were used according to their availability in the electronic literature database. In order to make the search more reproducible, the search url is also presented when it was available. Please note that in platforms that have paywall, results may vary according to user access.

**Table S1**

*Results and syntax for each database consulted.*

Database	Boolean operators	Filters	URL	N
PsycInfo	(Any Field: "questionnaire" OR Any Field: "scale" OR Any Field: "inventory" OR Any Field: "measure") AND (Any Field: "adolescent" OR Any Field: "child" OR Any Field: "children" OR Any Field: "adolescents") AND (Any Field: "five factor model" OR Any Field: "personality trait" OR Any Field: "big five" OR Any Field: "little six" OR Any Field: "temperament traits" OR Any Field: "activity level") NOT (Any Field: "disorders" OR Any Field: "abuse" OR Any Field: "callous" OR Any Field: "sexual" OR Any Field: "disabilities") AND Age Group: School Age (6-12 yrs) OR Age Group: Adolescence (13-17 yrs)	Age group	<a href="https://psycnet.apa.org/permalink/351d190b-13fb-5640-d6ab-09b7712c64db">https://psycnet.apa.org/permalink/351d190b-13fb-5640-d6ab-09b7712c64db</a>	1597
Scopus	( TITLE-ABS-KEY ( "five factor model" OR "personality trait" OR "big five" OR "little six" OR "temperament traits" OR "activity level" ) AND TITLE-ABS-KEY ( "adolescent" OR "child" OR "children" OR "adolescents" ) AND TITLE-ABS-KEY ( "questionnaire" OR "scale" OR "inventory" OR "measure" ) AND NOT TITLE-ABS-KEY ( "disorders" OR "abuse" OR "callous" OR "sexual" OR "disabilities" ) ) AND ( LIMIT-TO ( SUBJAREA , "PSYC" ) AND ( LIMIT-TO ( LANGUAGE , "English" ) OR LIMIT-TO ( LANGUAGE , "Spanish" ) OR LIMIT-TO ( LANGUAGE , "Portuguese" ) )	Language AND research area	Not available	1866
Pubmed	((("questionnaire"[Text Word] OR "scale"[Text Word] OR "inventory"[Text Word] OR "measure"[Text Word]) AND ("five factor model"[Text Word] OR "personality trait"[Text Word] OR "big five"[Text Word] OR "little six"[Text Word] OR "temperament traits"[Text Word] OR "activity level"[Text Word]) AND ("adolescent"[MeSH Terms] OR "child"[MeSH Terms] OR "children"[Text Word] OR "adolescents"[Text Word]) NOT ("disorders" OR "abuse" OR "callous" OR "sexual" OR "disabilities")) Filters: English, Portuguese, Spanish, Child: 6-12 years, Adolescent: 13-18 years, Humans	Age group AND language	<a href="https://pubmed.ncbi.nlm.nih.gov/?term=(((" questionnaire"[text+word])+or+("scale"[text+word])+or+("inventory"[text+word]))+and+((("five+factor+model"[text+word])+or+("personality+trait"[text+word])+or+("big+five"[text+word])+or+("little+six-")+or+("temperament+traits"[text+word])+or+("activity+level"[text+word]))+and+((("adolescent"[mesh+terms])+or+("child"[mesh+terms])+or+("children"[text+word])+or+("adolescents"[text+word]))+not+("disorders"+or+"abuse"+or+"callous"+or+"sexual"+or+"disabilities"))&amp;filter='hum_an_i.humans&amp;filter=lang.english&amp;filter=lang.portuguese&amp;filter=lang.spanish&amp;filter=age.child&amp;filter=age.adolescent&amp;ac=no&amp;sort=pubdate&amp;sort_order=asc&amp;size=200"'>https://pubmed.ncbi.nlm.nih.gov/?term=((("questionnaire"[Text+Word])+OR+("scale"[Text+Word])+OR+("inventory"[Text+Word]))+AND+((("five+factor+model"[Text+Word])+OR+("personality+trait"[Text+Word])+OR+("big+five"[Text+Word])+OR+("little+six-")+OR+("temperament+traits"[Text+Word])+OR+("activity+level"[Text+Word]))+AND+((("adolescent"[MeSH+Terms])+OR+("child"[MeSH+Terms])+OR+("children"[Text+Word])+OR+("adolescents"[Text+Word]))+NOT+("disorders"+OR+"abuse"+OR+"callous"+OR+"sexual"+OR+"disabilities"))&amp;filter=hum_an_i.humans&amp;filter=lang.english&amp;filter=lang.portuguese&amp;filter=lang.spanish&amp;filter=age.child&amp;filter=age.adolescent&amp;ac=no&amp;sort=pubdate&amp;sort_order=asc&amp;size=200</a>	2312
Web of science	TS=("five factor model" OR "personality trait" OR "big five" OR "little six" OR "temperament traits" OR "activity level") AND TS=("adolescent" OR "child" OR "children" OR "adolescents") AND TS=("questionnaire" OR "scale" OR "inventory" OR "measure") NOT TS=("disorders" OR "abuse" OR "callous" OR "sexual" OR "disabilities") and English or Spanish or Portuguese (Languages) and Psychology Multidisciplinary or Psychology Developmental or Psychology Social or Psychology Clinical or Psychology Educational or Psychology Applied or Psychology or Psychology Experimental or Psychology Biological or Psychology Mathematical (Web of Science Categories)	Language AND research field (research area: Psychology)	<a href="https://www.webofscience.com/wos/woscc/summary/03ba0092-a83e-4aa0-8708-84e45ba3b5da-be8bef04/relevance/1">https://www.webofscience.com/wos/woscc/summary/03ba0092-a83e-4aa0-8708-84e45ba3b5da-be8bef04/relevance/1</a>	698
BVS	((("adolescent" OR "child" OR "children" OR "adolescents")) AND (((("little six" OR "five factor model" OR "personality trait" OR "big five" OR "temperament traits" OR "activity level"))) AND (((("questionnaire" OR "scale" OR "inventory" OR "measure")) AND NOT (((("disorders" OR "abuse" OR "callous" OR "sexual" OR "disabilities")) AND (la:"en" OR "pt" OR "es")) AND limit:(("adolescent" OR "child"))	Language AND age group	<a a="" adolescent-")+or+("child")+or+("children")+or+("adolescents")))+and+(((("little+six")+or+("five+factor+model")+or+("personality+trait")+or+("big+five")+or+("temperament+traits")+or+("activity+level")))and+(((("questionnaire")+or+("scale")+or+("inventory")+or+("measure")))+and+not+(((("disorders")+or+("abuse")+or+("callous")+or+("sexual")+or+("disabilities")))+and+(+la%3a("en"+or+"pt"+or+"es"))+and+limit%3a("adolescent"+or+"child"))<="" href="https://pesquisa.bvsalud.org/portal/?output=&amp;lang=pt&amp;from=&amp;sort=&amp;format=&amp;count=&amp;fb=&amp;page=1&amp;skfp=&amp;index=&amp;q=((("></a>	2065
Total				8538

**Table S2***List of all instruments included in the text mining analysis*

Scale number	Name code	Full name
1	adjective scales	Digman Adjective Scales
2	adolescent personality scale – sample	Adolescent Personality Scale
3	b5bbs-25	B5BBS-25
4	bfas	Big Five Aspects Scales
5	bfi	Big-Five Inventory
6	bfi-2	Big-Five Inventory 2
7	bfi-children	Big Five Inventory Children
8	bfq-c	Big Five Questionnaire for Children
9	big five marker scales	Big Five Marker Scales
10	big five personality trait short questionnaire	Big Five Personality Trait Short Questionnaire
11	big five self-rating questionnaire	Big Five Self-Rating Questionnaire
12	ccq	California Child Q-Set
13	chernyshenko conscientiousness scales	Chernyshenko Conscientiousness Scales
14	epqr-j	Eysenck Personality Questionnaire for Youth-Revised
15	five-factor model adolescent personality questionnaire	Five-Factor Model Adolescent Personality Questionnaire
16	hexaco-msi	HEXACO-Middle School Inventory
17	hipic-30	Hierarchical Inventory of Personality for Children (30 Items)
18	icid	Inventory for Child Individual Differences
19	international english mini-markers	International English Mini-Markers
20	ipip	International Personality Item Pool
21	ipip-neo-120	International Personality Item Pool Neo 120
22	js neo-a50	Junior Spanish Version of The Neo Questionnaire
23	little-six-scales	Little-Six-Scales
24	mini – ipip	Mini International Personality Item Pool
25	nomination scales	Nomination Scales
26	norwegian military personality inventory	Norwegian Military Personality Inventory
27	operas	Overall Personality Assessment Scale
28	pci	Personality Characteristics Inventory
29	pptq-c	Pictorial Personality Traits Questionnaire for Children
30	schobl-r-one-pole	School Behaviour Checklist-Revised
31	ten-item personality inventory (tipi)	Ten-Item Personality Inventory (Tipi)
32	the way i am	The Way I Am
33	abridged big five circumplex (ab5c)	Abridged Big Five Circumplex (AB5C)
34	m5-ps	M5-PS

**Contribution of each author to the work:**

**Pedro S. R. Martins:** Study planning, literature search, data analysis, and manuscript writing

Marcela Mansur-Alves: Study planning, manuscript writing

**EDITORIAL BOARD****Editor-in-chief**

Cristiane Silvestre de Paula

**Associated editors**

Alessandra Gotuzo Seabra  
Ana Alexandra Caldas Osório  
Luiz Renato Rodrigues Carreiro  
Maria Cristina Triguero Veloz Teixeira

**Section editors****"Psychological Assessment"**

Alexandre Luiz de Oliveira Serpa  
André Luiz de Carvalho Braule Pinto  
Natália Becker  
Juliana Burges Sbicigo  
Lisandra Borges

**"Psychology and Education"**

Alessandra Gotuzo Seabra  
Carlo Schmidt  
Regina Basso Zanon

**"Social Psychology and  
Population's Health"**

Enzo Banti Bissoli  
Marina Xavier Carpena  
Daniel Kveller

**"Clinical Psychology"**

Carolina Andrea Ziebold Jorquera  
Julia Garcia Durand  
Ana Alexandra Caldas Osório

**"Human Development"**

Maria Cristina Triguero Veloz Teixeira  
Rosane Lowenthal

**Review Articles**

Jessica Mayumi Maruyama

**Technical support**

Davi Mendes  
Maria Gabriela Maglio

**EDITORIAL PRODUCTION****Publishing coordination**

Surane Chiliani Vellenich

**Editorial intern**

Isabelle Callegari Lopes

**Language editor**

Daniel Leão

**Layout designer**

Acqua Estúdio Gráfico