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Instituto de Psicologia

Departamento de Psicologia Social e do Trabalho

Programa de Pós- Graduação em Psicologia Social, do Trabalho e das Organizações

PROPRIEDADES PSICOMÉTRICAS DO INVENTÁRIO *SOCIAL AND EMOTIONAL (OR
NON COGNITIVE) NATIONWIDE ASSESSMENT (SENNA)*

Gina Pamela Pancorbo Valdivia

Brasília, 2016



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Orientador: Jacob Arie Laros

Dissertação apresentada ao Programa de Pós-Graduação em Psicologia Social, do Trabalho e das Organizações da Universidade de Brasília, como requisito parcial à obtenção do título de Mestre em Psicologia. O presente trabalho foi realizado com apoio do Programa Estudantes-Convênio de Pós-Graduação – PEC-PG, da CAPES/CNPq – Brasil.

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Banca Examinadora:

Prof. PhD. Jacob Arie Laros (*Orientador*)

Universidade de Brasília – UnB

Prof^a. Dr^a. Cristiane Faiad (*Membro*)

Universidade de Brasília – UnB

Prof. Dr. Josemberg Moura Andrade (*Membro*)

Universidade Federal da Paraíba – UFPB

Prof. Dr. Ronaldo Pilati (*Membro suplente*)

Universidade de Brasília – UnB

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RESUMO GERAL

Diferentes pesquisas têm apoiado a associação entre as competências socioemocionais e importantes resultados como o desempenho acadêmico, a redução da violência e a prevenção de doenças. Dada sua importante contribuição e a necessidade de instrumentos adequados para avaliar estas competências, foi desenvolvido o instrumento *Social and Emotional (or Noncognitive) Nationwide Assessment (SENNA)*. Neste contexto, o objetivo da dissertação foi avaliar as propriedades psicométricas dos escores de uma segunda versão do instrumento SENNA e obter evidências de validade de construto e validade convergente. A validade convergente foi avaliada aplicando a Escala Reduzida de Cinco Grandes Fatores de Personalidade (ER5FP) junto com o instrumento SENNA. Ambos foram administrados para uma amostra de 634 estudantes (59% mulheres) com uma média de idade de 16,3 anos ($DP = 1,21$) de oito escolas de Ensino Médio do Distrito Federal. No primeiro manuscrito, realizou-se uma Análise Fatorial Exploratória e obteve-se uma estrutura de 6 fatores com 65 itens que explicou 42,7% da variância comum. Os coeficientes de fidedignidade dos escores fatoriais variaram entre 0,66 e 0,89. Os coeficientes de validade do SENNA com a ER5FP foram entre 0,37 e 0,81 com um valor médio de 0,59. O valor mais baixo foi entre os fatores de Conscienciosidade e os valores mais altos entre os fatores de Extroversão. O segundo manuscrito visou a testar qual dos três modelos de mensuração do SENNA mostraram a melhor adequação aos dados: (1) um modelo de 5 fatores e 52 itens; (2) um modelo de 6 fatores e 83 itens; (3) um modelo de 6 fatores e 65 itens. Para tal fim, os modelos foram testados usando Análise Fatorial Confirmatória e a Modelagem por Equações Estruturais Exploratórias. Os resultados indicaram que o modelo de 5 fatores com 52 itens mostrou o melhor ajuste aos dados. Em geral, os resultados da dissertação indicaram adequadas evidências de validade do instrumento SENNA, porém, recomenda-se que alguns itens sejam revisados para representar melhor as dimensões latentes do instrumento.

Palavras-chave: competências socioemocionais, validade, fidedignidade, psicometria.

GENERAL ABSTRACT

Different researches have supported the association of socio-emotional skills with important life outcomes like academic performance, reduction of violence and disease prevention. Given the contribution of these skills to well-being and the need of adequate instruments to assess them, the Social and Emotional (or Noncognitive) Nationwide Assessment (SENNA) inventory was developed. In that context, the objective of this dissertation was to evaluate the psychometric properties of the scores of the SENNA instrument and obtain evidences of its construct validity and convergent validity. Convergent validity was evaluated through the application of the Reduced Scale of the Big Five Personality Factors (ER5FP) together with SENNA instrument. Both instruments were administered to a sample of 634 students (59% females) with a mean age of 16.3 years ($SD = 1.21$) from eight secondary schools of the Federal District. In the first manuscript, an Exploratory Factor Analysis was performed and a 6-factor structure of 65 items was obtained, explaining 42.7% of the common variance. Reliability coefficients of the factor scores varied between .66 and .89. The validity coefficients between SENNA and ER5FP ranged between .37 and .81 with a mean value of .59. The lowest values were between the factors of Conscientiousness and the highest values were between the factors of Extroversion. The second manuscript aimed to test which of three different measurement models of SENNA showed the best fit to the data: (1) a 5-factor model with 52 items; (2) a 6-factor model with 83 items; (3) a 6-factor model with 65 items. With that objective, analyses were performed with Confirmatory Factor Analysis and Exploratory Structural Equation Modeling. The results showed that the 5-factor model with 52 items showed the best fit to the data. Overall, the results of the dissertation indicate adequate validity evidence of the SENNA inventory, although some items should be revised for improving their representation of the latent dimensions of the scale.

Keywords: socioemotional skills, validity, reliability, psychometry.

INTRODUÇÃO

Na era atual, muitas crianças e jovens se vêm afetados pelo aumento do desemprego (no caso destes últimos), índices elevados de obesidade, decréscimo da participação cívica e situação ambiental preocupante em seus países. As sociedades estão cada vez mais conectadas, existem novos centros de poder no mundo e aumentam as desigualdades, assim como os conflitos e as intolerâncias. O mundo está se transformando e a educação deve acompanhar essas mudanças (UNESCO, 2015).

A educação e a aprendizagem têm um papel fundamental para fomentar competências que permitam aos estudantes fazer frente aos desafios locais e globais. Tradicionalmente, os sistemas educativos têm se focado no desenvolvimento de competências cognitivas como língua portuguesa e matemática. No entanto, considerando as pressões do mundo de hoje, isso já não é mais suficiente. Assim, o desenvolvimento de competências orientadas, por exemplo, ao respeito, à convivência, à assertividade, à igualdade, entre outras, deveria complementar a aprendizagem para oferecer uma educação mais integral aos estudantes.

As competências socioemocionais, também chamadas de habilidades não cognitivas ou *soft skills*, são o tipo de habilidades envolvidas em alcançar metas, trabalhar com os outros e gerar as emoções (Ikesako & Miyamoto, 2015). Elas podem ser definidas como características individuais que a) se originam na interação recíproca entre predisposições biológicas e fatores ambientais; b) se manifestam em padrões consistentes de pensamento, sentimentos e comportamentos; c) continuam se desenvolvendo por meio de experiências de aprendizagem formais e informais; e d) influenciam importantes resultados sociais e econômicos ao longo da vida do indivíduo (De Fruyt, Wille, & John, 2015).

Assim como ocorre com as competências cognitivas, as socioemocionais são desenvolvidas ao longo da vida, bem como recebem a influência tanto de fatores genéticos quanto de fatores ambientais (como a família, a escola e a comunidade) (OECD, 2015). Elas se manifestam em diversas situações do cotidiano e têm um papel importante nas diferentes etapas do desenvolvimento. Assim, as pessoas tomam decisões e perseguem metas ao longo da vida, desde a etapa da infância quando têm de decidir sobre qual jogo eleger, até a maioridade quando devem decidir qual carreira estudar ou qual trabalho aceitar. O processo de aprendizagem sobre como expressar as emoções positivas ou negativas, além de formas de gerir o estresse e as frustrações é um desafio constante ao longo da vida (Ikesako & Miyamoto, 2015).

O ritmo ou rapidez do desenvolvimento das competências socioemocionais depende da idade da pessoa e do nível de base sobre o qual sua formação se inicia, uma vez que os primeiros anos da pessoa são fundamentais para seu desenvolvimento (OECD, 2015). Nesse período, a família e o tipo de relacionamento com os pais têm um papel fundamental, devido a sua influência sobre o processo de formação das competências socioemocionais (Kautz, Heckman, Diris, Weel & Borghans, 2014). Já durante a infância tardia e a adolescência, a escola, os grupos de amigos e a comunidade adquirem cada vez maior importância (Ikesako & Miyamoto, 2015).

As evidências de pesquisa sugerem que quanto maior o nível adquirido de competências da pessoa, maior será seu ganho em competências no futuro. Por exemplo, se ao entrar na escola, um menino tem maior conhecimento de matemática que seus pares, ele terá uma maior probabilidade de concluir a etapa escolar com melhor desempenho que seu grupo (Cunha & Heckman, 2007; OECD, 2015).

Igualmente, evidências indicam que um tipo de competência pode ajudar a promover outro tipo ao longo do tempo. Isso é especialmente evidente para aqueles indivíduos com altos níveis de competências socioemocionais, já que tais competências podem subsidiar o desenvolvimento de competências cognitivas. Por exemplo, é muito mais provável que um estudante muito disciplinado e persistente melhore seu desempenho em matemática que outro estudante com igual nível de desempenho na matéria, mas com menor nível de disciplina e persistência (OECD, 2015).

Existe diferentes marcos de referência para compreender quais são as competências socioemocionais que importam para serem promovidas nas crianças e jovens. A identificação de quais são essas competências é moderada pela aproximação teórica das intervenções e pela evidência científica que associa determinadas competências com os resultados produto do seu desenvolvimento nos âmbitos da educação, saúde, trabalho, formação da cidadania, etc.

Uma dessas propostas é realizada pela organização CASEL (*Collaborative for Academic, Social, and Emotional Learning*) que identifica cinco competências cognitivas, afetivas e comportamentais que se encontram em diferentes programas que promovem competências socioemocionais (CATEL, 2013):

- Autoconsciência: Habilidade para reconhecer as próprias emoções e pensamentos e sua influencia no comportamento.
- Autogestão: Habilidade para regular eficazmente as próprias emoções, pensamentos e comportamentos em diferentes situações.
- Consciência social: Habilidade para considerar as diferentes perspectivas e sentir empatia por outras pessoas de diversas procedências e culturas, compreender normas

sociais e éticas de comportamento, e reconhecer os recursos e apoio da família, a escola e a comunidade.

- Habilidades de relacionamento: Habilidade para estabelecer e manter relacionamentos saudáveis e gratificantes com diversas pessoas e grupos.
- Tomada de decisão responsável: Habilidade para tomar decisões construtivas e respeitadas sobre o comportamento pessoal e interações sociais levando em consideração padrões éticos, preocupações de segurança, normas sociais, etc.

De forma similar, a Organização para a Cooperação e Desenvolvimento Econômico (OCDE) enfatiza o papel das competências para ajudar as pessoas a fazer frente aos desafios do mundo moderno. Assim, a OCDE define as competências socioemocionais como capacidades individuais que se manifestam em padrões consistentes de pensamentos, sentimentos e condutas, se desenvolvem através de experiências formais e informais e são importantes condutores de resultados socioeconômicos ao longo da vida dos indivíduos. A Figura 1 apresenta a proposta da OCDE sobre a categorização das competências e a inter-relação entre as cognitivas e socioemocionais.

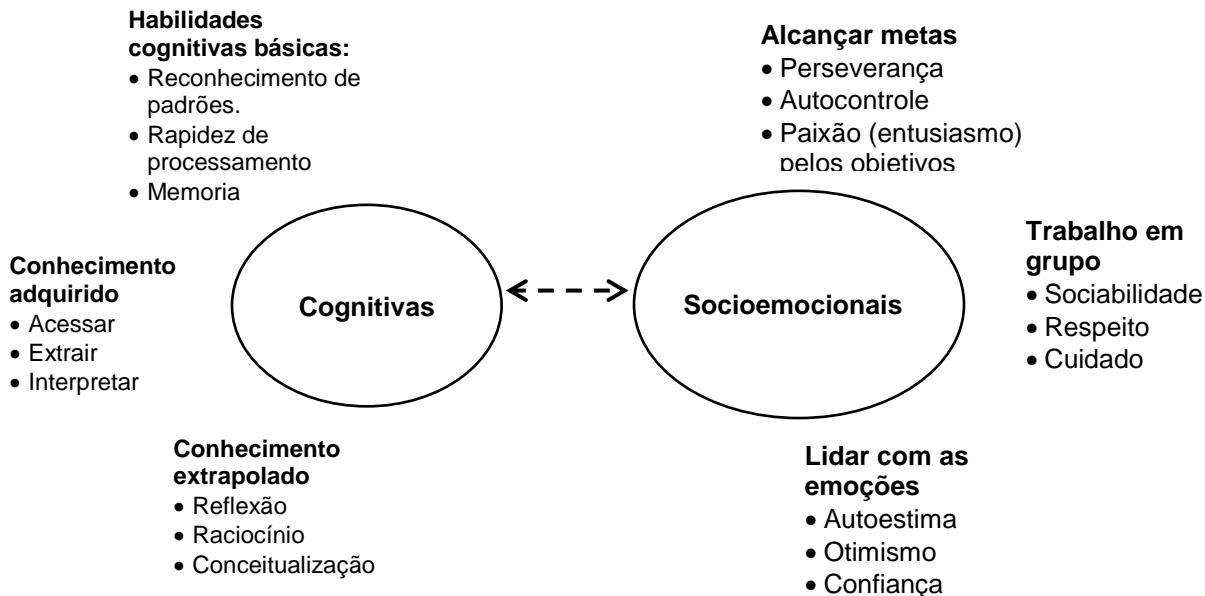


Figura 1. Categorização de competências cognitivas e socioemocionais de acordo com a OCDE.

Por outro lado, um dos modelos teóricos com maior influência na pesquisa sobre as competências socioemocionais é o dos Cinco Grandes Fatores de Personalidade (CGFP). Esse modelo é uma organização de traços de personalidade agrupados em cinco dimensões básicas: Extroversão, Conscienciosidade, Neuroticismo, Amabilidade e Abertura a Novas Experiências. Os traços de personalidade se definem como disposições duradoras que podem ser inferidas de padrões de comportamento relativamente estáveis ao longo do tempo e avaliadas similarmente por diferentes observadores (Costa & McCrae, 1992).

O modelo CGFP conta com grande evidência científica acumulada sobre a associação da personalidade com desempenho acadêmico, indicadores de saúde, progresso econômico e social e bem-estar em geral (Almlund, Duckworth, Heckman, & Kautz, 2011; Friedman & Kern, 2014; Kautz et al., 2014; OECD, 2015; Poropat, 2009). No âmbito educacional, existem evidências empíricas que apontam que as medidas de personalidade, especialmente a

Conscienciosidade, são tão ou mais preditivas de diversos resultados quanto as medidas cognitivas (Almlund et al., 2011). Uma meta-análise de Poropat (2009) mostrou que a Conscienciosidade está associada ao desempenho escolar, enquanto um estudo de Almlund et al. (2011) mostrou que essa dimensão da personalidade prediz os anos de escolaridade com igual precisão que as medidas de inteligência.

Em outros domínios, existe um conjunto crescente de conhecimentos sobre a associação dos traços de personalidade, especialmente do fator de Conscienciosidade, sobre o desempenho no trabalho e o salário. Igualmente, alguns traços dos fatores de Conscienciosidade, Abertura a Novas Experiências e Amabilidade estão associados à longevidade (Kautz et al., 2014).

Outros resultados de estudos longitudinais realizados pela OECD (2015) em diferentes países acerca do valor preditivo das competências socioemocionais mostram que elas têm maior impacto que as cognitivas sobre resultados do âmbito social e do bem-estar. Sua especial influência nessas áreas seria devido a sua contribuição no modelamento dos comportamentos das pessoas e de seus estilos de vida. Assim, por exemplo, em países como a Noruega, o Reino Unido e os Estados Unidos, o fortalecimento das competências socioemocionais (p. ex. autoestima, lócus de controle e persistência) teve impacto na redução de índices de obesidade e depressão. No entanto, na Coreia do Sul, na Nova Zelândia, na Suíça e nos Estados Unidos as mencionadas competências (p. ex. autoestima, perseverança, responsabilidade e habilidades sociais) tiveram impacto importante na diminuição da probabilidade de os indivíduos reportarem o engajamento em problemas de conduta (beber álcool, fumar, abusar de substâncias, violências e brigas). Por outro lado, os resultados do mesmo estudo da OECD (2015) mostram que o aprimoramento das competências socioemocionais teve impacto maior do que o aprimoramento das competências cognitivas sobre aspectos como satisfação com a vida,

atitudes positivas perante a vida e felicidade em pessoas de países como Suíça, Coreia do Sul, Nova Zelândia e Estados Unidos.

Dada a associação das competências socioemocionais com o aprendizado e o bem-estar de crianças e jovens, resulta relevante sua inclusão nos currículos nacionais dos sistemas de ensino, seja como disciplinas específicas ou de forma transversal em diversas disciplinas (Lee, 2013). A vantagem dessa prática é garantir que os governos se responsabilizem pelo aprimoramento das competências socioemocionais e, assim, seja possível alcançar a sustentabilidade das ações para conseguir resultados nos âmbitos mencionados.

No Brasil, as competências socioemocionais estão incorporadas nas Diretrizes Nacionais Curriculares, nas diversas etapas da Educação Básica (Educação Infantil, Ensino Fundamental e Ensino Médio), como princípios gerais que orientam os diversos conteúdos que devem os estudantes apreender. Já a Base Nacional Comum – um dos componentes das Diretrizes e cujo objetivo é nortear as avaliações e a elaboração de documentos pedagógicos – reconhece a importância dos aspectos sociais e emocionais, assim como de se incorporar, nos seus fundamentos, o ensino dos valores e dos saberes gerados no mundo do trabalho, nas atividades esportivas e corporais, nas expressões artísticas e no exercício da cidadania.

“Entende-se por base nacional comum, na Educação Básica, os conhecimentos, saberes e valores produzidos culturalmente, expressos nas políticas públicas e que são gerados nas instituições produtoras do conhecimento científico e tecnológico; no mundo do trabalho; no desenvolvimento das linguagens; nas atividades desportivas e corporais; na produção artística; nas formas diversas e exercício da cidadania; nos movimentos sociais, definidos no texto dessa Lei, artigos 26 e 3315 [...]” (MEC, 2013, p. 31).

Essa definição implicaria que, no ensino das disciplinas obrigatórias que formam parte da Base Nacional Comum, sejam incorporados conteúdos relacionados ao desenvolvimento socioemocional. No entanto, ao longo das diretrizes de cada etapa de ensino, não se especificam quais seriam as competências socioemocionais específicas a desenvolver nas diversas disciplinas, nem quais são as orientações particulares para seu ensino e sua avaliação. Isto é, se bem reconhece-se a importância dos aspectos socioemocionais para aprendizagem, não se indicam ou especificam quais seriam as condições para implementar o desenvolvimento socioemocional nas diversas etapas de ensino. Já no corpo das diretrizes, reconhece-se que um dos desafios do ensino e da avaliação dos conteúdos curriculares é a incorporação da multidimensionalidade da aprendizagem nos campos cognitivo, afetivo e físico-corporal. Diante disso, as diretrizes instam a comunidade educativa a realizar uma avaliação integral das aprendizagens que valorize as propostas educativas que não são tradicionalmente avaliadas, como a autonomia, a solidariedade, o compromisso político e a cidadania. No entanto, não as Diretrizes não especificam como realizar essa avaliação (MEC, 2013).

De maneira similar, o Ministério de Educação do Brasil elaborou a proposta Base Nacional Comum Curricular¹ que estabelece os conhecimentos e habilidades essenciais que todos os estudantes têm o direito de ter acesso e se apropriar durante os diferentes anos da Educação Básica, desde a Educação Infantil até o Ensino Médio (MEC, 2015). O documento incorpora conteúdos que poderiam implicar o desenvolvimento socioemocional dos estudantes como a construção da cidadania que é vista como princípio orientador expresso em diversos objetivos de aprendizagem em diversas áreas curriculares das etapas de ensino. Assim, em torno à cidadania, a Base Nacional Comum inclui objetivos de aprendizagem orientados à

¹ Até o momento da finalização do documento da dissertação (Dez, 2015), a Base Nacional Comum Curricular não tinha sido aprovada pelo Ministério de Educação já que encontra-se em consulta pública.

convivência e a compreensão do outro e ao conhecimento de diversas culturas e os direitos. No entanto, isto é focado desde uma perspectiva cognoscitiva (conhecer e aceitar as diversas culturas, as crenças, as culturas dos outros) e não desde uma abordagem social ou emocional que poderiam complementar a construção da cidadania. Isto é, não se especifica quais seriam as competências socioemocionais a ensinar (como a empatia, respeito, reconhecimento de emoções, etc.) ou quais seriam as condições pedagógicas, avaliativas ou de progresso para seu desenvolvimento nos estudantes. Sem estas orientações, não se estabelecem as condições necessárias para o ensino das competências socioemocionais no sistema educativo.

Nesse sentido e com o intuito de contribuir a melhora da educação integral dos estudantes no Brasil incorporando princípios cognitivos e socioemocionais, o Instituto Ayrton Senna desenvolveu um instrumento de medição de competências socioemocionais chamado *Social and Emotional (or Noncognitive) Nationwide Assessment* (SENNA). O instrumento construído apresentou evidências satisfatórias de validade em grande amostra de alunos da rede estadual de educação do Rio de Janeiro. Essa ferramenta baseia-se no modelo dos Cinco Grandes Fatores de Personalidade e é composta por seis dimensões: Extroversão, Conscienciosidade, Neuroticismo, Amabilidade, Abertura para novas experiências e Lócus de controle externo (Santos & Primi, 2014).

Com base nas considerações apresentadas anteriormente, o objetivo da presente pesquisa foi avaliar as propriedades psicométricas do inventário SENNA no contexto educativo do Distrito Federal (DF). Assim, o estudo visou a contribuir para o aprimoramento do inventário SENNA por meio da obtenção de evidências de validade de construto e validade convergente em outro contexto regional do Brasil, com características sociais e econômicas diferentes daquelas do Rio de Janeiro (Santos & Primi, 2014).

Para alcançar o objetivo geral, foram realizados dois estudos. O primeiro estudo visou a obter evidências de validade de construto do inventário SENNA com uma Análise Fatorial Exploratória, além de evidências de validade convergente com o uso da Escala Reduzida de Cinco Grandes Fatores de Personalidade (ER5FP). Já em um segundo passo, realizou-se um estudo cujo objetivo foi aprofundar os primeiros achados sobre as evidências de validade de construto do instrumento e testar sua estrutura fatorial por meio do uso da Análise Fatorial Confirmatória e da Modelagem por Equações Estruturais Exploratórias. Adicionalmente, nos dois estudos foi analisada a consistência interna dos fatores do instrumento.

Na sequência, serão apresentados os dois estudos realizados.

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MANUSCRITO 1

**Validity evidence for the Social and Emotional (or Noncognitive) Nationwide Assessment
(SENNA) inventory**

**Evidências de validade do inventário *Social and Emotional (or Noncognitive) Nationwide
Assessment (SENNA)***

**Evidencias de validez del inventario *Social and Emotional (or Noncognitive) Nationwide
Assessment
(SENNA)***

Abstract

Given the potential of socio-emotional skills and the need of adequate instruments for their measurement, this study aimed to obtain evidence on the psychometric characteristics of a second version of the Social and Emotional (or Noncognitive) Nationwide Assessment (SENNA) inventory and its convergent validity with the Reduced Scale of the Big Five Personality Factors (ER5FP). Both instruments were administered to a sample of 634 students (59% females) with a mean age of 16.3 years ($SD = 1.21$) from eight secondary schools of the Federal District of Brazil. Using Principal Axis Factoring with Promax rotation a 6-factor structure was obtained explaining 42.7% of the common variance. Reliability coefficients of the factor scores varied between .66 and .89. The convergent correlations between the two instruments ranged between .37 (Conscientiousness) and .81 (Extraversion) with a mean value of .59. In conclusion, the results confirm satisfactory evidence of the score validity of the SENNA inventory.

Keywords: personality traits, test validity, test reliability.

Resumo

Dado o potencial das competências socioemocionais e a necessidade de instrumentos adequados para sua mensuração, o objetivo deste estudo foi obter dados sobre as características psicométricas da segunda versão do inventário *Social and Emotional (or Noncognitive) Nationwide Assessment* (SENNA) e sua validade convergente com a Escala Reduzida de Cinco Grandes Fatores de Personalidade (ER5FP). Ambos os instrumentos foram administrados para uma amostra de 634 estudantes (59% mulheres) com uma média de idade de 16,3 anos ($DP = 1,21$) de oito escolas de Ensino Médio do Distrito Federal. Utilizando fatoração dos eixos principais com rotação Promax foi obtida uma estrutura de seis fatores explicando 42,7% da variância comum. Os coeficientes de fidedignidade dos escores fatoriais variaram entre 0,66 e 0,89. As correlações de convergência entre os instrumentos variaram entre 0,37 (Conscienciosidade) e 0,81 (Extroversão) com um valor médio de 0,59. Em conclusão, os resultados sugerem evidências satisfatórias de validade do inventário SENNA.

Palavras-chave: traços de personalidade, validade do teste, precisão do teste.

Resumen

Dado el potencial de las competencias socioemocionales y la necesidad de instrumentos adecuados para su medición, el objetivo del estudio fue obtener información sobre las características psicométricas de una segunda versión del inventario *Social and Emotional (or Noncognitive) Nationwide Assessment* (SENNA) y su validez convergente con la Escala Reducida de Cinco Grandes Factores de Personalidad (ER5FP). Ambos instrumentos fueron administrados a una muestra de 634 estudiantes (59% mujeres) con una edad promedio de 16,3 años ($DE = 1,21$) de ocho escuelas secundarias del Distrito Federal en Brasil. Utilizando factorización de ejes principales con rotación Promax fue obtenida una estructura de seis factores que explicó el 42,7% de variancia. Los coeficientes de confiabilidad de los puntajes factoriales variaron entre 0,66 a 0,89. Las correlaciones de convergencia entre los dos instrumentos variaron entre 0,37 (Conciencia) y 0,81 (Extroversión) con un valor promedio de 0,59. En conclusión, los resultados sugieren evidencias satisfactorias de validez del inventario SENNA.

Palabras clave: rasgos de personalidad, validación de test, precisión de test.

Twenty-first century challenges require changes of the educational system in order to develop various skills for academic, professional, and personal success of children and youth. These skills involve the traditionally measured cognitive skills such as literacy and numeracy, which have been largely acknowledged. Nevertheless, there are other non-cognitive skills related to social and emotional learning that are not properly captured by traditional performance evaluations at schools, but have been lauded for their role in enhancing children and youth's success in school and life (Durlak, Weissberg, Dymnicki, Taylor & Schellinger, 2011; Friedman & Kern, 2014; OECD, 2015).

Zins and Elias (2006) defined socio-emotional learning as the process of acquiring the necessary knowledge, attitudes, and skills to recognize and manage emotions, care, and concern for others, make responsible decisions, establish positive relationships, and handle challenging situations. Similarly, socio-emotional skills (SEMS) can be defined as:

Individual characteristics that (a) originate in the reciprocal interaction between biological predispositions and environmental factors; (b) are manifested in consistent patterns of thoughts, feelings and behaviors; (c) continue to develop through formal and informal learning experiences; and (d) influence important socioeconomic outcomes throughout the individual's life. (De Fruyt, Wille, & John, 2015, p. 279)

In economics, psychology and education, several studies have shown meaningful and replicable associations between SEMS and various important life outcomes (Kautz, Heckman, Diris, Weel, & Borghans, 2014). A meta-analysis by Poropat (2009) showed that personality dimensions such as Conscientiousness are associated with school achievement. In addition, a more recent study by Duckworth, Tsukayama and May (2010) provided evidence that support

the causal role of self-control in achievement measured by the GPA of students. Moreover, when compared with cognitive measures (IQ and achievement tests), personality measures are in some cases, just as predictive than achievement tests (Almlund, Duckworth, Heckman, & Kautz, 2011). Specifically, there is growing empirical evidence for the contribution of personality traits including Conscientiousness and Neuroticism, on labor market outcomes, such as job performance and wages (Almlund et al., 2011), and health and well-being indicators across lifespan (Friedman & Kern, 2014).

For these reasons, the educational system is considered to play a pivotal role in developing SEMS. There is now convincing evidence that school-based intervention programs can affect and moderate SEMS development and contribute to cognitive achievement (Durlak et al., 2011). However, including socio-emotional skills learning in schools constitutes a paradigm shift for the educational evaluation system, due to its traditional emphasis on the assessment of cognitive learning outcomes, with little systematic attention for other types of skills. The educational field therefore needs measurement tools to assess SEMS comprehensively and reliably in order to examine students' individual differences in those skills and evaluate interventions' impact on SEMS development (Duckworth & Yeager, 2015).

Given this necessity and the potential of SEMS to impact upon young people's life and future, the Institute Ayrton Senna developed the Social and Emotional (or Noncognitive) Nationwide Assessment (SENNA) Inventory to be used for large-scale monitoring of socio-emotional skills development in Brazilian schools. The SENNA inventory was constructed from the inspection of the underlying structure of eight robust scales that are frequently used to measure socio-emotional skills in childhood and adolescence: Rosenberg Self-Esteem Scale (Rosenberg, 1979); Strengths and Difficulties Questionnaire-SDQ (Goodman, 1997); Big Five

Inventory-BFI (John, Donahue & Kentle, 1991); Self-Efficacy Questionnaire for Children (Muris, 2001); Big Five for Children- BFC (Barbaranelli, Caprara, Rabasca & Pastorelli, 2003); Core Self Evaluations-CORE (Judge, Erez, Bono & Thoresen, 2003); Grit Scale (Duckworth & Quinn, 2009) and the Norwick-Strickland Locus of Control Scale (Nowicki & Strickland, 1973)

Santos and Primi (2014) examined the overlap and commonality existing across the more than 200 items of the seven scales with the idea of representing their common variance by a more manageable group of socio-emotional skills. The underlying dimensions were identified in a first study with a sample of 3,023 students from primary and secondary schools in Rio de Janeiro. Exploratory factor analysis with Geomin rotation showed that the structure of the instrument could be represented by a group of six dimensions, five of which showed strong parallels and could be easily interpreted from the Big Five personality framework.

The first factor, Conscientiousness, captures characteristics like perseverance, efficiency and efficacy. The second, Neuroticism, includes negative emotions such as anger, frustration, anxiety and sadness. The third is called Extraversion and includes skills like friendliness, sociability, self-confidence, enthusiasm, as well as self-efficacy and core self-evaluation. The fourth dimension, Agreeableness, captures traits like tolerance, modesty, friendliness, being sympathetic and acting prosocial. The fifth dimension, Openness to Experience includes creativity and curiosity skills, artistic and unconventional interests and fantasy. Finally, the sixth dimension, External Locus of Control (ELC), refers to low self-esteem and negative valence, reflecting the failure to have control over his/her life and execute actions (Primi et al., 2015).

In a replication study developed by Santos and Primi (2014) with a large sample of students in Rio de Janeiro ($N = 24,605$), the SENNA inventory showed adequate psychometric characteristics, as well as a robust factor structure. Given its objective to be useful and transferrable across schools in the different states in Brazil, it is crucial to obtain further evidences about its psychometric properties in addition to evaluate its adequacy in a broader set of populations. Therefore, the current study aimed to examine the psychometric characteristics and SENNA convergent validity with a related assessment tool, the Reduced Scale of Big Five Personality Factors (ER5FP), in the Federal District of Brazil.

Method

Participants

Data was collected using a convenience sample obtained from seven secondary public schools and one secondary private school in the Federal District of Brazil. A total of 689 students participated, from which 55 (8%) were excluded because they did not complete the questionnaires. The final sample consisted of 634 students (59% female) with a mean age of 16.3 years ($SD = 1.21$). Of these, 39.1% were in the first grade, 31.4% in the second grade and 29.5% in the third grade. Data collection took place in schools located in different areas of Federal District: Santa Maria (25.1%), Asa Norte (24.3%), Gama (24.3%), Riacho Fundo II (21.9%) and Lago Norte (4.4%).

Instruments

Sociodemographic questionnaire (Santos & Primi, 2014). This questionnaire contains 29 multiple-choice questions about family environment (mother's education, father's literacy status, socioeconomic status, number of books at home, mother's residence, parent's origin,

economic vulnerability), individual characteristics (sex, age, race, place of birth), parents' and children's attitudes toward studying (reading frequency, parents encouragement for studying) and classroom characteristics.

SENNA inventory (Santos & Primi, 2014). This self-report inventory assesses socio-emotional skills and was originally developed for Brazilian youth. It measures six dimensions: Conscientiousness, Neuroticism, Agreeableness, Openness to Experience, Extraversion, and External Locus of Control. The instrument consists of 92 items using a 5-point Likert scale (1 = "Nothing and 5 = "Totally"). SENNA's structure was already replicated in an independent sample of 24,605 respondents using Exploratory Structural Equation Modeling (ESEM) analyses. The results indicated an acceptable fit of the six-factor model (CFI = .915; TLI = .903; RMSEA = .036) and also supported measurement invariance across different school grades, providing initial evidence for the instrument's validity. Internal consistency coefficients of the six factors were all above .75.

In the present study, a second version of 83 items of the SENNA inventory was used by suggestion of its authors. Nine items (external locus of control: 5; agreeableness: 2; extraversion: 1; openness to experience: 1) from the original 92 items of the instrument, were excluded, because of unsatisfactory psychometric characteristics like low factor loadings, and difficulties with their interpretation after factor analysis.

Reduced scale of big five personality factors (ER5FP) (Damasio, 2014). The ER5FP was used to obtain evidence on the convergent validity of the SENNA inventory. The instrument consists of 20 items and assesses the Big Five Personality Factors (Conscientiousness, Extraversion, Emotional Stability, Agreeableness, and Openness to Experience) using a 6 option semantic differential response scale. The ER5FP was created by

Damasio (2014) and was applied in the Federal District to a sample of 365 college students with a mean age of 29.5 years ($SD = 8.6$). Confirmatory factor analysis showed a five-factor structure with reliability coefficients (Lambda 2 of Guttman) between .71 and .85. The mean correlation between items across factors varied from .37 to .58, and the factor loadings were distributed between .62 and .77, indicating a model with robust data. A main advantage of the ER5FP is its short administration time.

Procedure

Data collection. The instruments were initially administrated to a pilot sample of 30 students of a secondary school to evaluate the adequacy of instruction, language and response time. Students were questioned if they understood the items of each instrument. In case of the ER5FP some adjective were not understood like the term “Prosaico”. In total, 2 adjectives were changed with the support of the author of the scale. In addition, the written instructions for the application of the scale were reformulated for being more comprehensive to the students. After corrections were made, private and public secondary schools from different areas of the Federal District were contacted to present the study and ask for authorization to administer the instruments. Together with the school principals, the classrooms were selected for the data collection. Instructions were carefully explained to the students and the instruments were administrated collectively to those who accepted to participate in the study.

Data analysis. Exploratory Factor Analysis (EFA) of SENNA inventory was performed using Principal Axis Factoring (PAF), while Principal Component Analysis (PC) was used for the ER5FP. In the last case, PC was chosen because the analysis with PAF did not show an interpretable five factor solution. Oblique rotation (Promax) was used considering the correlations between factors found in a previous study (Santos & Primi, 2014). The number of

factors extracted in EFA was based on Parallel Analysis, Hull method using the program FACTOR 10.3.01 and theoretical considerations. Lambda 2 of Guttman (λ_2) was used as the reliability coefficient. The value of .70 was established as an indication of adequate internal consistency. An independent-samples t-test was run to determine if there were significant differences between males and females in SENNA factor scores. Convergent validity was assessed using Pearson correlations between SENNA inventory and the ER5FP. Correlations between .50 and .70 were expected between the corresponding factors of these two instruments.

Ethical considerations

This study was approved by the Ethics Committee of the Institute of Human Sciences of University of Brasilia (CAAE 38811314.6.0000.5540). Two copies of the Informed Consent were given to the students: one for the students and the other for their parents. The instruments were not delivered a student if he/she did not accept to participate. However, the student stayed in the classroom during the application. In addition, if a parent did not consent the participation of a student, he/she could inform his/her decision to the school for not considering the participation of the student in the application.

Results

Assumptions required for univariate statistical analysis were verified by exploring the data. The sample size was sufficiently large for exploratory factor analysis (Beavers et al., 2013) considering the moderate factor loadings of SENNA found in previous studies (Santos & Primi, 2014). Univariate normality assumption was not seriously violated as skewness and kurtosis in almost 90% of the variables were < 1.00 (Weston, Gore, Chan, & Catalano, 2008). In the database no outliers were identified, while the percentage of missing cases was less than

2%. Missing cases were replaced using the linear trend at point method which is part of SPSS version 20.

The factorability of the matrix was corroborated and results supported the use of factor analyses (KMO = .88). Parallel Analysis indicated eight factors with empirical eigenvalues higher than the 95% percentile of the random generated eigenvalues. Initially eight factors were extracted, but two of them were under-defined and not theoretically interpretable. The Hull method (Lorenzo-Seva, Timmerman, & Kiers, 2011) was also used to determine the number of factors to be extracted. This method suggested retaining six factors. The six-factor solution proved to be the most interpretable one and consonant to the literature.

The six-factor solution was inspected to verify the need to exclude items. The following criteria for item exclusion were used: (1) when items showed a factor loading less than .32 on their principal factor, (2) when items had factor loadings $>.32$ on more than one factor with a difference less than .10, (3) when items showed a high factor loading on a different factor than theoretically expected. Using these criteria, 18 items were excluded. The final solution explained 42.7% of the total variance. Table 1 shows for each of the six factors: number of items, eigenvalue before rotation, interval of factor loadings after rotation, interval of communalities, and reliability coefficient (See the full factor loading table in Portuguese in *Anexo 1*).

Table 1

Extracted Factors of SENNA inventory (N = 634)

Factor	n ítems	Eigenvalue	Factor loadings Range (<i>M</i>)	Communalities Range (<i>M</i>)	λ_2
Neuroticism	12	9.56	.35 - .84 (.61)	.17 - .68 (.46)	.89
Conscientiousness	14	5.54	.41 - .72 (.58)	.24 - .52 (.38)	.88
Openness to Experience	11	4.31	.36 - .76 (.53)	.14 - .52 (.33)	.82
Agreeableness	11	3.46	.37 - .62 (.48)	.19 - .53 (.34)	.81
Extroversion	10	2.54	.40 - .64 (.52)	.24 - .52 (.37)	.81
External Locus of Control	7	1.89	.34 - .54 (.44)	.19 - .35 (.26)	.66

Note. Correlations between factors: NE-CO = -.25; NE-OE = -.10; NE-AG = -.19; NE-EX = -.11; NE-ELC = .24, CO-OE = .20, CO-AG .31; CO-EX = .12; CO-ELC = -.37; OE-AG = .41; OE-EX = .33; OE-ELC = .01; AG-EX = .39; AG-ELC = -.06, EX-ELC = -.18. The eigenvalues refer to the values before the rotation of the factors. The factor loadings refer to the values after the rotation of the factors. Means of the factor loadings and communalities are between parentheses.

All eigenvalues were higher than one and all factors showed adequate reliability coefficients above .80, except for the sixth factor of External Locus of Control ($\lambda_2 = .66$). Moderate correlations were observed between Openness to Experience and Agreeableness ($r = .41, p < .01$), Conscientiousness and External Locus of Control ($r = -.37, p < .01$), Openness to Experience and Extraversion ($r = .33, p < .01$) and Conscientiousness and Agreeableness ($r = .31, p < .01$). The remaining correlations were all less than .30.

Means and standard deviations of the six factor scores of the SENNA inventory, as well as mean differences between male and female students are presented in Table 2.

Table 2

Mean differences between men and women on the six factors of the SENNA Inventory

Factor	Total <i>M (SD)</i>	Male <i>M(SD)</i>	Female <i>M(SD)</i>	<i>df</i>	<i>t</i>	<i>Cohen's d</i>
Neuroticism	2.73 (.80)	2.54 (.77)	2.86 (.80)	629	-5.08**	-0.41
Conscientiousness	3.21 (.63)	3.09 (.62)	3.29 (.62)	629	-3.98**	-0.32
Openness to Experience	3.42 (.65)	3.52 (.63)	3.35 (.66)	629	3.20**	0.26
Agreeableness	3.52 (.60)	3.45 (.55)	3.57 (.62)	629	-2.35*	-0.19
Extraversion	3.44 (.67)	3.49 (.62)	3.41 (.70)	629	1.64	0.13
External Locus of Control	2.05 (.60)	2.19 (.64)	1.95 (.56)	629	5.00**	0.41

* $p < .05$. ** $p < .01$.

Female students showed statistical significant higher scores on Conscientiousness, Agreeableness and Neuroticism than male students. Male students had higher scores on Openness to Experience and External Locus of Control than female students. However, all mean differences presented a small effect size (Cohen's d).

In the context of exploratory factor analysis of the ER5FP ($KMO = .84$), parallel analysis indicated the extraction of 3 factors. Nevertheless, neither the three-factor solution, nor the four-factor solution, was theoretically interpretable. The five-factor solution was the most interpretable one. After factor extraction and rotation, 2 items were excluded using the same criteria as with the factor analysis of the SENNA inventory. The final five-factor solution explained 61.2% of the total variance. Internal consistency coefficients of all factors were satisfactory except for Openness to Experience ($\lambda_2 = .55$). Table 3 presents summarized information of the five-factor solution of the ER5FP (See the full factor loading table in Portuguese in *Anexo 2*)

Table 3
Extracted Components of ER5FP (N = 634)

Factor	n ítems	Eigenvalue	Factor loadings (M)	Communalities (M)	λ_2
Agreeableness	4	5.10	.64 - .86 (.76)	.50 - .68 (.60)	.76
Extroversion	4	2.04	.51 - .87 (.76)	.43 - .76 (.65)	.81
Conscientiousness	4	1.72	.38 - .97 (.68)	.48 - .71 (.60)	.74
Emotional Stability	3	1.20	.74 - .83 (.78)	.61 - .68 (.66)	.73
Openness to Experience	3	0.96	.58 - .86 (.68)	.50 - .62 (.54)	.55

Note. Correlations between components: AG-EX = .27; AG-CO = .50; AG-ES = .22; AG-OE = .37; EX-CO = .34, EX-ES = .07, EX-OE .37; CO-ES = .07; CO-OE = .46; ES-OE = .13. The eigenvalues refer to the values before the rotation of the factors. The component loadings refer to the values after the rotation of the factors. Means of the factor loadings and communalities are between parentheses.

Male students ($M = 3.98$; $SD = 1.30$) showed significant higher mean scores on Emotional Stability than women ($M = 3.46$; $SD = 1.35$); $t(629) = 4.84$, $p < .01$, $d = 0.39$. Also, they ($M = 4.17$; $SD = 1.12$) had significant higher mean scores on Extraversion compared to female students ($M = 3.91$; $SD = 1.18$); $t(629) = 2.79$, $p < .01$, $d = 0.23$.

Correlations between SENNA and ER5FP factors were studied in order to obtain convergent validity evidence of the SENNA inventory (Table 4). The correlations between correspondent factors of the SENNA inventory and ER5FP were strong in size and statistically significant. The lowest correlation was observed between the two Conscientiousness factors ($r = .37$, $p < .01$), while the two Extraversion factors showed the largest correlation ($r = .81$, $p < .01$). The Emotional Stability component of ER5FP showed a strong negative correlation with the Neuroticism factor of SENNA inventory ($r = -.70$, $p < .01$), which reflects their inverse conceptual interpretation.

Table 4

Correlations between the six factors of the SENNA inventory and the Five Factors of the ER5FP

SENNA	ER5FP				
	EX	AG	ES	CO	OE
Conscientiousness	.14 (.13)	.31 (.29)	.17 (.16)	.37 (.35)	.20 (.19)
Neuroticism	-.14 (-.13)	-.26 (-.25)	-.70 (-.66)	-.19 (-.18)	-.20 (-.19)
Openness to Experience	.24 (.22)	.13 (.12)	.10 (.09)	.23 (.21)	.51 (.46)
Agreeableness	.26 (.24)	.56 (.51)	.15 (.14)	.32 (.29)	.27 (.25)
Extraversion	.81 (.73)	.32 (.29)	.06 (.05)	.39 (.35)	.39 (.35)
External Locus of Control	-.18 (-.15)	-.14 (-.11)	-.07 (-.06)	-.28 (-.23)	-.10 (-.08)

Notes. EX = Extraversion; AG = Agreeableness; ES = Emotional Stability; CO = Conscientiousness; OE = Openness to Experience. The first values presented in the table are referring to correlations corrected for attenuation, while the uncorrected correlations are between parentheses. All correlation values $\geq .09$ are significant at the 1% level. All other values are significant at the 5% level.

Discussion

This study verified the psychometric characteristics and convergent validity of the SENNA inventory based on data collected in the Federal District of Brazil. The results of the present study corroborate the results obtained in previous studies of SENNA Inventory and confirm satisfactory validity evidence of the instrument.

On basis of the results of factor analysis, 13 items of SENNA inventory were eliminated because of low factor loadings and shared loadings on two factors. The largest number of excluded items belonged to the factors Openness to Experience and Extraversion. In a previous study of the SENNA inventory, a total of 11 items of Openness to Experience, External Locus of Control and Agreeableness also presented some problems after a Differential Item Functioning (DIF) analysis but were not eliminated (Santos & Primi, 2014).

Furthermore, in a study about properties of culture-level personality traits performed by McCrae et al. (2010), the personality factor of Openness to Experience showed instable characteristics. This was attributed to its relationship with Conscientiousness, to problems with its identification in some cultures and because it is not well defined in the adolescence period.

In addition, the results of the present study show that 4 items migrated from one factor to the other. For example, the External Locus of Control item “Overall, I am satisfied with myself”, loaded negatively in the Extraversion factor. It is noteworthy that in the original structure of 92 items of the SENNA inventory, this item was included in the Extraversion factor and not in the External Locus of Control one. The negative loading of the item showed in the present study is not consistent with the Extraversion factor interpretation. Therefore, this item was excluded and should be revised for future studies.

In Santos and Primi (2014) study, a small number of items migrated between factors, especially between Extraversion and Agreeableness, and Conscientiousness and External Locus of Control. This was explained by the authors as a consequence of the relationship between these factors.

As well as on a previous study of the SENNA inventory (Santos & Primi, 2014), the present research also showed some moderate correlations between factors, especially between Openness to Experience and the factors of Agreeableness, Extraversion and Conscientiousness. This finding is in agreement with McCrae et al. (2010) study, where some of the defining facets of Openness to Experience loaded in the factors of Extraversion and Conscientiousness. Indeed, as pointed out by De Raad and Mlacic (2015), the majority of trait variables in personality research tend to have substantial loadings on two or more factors.

Reliability scores of the present study were, in general, satisfactory. The factor with the lowest reliability was External Locus of Control, which also presented the lowest factor loadings. In a similar vein, in a previous study of the SENNA inventory (Santos & Primi, 2014), this factor also presented instable characteristics that has been linked to its connection with Emotional Stability/Neuroticism and the possibility that it reflects a method factor, instead of a differential one beyond the model of the Big Five. Due to this evidence, it is recommended to revise the External Locus of Control items, in order to improve the psychometric characteristics of the factor.

On the other hand, results of this study indicated gender differences with small effect sizes for Conscientiousness, Agreeableness and Neuroticism, with female students scoring higher than male students. The same results were found in a previous study of the SENNA inventory where girls scored higher on the same factors, in addition to Extraversion (Santos & Primi, 2014). This has been corroborated in similar studies in the field of personality psychology, as the research with a large cross-sectional sample conducted by Soto, Gosling, John and Potter (2011). The authors found that females in the mid-adolescence were more prone to anxiety and other negative emotions in comparison with males. The authors explained that during adolescence, girls experience more social and psychological difficulties, including gender expectations and stereotypes. This and other studies also found that in adolescence and early adulthood, girls tend to be more conscientious and agreeable than boys (McCrae et al., 2002; Soto et al., 2011).

Regarding convergent validity, the SENNA inventory and the ER5FP presented moderate correlations between factors. The strongest correlations were between both Extraversion and Agreeableness factors, and between Neuroticism and Emotional Stability; which indicates that

these factors assess similar dimensions. Conscientiousness factors had the lowest correlation, but still moderate in size.

The relationship between Openness to Experience factors of the two instruments was also moderate. However, this result should be interpreted cautiously, as in the process of validation of the ER5FP, the scores on this factor failed to present satisfactory psychometric characteristics, such as a low reliability coefficient and relative low factor loadings (Damásio & Laros, 2015).

These results show that there is adequate evidence of convergent validity of the SENNA inventory with ER5FP, although they are not as robust as expected. Overall, this confirms that the majority of the socio-emotional items of the inventory can be interpreted by the model of the Big Five Personality Framework. This supports the close relationship between socio-emotional skills measured by the SENNA inventory and the underlying dimensions of the Big Five.

The present research is not exempt of limitations as the composition of the sample by convenience and the low number of respondents from private schools. This resulted in an unequal number of participants from private and public schools, disfavoring the variability of the sample. Future studies should consider representative samples to confirm and improve the proposed structure. In addition, the study did not include methods to evaluate the model structure adequacy of the SENNA inventory. These analyses will be performed in future studies to continue analyzing the psychometric properties of the instrument.

To conclude, the results of the present study support the conclusion that the SENNA inventory presents adequate psychometric properties and evidences of convergent validity in Federal District. In this sense, a similar structure of six underlying dimensions has been

reproduced in a different sample with different characteristics. Future studies should continue to obtain data on the psychometric properties of the instrument with complementary methods and considering the inclusion of diverse samples of the Brazilian population.

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MANUSCRITO 2

**Comparing measurement models of the SENNA inventory
using CFA and ESEM**

**Comparaç o de modelos de mensuraç o do invent rio SENNA
utilizando AFC e ESEM**

**Comparaci n de modelos de medida del inventario SENNA
utilizando AFC y ESEM**

Abstract

Accurate assessments tools for measuring socioemotional skills are crucial to gain knowledge of the individual differences of students. The objective of this study was to test which of three different measurement models for the Social and Emotional (or Noncognitive) Nationwide Assessment (SENNA) inventory showed the best fit to the data: (1) a 5-factor model with 52 indicators; (2) a 6-factor model with 83 indicators; (3) a 6-factor model with 65 indicators. The models were compared using Confirmatory Factor Analysis (CFA) and Exploratory Structural Equation Modeling (ESEM). The participants in this study were 634 students (59% females) with a mean age of 16.3 years ($SD = 1.21$) from secondary schools of the Federal District of Brazil. The results of the analyses indicated that the 5-factor model with 52 items showed the best fit to the data.

Keywords: socioemotional skills; score validity; structural equation modeling.

Resumo

Instrumentos de avaliação precisos para medir competências socioemocionais são cruciais para ganhar conhecimento sobre as diferenças individuais dos estudantes. O objetivo deste estudo foi testar qual dos três modelos de mensuração do inventário *Social and Emotional (or Noncognitive) Nationwide Assessment* (SENNA) mostra a melhor adequação aos dados: (1) um modelo de 5 fatores e 52 indicadores; (2) um modelo de 6 fatores e 83 indicadores; (3) um modelo de 6 fatores e 65 indicadores. Os modelos foram comparados utilizando a Análise Fatorial Confirmatória (AFC) e a Modelagem por Equações Estruturais Exploratórias (ESEM). Participaram 634 estudantes (59% mulheres) no estudo com uma média de idade de 16,3 anos ($DP = 1,21$) de oito escolas de Ensino Médio do Distrito Federal no Brasil. Os resultados indicaram que o modelo de 5 fatores e 52 itens apresentou o melhor ajuste aos dados.

Palavras-chave: competências socioemocionais; validade do teste; modelagem por equações estruturais.

Resumen

Instrumentos de evaluación precisos para medir competencias socioemocionales son cruciales para ganar conocimiento sobre las diferencias individuales de los estudiantes. El objetivo del estudio fue testar cuál de los tres modelos de medida del inventario *Social and Emotional (or Noncognitive) Nationwide Assessment (SENNA)* presentaba la mejor adecuación a los datos: (1) un modelo de 5 factores y 52 indicadores; (2) un modelo de 6 factores y 83 indicadores; (3) un modelo de 6 factores y 65 indicadores. Los modelos fueron comparados utilizando Análisis Factorial Confirmatorio (AFC) y Modelaje por Ecuaciones Estructurales Exploratorias (ESEM). Participaron 634 estudiantes (59% mujeres) en el estudio con una edad promedio de 16,3 años ($DE = 1,21$) de ocho escuelas secundarias del Distrito Federal en Brasil. Los resultados indicaron que el modelo de 5 factores con 52 ítems presentó la mejor adecuación a los datos.

Palabras clave: competencias socioemocionales; validez del teste; modelaje por ecuaciones estructurales.

Socioemotional skills have been defined by De Fruyt, Wille and John (2015) as individual characteristics that originate from the interaction between biological predispositions and environmental factors; which manifest as consistent patterns of thoughts, feelings, and behaviors; that are developed through formal and informal learning experiences; and influence the socioeconomic outcomes of individuals throughout their life. One of the key challenges in the study of socioemotional skills is their assessment since it demands different approaches from those that have been traditionally used in educational assessment (Killonel, 2012). In this context, the objective of the present study is to obtain evidences of the psychometric properties of one of the proposed instruments to measure socioemotional skills and therefore, contribute to overcome the challenges of assessment.

Self-reports have been widely used and is the most common approach for assessing personal qualities as socioemotional skills (Duckworth & Yeager, 2015). They have the advantage of being quick, easy to administer, reliable and able to predict some objectively measured outcomes (Duckworth, Tsukayama, & May, 2010; Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). In addition, literature in social and cognitive psychology has shown that people are good and accurate at communicating their true opinions through questionnaires (Duckworth & Yeager, 2015).

However, self-reports have a number limitations. The measurement of these skills might be constrained by the literacy level of the respondent, since there can be problems to understand the vocabulary or capture the meaning of the questions. Also, when respondents search through their memories, they can be more inclined to recall past behaviors in order to make their judgement undermining information about current behavior. In addition, people

tend to see themselves as having consistent beliefs and attitudes over time, which could bias the information that is recalled and evaluated (Duckworth & Yeager, 2015).

Other type of measures has been proposed to measure socioemotional skills, like teacher reports or observing the performance of tasks (Duckworth & Yeager, 2015; Kyllonen, 2012). Ultimately, all kind of measures have limitations and advantages. That is why researchers have acknowledged that a measurement is not valid in itself, but rather, its validity depends on its particular purpose and use (AERA, APA, & NCME, 1999; Duckworth & Yeager, 2015). For this reason, as pointed out by Duckworth and Yeager (2015), each measure's validity varies depending on their psychometric properties and its application context.

In case of the present study, the psychometric properties of the SENNA inventory self-report were obtained for the context of the Federal District of Brazil. This assessment tool was chosen due to demonstrated advantages of the SENNA inventory in previous applications, with a robust and replicable factor structure and measurement invariance across grades, which suggests that this measurement is suitable for research on socio-emotional development.

The SENNA inventory was constructed through inspection of the underlying structure of the following eight scales that are frequently used to measure socio-emotional skills in childhood and adolescence: Rosenberg Self-Esteem Scale (Rosenberg, 1979); Strengths and Difficulties Questionnaire-SDQ (Goodman, 1997); Big Five Inventory-BFI (John, Donahue & Kentle, 1991); Self-Efficacy Questionnaire for Children (Muris, 2001); Big Five for Children-BFC (Barbaranelli, Caprara, Rabasca & Pastorelli, 2003); Core Self Evaluations-CORE (Judge, Erez, Bono & Thoresen, 2003); Grit Scale (Duckworth & Quinn, 2009) and the Norwick-Strickland Locus of Control Scale (Nowicki & Strickland, 1973).

Santos and Primi (2014) examined the existing overlap and commonality across the more than 200 items of the eight scales with the objective of representing their common variance by a more manageable group of socio-emotional skills. The underlying dimensions were identified in a first study with a sample of 3,023 students from primary and secondary schools in Rio de Janeiro, Brazil.

Exploratory factor analyses with oblique rotation (Geomin) showed that the structure of the instrument could be represented by a set of six dimensions, five of which showed strong parallels with the Big Five personality framework (McCrae & John, 1992). The six dimensions were interpreted as follows: Conscientiousness, Neuroticism, Extraversion, Agreeableness, Openness to Experience, and External Locus of Control. The least clearly defined of these six factors, was External Locus of Control, because of its low percentage of explained variance, considerable secondary loadings on the other factors and instability across analysis (Santos & Primi, 2014).

In order to assess the internal structure of SENNA inventory, a study with a large sample of primary and secondary students in Rio de Janeiro ($N=24,605$) was developed. An Exploratory Structural Equation Modeling (ESEM) analysis with the Weighted Least Square parameter estimator (WLSMV) was performed to test if the structure of six factors with the same indicators could be recovered. This method of analysis was chosen by the authors because it showed to be more suitable for structures where significant secondary loadings can be expected and item-level factor analysis could be performed (Primi et al., 2015; Marsh et al., 2010;). For comparative purposes, a confirmatory factor analysis (CFA) was also performed.

The results showed that the ESEM six factor structure presented an acceptable fit to the data ($CFI=.92$, $TLI=.90$, $RMSEA=.04$) and indicated that the item-factor organization was

well recovered with only a few cross-loading items. On the other hand, CFA results showed lower indices of model fit (CFI=.70, TLI=.69, RMSEA= .06), which supported the use of ESEM analysis (Primi et al., 2015). Internal consistency coefficients of the six factors were all above .75.

Based on the analysis of the six factor structure of SENNA inventory with 92 indicators, the authors proposed a slightly shorter version of 83 items of the instrument. They excluded nine items from the original 92 version because of low factor loadings, difficulties with their interpretation, cross loadings in more than two factors and other unsatisfactory psychometric characteristics. The excluded items corresponded to the following factors: Extraversion (1 item); Openness to Experience (1 item), Agreeableness (2 items) and External Locus of Control (5 items).

The first time that the factor structure of the 83 item version of SENNA inventory was analyzed, was in the Federal District of Brazil during a study performed by Pancorbo and Laros (2015). This study aimed to obtain evidence of the psychometric characteristics of SENNA inventory and its convergent validity with the Reduced Scale of the Big Five Personality Factors (ER5FP). The study used data from 634 students (59% females) from secondary schools of the Federal District.

Exploratory Factor Analysis (EFA) was performed using Principal Axis Factoring with oblique rotation considering the correlations between factors (Santos & Primi, 2014). Considering the results of the Hull method (Lorenzo-Seva, Timmerman, & Kiers, 2011) and theoretical considerations six factors were extracted. Based on the following criteria 18 items of the six-factor solution were excluded: (1) factor loadings $<.32$ on its principal factor, (2)

factor loadings $>.32$ on more than one factor with a difference less than $|.10|$, (3) high factor loading on a different factor than theoretically expected.

The final solution of the six factors with 65 items explained 42.7% of the total variance. All factors showed reliability coefficients above .80, except for the sixth factor of External Locus of Control (Guttman's $\lambda_2 - [\lambda_2] = .66$). This factor also presented the lowest factor loadings in the obtained solution.

The correlations between correspondent factors of the SENNA inventory and ER5FP were strong in size and statistically significant. The lowest correlation was observed between the two Conscientiousness factors ($r = .37, p < .01$), while the two Extraversion factors showed the largest correlation ($r = .81, p < .01$). The Emotional Stability component of ER5FP showed a strong negative correlation with the Neuroticism factor of SENNA inventory ($r = -.70, p < .01$), which reflects their inverse conceptual interpretation.

Overall, the two previous studies provided evidences that support the existence of a six factor model in SENNA inventory. In case of the first study performed by Santos and Primi (2014), the model considered 92 indicators, but 83 were recommended by the authors for later model testing. In the case of the second study by Pancorbo and Laros (2015), a model of six factors with 65 indicators proved to be supported by the data.

The present study tested the above two models in addition to a third model of five factors with 52 items. The third model was proposed with the assumption that a reduced model of five factors, with fewer items would present a better model fit, based on the following theoretical and statistical reasons. First, in previous Exploratory Factor Analysis of SENNA inventory in Distrito Federal and Rio de Janeiro (Santos & Primi, 2014) several items showed medium or low factor loadings ($< .40$), many of which could be probably excluded for improving the

model. Second, as stated by the authors of SENNA, the inventory structure presents a strong parallel with the model of the Big Five personality factors (Primi et al., 2015), then perhaps, its structure could be well represented by five dimensions. Third, in the Exploratory Factor Analysis of SENNA inventory using data from Distrito Federal (Pancorbo & Laros, 2015) the factor of External Locus of Control presented unsatisfactory psychometric properties as the lowest factor loadings and reliability indices. Fourth, according to some authors, simple model structures could contribute more than complex structures to the interpretability of the measurements and to its validity (Herrmann & Pfister, 2013; Ullman, 2006; Byrne, 2005).

The three models were tested through two types of analysis: and Exploratory Structural Equation Modeling (ESEM) and a Confirmatory Factor Analysis (CFA). The ESEM analysis was performed using the Mplus statistical package (L. K. Muthén & B. O. Muthén, 2012). ESEM is an intermediate way between exploratory approaches and the confirmatory factor analysis (Primi et al., 2015). ESEM provides SEM parameter estimates, standard errors and goodness-of-fit statistics, which are traditionally associated with CFA.

The ESEM differs from CFA approach in that it imposes restrictions in the number of factors, but leaves their loadings free to be estimated for all extracted factors and not just for the principal factors (Primi et al., 2015; Marsh et al., 2010). This difference is particularly important in the case of factor structures of personality traits, where the majority of trait variables tend to have loadings on more than one factor (De Raad & Mlacic, 2015). Therefore, as specified in CFA analysis, for personality structures it is in practical sense, difficult to assume that the variables have zero-loadings on all factors, except for the ones which are a priori specified in the model (McCrae, Zonderman, Costa, Bond & Paunonen, 1996; Borkenau & Ostendorf, 1990).

When fixing many or all cross-loadings at zero, the CFA analysis may force a researcher to restrict the model more than is suitable to the data and “rely on extensive model modification to find a well-fitting model, which, in turn, could distort the factor structure” (Asparouhov & Muthén, 2009, p. 397). The alteration of the original structural model using modification indices should be carefully performed for avoiding problems with the capitalization on chance of the data and the occurrence of type I and II errors in the model (Pilati & Laros, 2007; Ullman, 2006). In that sense, modifications should be based on strong theoretical argumentations and not only on statistical considerations to improve the model fit indices (Pilati & Laros, 2007; Byrne, 2005).

Method

Participants

The convenience sample consisted of 634 students (59% female) with a mean age of 16.3 years ($SD = 1.21$) from seven secondary public schools and one secondary private school from the Federal District of Brazil. Of these, 39.1% were in the first grade, 31.4% in the second grade and 29.5% in the third grade. Data collection took place in schools located in five regions with different socioeconomic characteristics: Santa Maria (25.1%), Asa Norte (24.3%), Gama (24.3%), Riacho Fundo II (21.9%) and Lago Norte (4.4%).

Instruments

Sociodemographic questionnaire (Santos & Primi, 2014). The instrument assesses information about student’s family environment, individual characteristics, parents and children’s attitudes toward studying and classroom characteristics. The instrument contains 29 multiple-choice items.

SENNA inventory (Primi et al., 2015). This self-report inventory assesses socio-emotional skills and was originally developed for Brazilian youth. It measures six dimensions: Conscientiousness, Neuroticism, Agreeableness, Openness to Experience, Extraversion and External Locus of Control. The instrument consists of 92 questions of which the respondents need to answer on a 5-point Likert scale (1 = "Nothing and 5 = "Totally"). In the present study, a shorter version of 83 items of the SENNA inventory was used by suggestion of its authors.

Procedure

Data collection. The instruments were administrated to a pilot sample in order to make corrections on the adequacy of the instructions, the language and the response time. Some corrections were made on the adjectives and the instructions of the ER5FP, as well as on the instructions for its application. Changes were made under supervision of the author of the scale. After this process, several secondary schools from different socioeconomic areas of the Federal District were contacted to present the study and ask for permission to administer the instruments. Classrooms to the data collection were selected with the school principals. In each classroom, instructions were explained to the students and the instruments were administrated collectively to the students.

Data analysis. The present study tested the best fit to the data of three proposed models: a five factor model with 52 indicators (M1); a six factor model with 83 indicators (M2); a six factor model with 65 indicators (M3). CFA and ESEM analyses will be performed with the assumption that ESEM models will fit better than CFA models for the reasons exposed above.

Normality of the data was verified through multivariate tests for skewness and kurtosis proposed by Mardia (1970) using the statistical programs FACTOR and Mplus 6.12. In the

program FACTOR, the test for skewness was not statistically significant, although there was evidence of excessive kurtosis. However, using the program Mplus 6.12, the tests for skewness and kurtosis were statistically significant, which indicates a violation of the assumption of multivariate normality. The presence of outliers and missing cases was verified by exploring the data. No outliers were identified in the database, while the percentage of missing cases was less than 2%. Missing cases were replaced using the linear trend at point method which is part of SPSS version 21.

After verifying the above assumptions, three models were tested using the program Mplus 6.12: a five factor model with 52 indicators (M1); a six factor model with 83 indicators (M2); a six factor model with 65 indicators (M3). The distribution of items of the M1 model was performed using an Exploratory Factor Analysis with Weighted Least Square parameter estimator (WLSMV) and Geomin rotation using Mplus 6.12. The number of extracted factors was fixed on five and an item was excluded when it showed a factor loading less than .40 on its principal factor.

In order to test the fit of the three proposed models to the data two analyses were performed: Exploratory Structural Equation Modeling (ESEM) and Confirmatory Factor Analysis (CFA). Both analyses were performed using Mplus 6.12 (L. K. Muthén & B. O. Muthén, 2012). The type of model estimator chosen was MLM for CFA analyses and MLR for ESEM. Both are Mplus options for maximum likelihood estimation with robust standard errors. These types of estimators are adequate for non-normal data and provide suitable indices for model comparison in case of non-nested models. (J. Wang & X. Wang, 2012; L. K. Muthén & B. O. Muthén, 2012).

The following indices were used to test the fit of the model: Comparative Fit Index (CFI); Tucker-Lewis index (TLI), Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). CFI and TLI values greater than .95 indicate a good fit of the model to the data (Ullman, 2006). Meanwhile, for the RMSEA, a value of .06 or less indicates a close fitting model (Ullman, 2006). As for the SRMR index, a value less than .08 is considered a good fit (J. Wang & X. Wang, 2012). However, Marsh et al. (2010) pointed out that this indices should be considered as rough guidelines in the case of instruments with large factor structures (e.g., instruments with at least 50 items and at least five factors), due to the fact that they are typically unable to satisfy the minimally acceptable standards of fit.

In addition to the above goodness-of-fit indices, the coefficients of the variables and their levels of significance, the standardized residuals of the tested models, the correlation between factors, as well as the squared multiple correlations were inspected for the evaluation of the models. For the standardized residuals, values greater than $|2.58|$ were considered large (Byrne, 2010).

For the purpose of model comparison, a chi-square difference test using the Satorra-Bentler scaled chi-square (χ^2) was performed. In the Satorra-Bentler scaled (mean-adjusted) chi-square, the usual normal data based chi-square statistic is divided by a scaling correction to better approximate the chi-square under non-normality. Using this estimate, scaled chi-square difference test (SCDT) was calculated, followed by the chi-square difference test with its respective p value (J. Wang & X. Wang, 2012).

Ethical considerations

This study was approved by the Ethics Committee of the Institute of Human Sciences of University of Brasilia (CAAE 38811314.6.0000.5540). Two copies of the Informed Consent were given to the students: one for the students and the other for their parents. If a student did not consent to participate, instruments were not delivered and he/she stayed in the classroom during the application. In addition, if a parent did not consent the participation of a student, he/she could inform the school about his decision and the student did not participate in the study.

Results

A summary of the goodness-of-fit indices of the three models for CFA and ESEM is presented in Table 1. In CFA analysis, M3 presented the best fit to the data (CFI = .76; TLI = .75; RMSEA = .047; SRMR = .072), together with M1 model (CFI = .78; TLI = .77; RMSEA = .053; SRMR = .072). Similarly, in ESEM analysis, M3 model (CFI = .87; TLI = .84; RMSEA = .038; SRMR = .033) and M1 model (CFI = .87; TLI = .84; RMSEA = .044; SRMR = .036) showed the best fit to the data.

On the other hand, in the CFA and ESEM analyses of the three models, the resulting indices of RMSEA and their upper limits of 90% Confidence Interval (CI), and SRMR indices reflected a close fit to the data, considering the expected maximum values of .06 and .08, respectively. In the case of the CFI and TLI indices of the three models, none of them reached the expected benchmark value (CFI \geq .95; TLI \geq .95).

Table 1

Summary of goodness of fit indices of three alternative measurement models do SENNA

Model	Factors	Items	Analysis	CFI	TLI	RMSEA (90% C.I.)	SRMR
M1	5	52	CFA	.78	.77	.053 (.051-.055)	.072
M2	6	83	CFA	.68	.67	.048 (.047 - .050)	.079
M3	6	65	CFA	.76	.75	.047 (.046 - .049)	.072
M1	5	52	ESEM	.87	.84	.044 (.042 - .046)	.036
M2	6	83	ESEM	.83	.80	.037 (.036 - .039)	.036
M3	6	65	ESEM	.87	.84	.038 (.036 - .040)	.033

Notes. M1 = 5-factor model with 52 indicators; M2 = 6-factor model with 83 indicators; M3 = 6-factor model with 65 indicators. CFA = confirmatory factor analysis; ESEM = exploratory structural equation modeling. CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; RMSEA = Root-Mean-Square Error of Approximation; SRMR = Standardized Root Mean Square Residual.

Model comparison was tested using Satorra-Bentler scaled chi-square difference test.

Table 2 presents the paired model comparison for both CFA and ESEM analysis. In the Table 2, a model that presents an improvement over the other is marked in bold. As it can be seen, throughout the models comparison and for both analysis, M1 model (5-factor and 52 items) concurrently showed an improvement over the M2 (6-factor and 82 items) and the M3 (6-factor and 83 items) model that is statistically significant.

Table 2

Chi-square difference test using the Satorra-Bentler scaled chi-square

Analysis	Compared models	χ^2	<i>df</i>	SCDT	Δdf	Significance
CFA	M1	3527.14	1264	4623.22	2041	<i>p</i> < .001
	M2	8172.77	3305			
	M2	8172.77	3305	3342.02	1305	<i>p</i> < .001
	M3	4835.83	2000			
	M1	3527.14	1264	1288.03	736	<i>p</i> < .001
	M3	4835.83	2000			
ESEM	M1	2392.16	1076	3082.99	1844	<i>p</i> < .001
	M2	5503.25	2920			
	M3	3228.85	1705	2273.99	1215	<i>p</i> < .001
	M2	5503.25	2920			
	M1	2392.16	1076	799.78	629	<i>p</i> < .001
	M3	3228.85	1705			

Notes. M1 = 5- factor model with 52 indicators; M2 = 6-factor model with 83 indicators; M3 = 6 factor model with 65 indicators. CFA = Confirmatory Factor Analysis; ESEM = Exploratory Structural Equation Modeling. SCDT = Scaled Chi-squared Difference Test; Δdf = difference of degrees of freedom; significance = *p*-value for a chi-square statistic.

Up to this point, the results of Tables 1 and 2 indicate that M1 and M3 models present an overall, better fit to the data than the M2 model for both CFA and ESEM analysis. Although, as pointed out by many authors (J. Wang & X. Wang, 2012; Byrne, 2010; Pilati & Laros, 2007), the evaluation of the fit of a model should not exclusively rely on the goodness of fit indices. Instead, multiple methods should be considered, including the observation of the psychometric properties of the models. This includes evaluating the coefficients of the variables, their respective levels of significance, the residuals of the tested models, as well as the squared multiple correlations.

The range of the factor loadings and standard errors and their respective means of CFA and ESEM analyses are presented in Table 3 for the M1 model (5-factor and 52 items), Table 4 for M2 model (6-factor and 83 items) and Table 5 for M3 (6-factor and 65 items). As it can be

seen, CFA factor loadings of all factors are slightly higher than the ESEM loadings in all models. However, the differences are very small and the pattern of factor loadings is similar in all solutions. All factor loadings obtained were statistical significant at the level of 5%.

Table 3

Factor loadings, standard errors and reliability indices for the 5-factor model with 52 indicators (M1)

Factors	Analyses	M-FL (FL range)	M-SE (SE range)	n items	λ_2	$M r_{ij}$	$M r_{it}$
CO	CFA	.56 (.44 - .70)	.03 (.02-.04)	18	.90	.32	.54
	ESEM	.55 (.42 - .66)	.04 (.03-.04)	18			
NE	CFA	.69 (.37 - .85)	.02 (.01-.03)	9	.90	.48	.65
	ESEM	.68 (.35 - .86)	.03 (.02-.05)	9			
OE	CFA	.59 (.43 - .77)	.03 (.02-.04)	7	.78	.35	.51
	ESEM	.57 (.39 - .77)	.05 (.04-.05)	7			
AG	CFA	.53 (.31 - .72)	.03 (.02-.04)	12	.83	.28	.48
	ESEM	.50 (.38 - .64)	.05 (.04-.06)	13			
EX	CFA	.58 (.52 - .66)	.03 (.03-.03)	6	.74	.35	.50
	ESEM	.56 (.40 - .68)	.04 (.04-.05)	5			

Notes. CO = Conscientiousness; NE = Neuroticism; OE = Openness to Experience; AG = Agreeableness; EX = Extraversion; ELC = External Locus of Control. CFA = Confirmatory Factor Analysis; ESEM = Exploratory Structural Equation Modeling. M-FL = mean of factor loadings; M-SE mean of standard errors; The range of factor loadings (FL) and standard errors (SE) are shown between parentheses; $M r_{ij}$ = Mean of inter-item correlations. $M r_{it}$ = Mean of ítem-total correlations.

Table 4

Factor loadings, standard errors and reliability indices for the 6-factor model with 83 indicators (M2)

Factors	Analyses	M-FL (FL range)	M-SE (SE range)	n items	λ_2	$M r_{ij}$	$M r_{it}$
CO	CFA	.55 (.25 - .69)	.02 (.02-.03)	18	.87	.27	.51
	ESEM	.53 (.37- .69)	.05 (.03-.06)	16	.89	.33	.54
NE	CFA	.56 (.18 - .84)	.02 (.01-.03)	14	.83	.34	.55
	ESEM	.59 (.31 - .86)	.04 (.02-.06)	13	.87	.28	.55
OE	CFA	.47 (.07 - .74)	.03 (.02-.03)	14	.80	.22	.42
	ESEM	.48 (.29 - .73)	.05 (.04-.06)	12	.82	.27	.47
AG	CFA	.48 (.13 - .74)	.03 (.02-.03)	12	.78	.24	.43
	ESEM	.44 (.24 - .61)	.06 (.04-.07)	16	.82	.23	.43
EX	CFA	.49 (.32 - .73)	.02 (.02-.03)	15	.79	.19	.43
	ESEM	.42 (.24 - .52)	.07 (.05-.10)	13	.72	.14	.40
ELC	CFA	.41 (.19 - .64)	.03 (.02-.03)	10	.57	.12	.31
	ESEM	.35 (.24 - .46)	.07 (.05-.08)	13	.47	.05	.28

Notes. CO = Conscientiousness; NE = Neuroticism; OE = Openness to Experience; AG = Agreeableness; EX = Extraversion; ELC = External Locus of Control. CFA = confirmatory factor analysis; ESEM = exploratory structural equation modeling. M-FL = mean of factor loadings; M-SE mean of standard errors; the range of factor loadings (FL) and standard errors (SE) are shown between parentheses. $M r_{ij}$ = Mean of inter-item correlations. $M r_{it}$ = Mean of ítem-total correlations.

Table 5

Factor loadings, standard errors and reliability indices for the 6-factor model with 65 indicators (M3)

Factors	Analyses	<i>M</i> FL (FL range)	<i>M</i> SE (SE range)	n items	λ_2	<i>M</i> r_{ij}	<i>M</i> r_{it}
CO	CFA	.58 (.42 - .72)	.03 (.02-.03)	14	.88	.34	.54
	ESEM	.56 (.40 - .70)	.05 (.03-.07)	14			
NE	CFA	.61 (.31 - .85)	.02 (.01-.03)	12	.89	.38	.58
	ESEM	.61 (.30 - .86)	.03 (.02-.05)	12			
OE	CFA	.54 (.35 - .75)	.03 (.02-.03)	11	.82	.29	.48
	ESEM	.49 (.32 - .74)	.06 (.04-.07)	11			
AG	CFA	.53 (.31 - .73)	.03 (.02-.03)	11	.81	.28	.47
	ESEM	.49 (.35 - .64)	.06 (.04-.08)	11			
EX	CFA	.54 (.41 - .74)	.03 (.02-.03)	10	.81	.29	.48
	ESEM	.48 (.37 - .58)	.07 (.06-.08)	10			
ELC	CFA	.45 (.30 - .65)	.03 (.03-.04)	7	.66	.21	.36
	ESEM	.42 (.37 - .58)	.08 (.06-.10)	7			

Notes. CO = Conscientiousness; NE = Neuroticism; OE = Openness to Experience; AG = Agreeableness; EX = Extraversion; ELC = External Locus of Control. CFA = confirmatory factor analysis; ESEM = exploratory structural equation modeling. M-FL = mean of factor loadings; M-SE mean of standard errors; the range of factor loadings (FL) and standard errors (SE) are shown between parentheses. *M* r_{ij} = Mean of inter-item correlations. *M* r_{it} = Mean of ítem-total correlations.

In terms of the size of the factor loadings, M1 has higher loadings than M2 and M3 in almost all of their common factors. In the M3 and M2 model, the External Locus of Control (ELC) factor presented, on average, the lowest factor loadings. It should be noted that for the M1 model, the items of the ELC factor were almost all excluded during the EFA analysis, as they presented factor loadings lower than the benchmark of .40. In this model only one item remained and presented a medium negative loading (- .48) in the Conscientiousness factor, which was inversed for reporting purposes and presented in Table 3.

Almost all reliability indices were all above .75 for the three models, except for the ELC factor in the M2 (CFA $\lambda_2 = .57$; ESEM $\lambda_2 = .47$) and M3 ($\lambda_2 = .66$) model. An analysis of the

means of the inter-item and item-total correlations, indicate that in M1, the factor of Agreeableness presents the least internal consistency, while in M2 and M3 model, the External Locus of Control factor does.

In addition, the standardized residual values were inspected for ESEM models M1, M2 and M3. The proportion of residual values from the total of M1 model that exceeded the cut point of $|2.58|$, was 12.2%. In the meanwhile, the proportion of values that surpassed the same criteria from the total of model M2 was 11.1%, while for M3 was 14.5%.

The squared multiple correlations were inspected for models M1, M2 and M3 after CFA and ESEM analyses. On average, ESEM squared multiple correlations for models M1 ($M = .38$), M2 ($M = .33$) and M3 ($M = .37$) were higher than CFA results for all models ($M_{M1} = 0.35$; $M_{M2} = .28$; $M_{M3} = .32$). In addition, ESEM results presented more squared multiple correlations greater than .40 for both models than CFA results. All models showed equally number of values greater than the benchmark of .40.

In regard to the correlation between factors, correlations estimated by CFA tend to be systematically larger than ESEM ones in all models. In the case of the M1 model, the range of the factor correlations for CFA was $-.23$ to $.54$ (M absolute value = $.25$), while for ESEM the range was $-.23$ to $.34$ (M absolute value = $.12$). As for the M2 model, the range of factor correlations for CFA was $-.52$ to $.63$ (M absolute value = $.29$), while for ESEM this was $-.27$ to $.26$ (M absolute value = $.15$). Finally, for the M3 model, the range of factor correlations for CFA was $-.51$ to $.56$ (M absolute value = $.29$), and for ESEM this was $-.23$ to $.28$ (M absolute value = $.15$). The highest CFA factor correlations in the M3 model were between Conscientiousness and External Locus of Control ($r = -.51$) and between Agreeableness and Extraversion ($r = .56$). Similarly, these last two factors presented the highest CFA factor

correlation in the M1 model ($r = .54$) and in the M2 model ($r = .63$). In addition, in the M2 model Conscientiousness and External Locus of Control also presented a medium negative correlation ($r = -.53$).

Discussion

The objective of the present study was to test which of three proposed measurement models characterizing the SENNA inventory showed the best fit to the data: a 5-factor model with 52 indicators (M1); a 6-factor model with 83 indicators (M2); a 6-factor model with 65 indicators (M3). Results showed that the 5-factor model with 52 indicators (M1) presented the best fit to the data in comparison with the other two models. In addition, the obtained results allowed expressing a number of recommendations to improve the measurement characteristics of the scale.

It was expected beforehand that the model fit statistics using ESEM would be considerably better than the ones obtained with CFA, which was confirmed by the results of the present study. The goodness-of-fit indices of all three models using ESEM were better than the ones using CFA. However, the values of CFI and TLI of all models were lower than the expected benchmark values recommended by the literature (J. Wang & X. Wang, 2012; Byrne, 2010; Pilati & Laros, 2007; Ullman, 2006), while the RMSEA and SRMR values resulted as expected. In this regard, Marsh et al. (2010) warn that benchmark indices ($CFI \geq .95$ and $TLI \geq .95$) should be considered as “rough guidelines or rules of thumb” because of the limitations of large factor structures in personality assessment.

Furthermore, as Marsh et al. (2010) point out, there is ambiguity in the application of fit indices in ESEM because of the considerable number of parameters that are estimated in this analysis and because “this feature might make problematic any index that does not control for

model parsimony (due to capitalization on chance) and calls into question the appropriateness of controls for parsimony in those indices that do” (Marsh et al., 2010, p. 488). This could explain why CFI and TLI indices were not as good as expected in the present study, contrary to RMSEA and SRMR indices. In this context, Marsh et al. (2010) recommend researchers to use an eclectic approach based on the integration of a variety of information (e.g. different indices, detailed evaluations of the actual parameter estimates in relation to theory, a priori prediction, common sense, etc.) to evaluate the internal structure of a measurement model.

On the other hand, overall, ESEM factor correlations in the three models (two of them reported on the previous section) were lower than CFA correlations. In this respect, the ESEM solutions contribute more to the distinctiveness of the latent dimensions. Nevertheless, as found in previous studies using SENNA inventory (Santos & Primi, 2014), it was expected that three of the six factors (Openness to Experience, Agreeableness and Extraversion) would show moderate correlations between them. Specifically, in the present study, Agreeableness and Extraversion presented the highest correlations in the three models of CFA analysis and a considerable number of shared factor loadings. This reflects their strong content relationship and a certain limitations of the instrument to differentiate them for measurement purposes.

Evidence of the superiority of the ESEM approach in comparison to CFA has been supported by a number of studies (Asparouhov & Muthén, 2009; Marsh et al., 2010; Primi et al., 2015) which also point out that CFA should be avoided as a method to determine the more appropriate representation of the internal structure of personality instruments (Herrmann & Pfister, 2013; Marsh et al., 2010; Asparouhov & Muthén, 2009; McCrae et al., 1996). One of the claimed reasons is that, factor structures of personality traits usually present cross factor loadings, which could be handled better by ESEM as it leaves loadings free to be estimated for

all the extracted factors (Asparouhov & Muthén, 2009). In this regard, in the present study the inspection of the three model structures indicated a high number of cross loadings between factors, which supports the use of ESEM for the analysis.

In regard to the models comparison, the most parsimonious models M1 and M3, both with more restrictions than M2, presented the best goodness of fit indices. Specifically, M1 proved to be the best model based on Satorra-Bentler scaled chi-square difference test.

It should be noticed that the model M2 of 83 items follows the original structure of SENNA inventory of 92 items distributed in six factors. These six dimensions underlie different constructs of the socio-emotional skills, such as self-concepts, self-esteem and self-efficacy, motivation, attitudes and control beliefs (attributing control internally or externally), social and emotional adaptive and maladaptive behavior, and personality traits (Primi et al., 2015). Five of these dimensions present strong parallels with the Big Five factor theory, while the sixth one, External Locus of Control, was included in the model structure because of its connection with neuroticism and its relevance in the socio-emotional skills theoretical framework (Santos & Primi, 2014).

Previous studies using the 92 version of SENNA inventory and performed with large scale samples in Rio de Janeiro (Santos & Primi, 2014) provided evidences of psychometric problems with some items of SENNA inventory, as low factor loadings and weak psychometric characteristics of ELC factor. Due to these problems, nine items were excluded by the authors, five corresponding to the ELC factor. Thus, the 83 version of the scale was proposed. Nevertheless, after the application of this new version in the Federal District, similar results as the ones from Rio de Janeiro were found: similar items presented low factor loadings and also, ELC dimension showed the weakest psychometric properties. After the analyses, another

number of items were excluded and a 65 item version of SENNA inventory was proposed (Pancorbo & Laros, 2015).

Based on these evidences, the 5-factor model and 52 items was intended to include more restrictions on the structure of the instrument for methodological purposes: a higher shortcut on the factor loadings as a condition for the exclusion of the items and the extraction of just five factors. The results showed that the five factors contents presented strong parallels with the Big Five theory and almost all of the items of ELC factor were excluded and, as a consequence, this factor was not represented in the internal structure of the model.

Overall, the above evidence from different samples, showed that the factor of ELC, characterized by indicators of distress, ineffectiveness, and hopelessness, among others, presents weak psychometric characteristics. Several reasons could be hypothesized for understanding this result. For example, the factor items probably were not adequately formulated to represent the extension of the latent variable. Moreover, perhaps the items were not well understood by the respondents, as they were longer than the average length of other items. Finally, probably some items were subject of social desirability, due to their negative content (e.g. “I am filled with doubts about my competence”; “I feel that one of the best ways to handle most problems is just not to think about them”; “I am blamed for things that weren't my fault”).

However, despite the statistical evidences that support the 5-factor model and 52 indicators as the one with the best fit to the data, its internal structure presents some irregularities that should be addressed for future studies. As a considerable number of items were excluded, some factors were left with fewer items than others. For example, 18 items were held for Conscientiousness, while only 5 items were retained for Extraversion. This lack

of balance may have influenced how much the latent variables are being represented by the items in each factor, and thus, affecting the degree of the content validity of the scale (Cerentini, 2015).

The limitations of the study should be acknowledged. The study used a convenience sample mostly from public schools and the data presented a multivariate non-normal distribution. In terms of the data analysis, modifications indices were not used to improve the adequacy indices of the models, to avoid increasing the risk of type I and type II errors in the models (Pilati & Laros, 2007; Ullman, 2006). However, futures studies could consider to apply model modifications or re-specifications with strong statistical and theoretical argumentations to improve the initial model (J. Wang & X. Wang, 2012). In addition, future studies that seek to evaluate the psychometric properties of SENNA, should consider other statistical procedures like measurement invariance tests or a more detailed analysis of the items using Item Response Theory analysis.

In conclusion, the results of the study indicate that the latent structure of SENNA inventory was partially confirmed. The latent dimensions that have strong parallels to the Big Five Factor Theory were recovered in the three models, which supports the hypotheses that the socio-emotional items of the instrument can be interpreted by this personality framework (Santos & Primi, 2014). However, some items presented weak psychometric characteristics, especially the ones from External Locus of Control factor.

Nonetheless, the results of the study are encouraging to improve the internal structure of the instrument through the correction of some deficiencies that were found in the analyses. For instance, the items that presented a high covariance or low factor loadings could be revised or reformulated, although it should be considered the typical presence of cross-factor loadings in

personality measures. This last characteristic, corroborated in the results of the study, emphasizes the appropriateness of ESEM analysis in comparison to CFA to evaluate the internal structure of personality-based measurements as SENNA inventory.

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CONSIDERAÇÕES FINAIS

Os dois artigos elaborados contribuíram para alcançar o objetivo geral da dissertação: obter evidências de validade do instrumento SENNA.

O primeiro artigo permitiu fornecer evidências de validade de construto do instrumento por meio de análise fatorial exploratória dos itens do instrumento, e de validade convergente com a aplicação do SENNA junto com a Escala Reduzida de Cinco Grandes Fatores de Personalidade (ER5FP). Evidências adicionais de validade de construto foram obtidas por meio da comparação entre grupos nos seis fatores. Assim, foi encontrada uma diferença significativa ($p < 0,01$) entre homens e mulheres no fator Neuroticismo com um tamanho de efeito d de Cohen de 0,41, sendo que mulheres obtiveram um escore fatorial maior. Também foi encontrada uma diferença significativa ($p < 0,01$) entre homens e mulheres no fator Conscienciosidade com um tamanho de efeito d de Cohen de 0,32, sendo que mulheres obtiveram um escore fatorial maior. Por fim, foi encontrada uma diferença significativa entre homens e mulheres no fator Locus de Controle Externo com um tamanho de efeito d de Cohen de 0,41, sendo que homens obtiveram um escore fatorial maior. Todos esses resultados de comparação entre homens e mulheres estão em concordância com a literatura na área de personalidade.

Os dados coletados em uma amostra de 634 estudantes para os dois estudos, permitiram recuperar a estrutura latente de seis fatores do instrumento SENNA e obter adequados índices de consistência interna na maior parte dos fatores, concordando com os achados de estudos anteriores realizados no Rio de Janeiro. No entanto, os resultados indicaram a existência de vários itens com propriedades psicométricas insatisfatórias o que levou à exclusão de 18 dos 83 itens do instrumento SENNA. Assim, a solução fatorial final encontrada consistiu de 65 itens

distribuídos em seis fatores. Dos seis fatores encontrados, o fator de Locus de Controle Externo obteve uma consistência interna insatisfatória (Lambda 2 de 0,66), além de itens com cargas fatoriais medianas ou baixas o que evidenciou problemas na representação do construto.

Além dos achados anteriores, o primeiro artigo também permitiu identificar correlações moderadas entre alguns fatores do SENNA e a existência de itens com cargas fatoriais em mais de um fator. Esse resultado corrobora os resultados achados na aplicação da escala no Rio de Janeiro, além de resultados em outros estudos com instrumentos baseados no modelo de CGFP.

Uma análise de correlação entre os fatores de SENNA e o ER5FP foi utilizada para obter evidências de validade convergente do SENNA. As correlações mais elevadas foram encontradas entre os fatores de Extroversão ($r = 0,81$) de ambos os instrumentos e entre os fatores de Neuroticismo do SENNA e Estabilidade Emocional da ER5FP ($r = - 0,70$). A correlação mais baixa foi encontrada entre os fatores de Conscienciosidade ($r = 0,37$) dos dois instrumentos. Os resultados da análise correlacional entre os fatores do SENNA e ERRFP forneceram evidências positivas da validade convergente do SENNA e reforçaram o forte paralelo do instrumento SENNA com o modelo dos Cinco Grandes Fatores de Personalidade (CGFP).

Já no segundo artigo o objetivo foi acrescentar evidências de validade de construto do inventário SENNA por meio da testagem de três modelos alternativos de estrutura fatorial do instrumento. Observou-se qual dos modelos se ajustavam melhor aos dados coletados. Os seguintes modelos foram comparados: um modelo de 5 fatores e 52 itens; um modelo de 6 fatores e 65 itens e um modelo de 6 fatores e 83 itens. Com esse intuito, decidiu-se utilizar a Análise Fatorial Confirmatória (AFC) e outra análise recomendada pela literatura para avaliar a estrutura fatorial de medidas de personalidade: a Modelagem por Equações Estruturais

Exploratórias (ESEM). Achou-se adequada a utilização do ESEM devido a sua utilidade para avaliar estruturas fatoriais onde que existem associações entre os fatores e medianas cargas fatoriais em mais de um fator, como achado no primeiro estudo para o caso do instrumento SENNA.

Assim, o segundo estudo permitiu obter novas evidências de validade de construto do instrumento e identificar desafios na sua estrutura fatorial. O modelo que apresentou os melhores índices de adequação aos dados em comparação com os outros 2 modelos foi o de 5 fatores e 52 itens. No entanto, a utilização deste modelo para posteriores aplicações do instrumento, não é recomendável porque alguns dos seus índices de ajuste ($CFI = 0,87$ e $TLI = 0,84$) não alcançaram os recomendados pela literatura. Além disso, achou-se que existe um desequilíbrio na distribuição de itens nos fatores (alguns fatores têm muitos mais itens do que outros), o que apresenta riscos para a representatividade teórica dos construtos por trás de cada uma das dimensões. Contudo, a comparação dos três modelos e a identificação do modelo de cinco fatores como o que melhor se ajusta aos dados, permitiu coletar maiores informações sobre as fortalezas e fraquezas da estrutura fatorial do instrumento SENNA.

Em geral, os resultados dos estudos um e dois permitiram, recuperar a estrutura fatorial de seis fatores do instrumento SENNA, obter índices de consistência interna adequados na maioria das suas dimensões e corroborar que a estrutura do instrumento é próxima à estrutura do modelo de CGFP. Os resultados também permitiram identificar fraquezas nas propriedades psicométricas de um dos fatores da escala, o fator de Locus de Controle Externo; observar que existem fatores que não contribuem para a diferenciação das dimensões da escala por sua correlação elevada (Amabilidade e Extroversão), e que alguns itens apresentaram problemas

psicométricos que deverão ser analisados à profundidade com outro tipo de técnicas a fim de representarem melhor as dimensões latentes do instrumento.

A implicação metodológica da dissertação foi oferecer evidências das vantagens do uso do ESEM frente ao CFA para a avaliação de medidas de personalidade quando estas apresentam correlação entre fatores e itens com cargas fatoriais medianas em mais de um fator, como o caso do instrumento SENNA. No entanto, como afirmam Marsh et al. (2010) maiores pesquisas deverão ser feitas para avaliar a adequação do uso do ESEM e seus índices de ajuste para a avaliação de estruturas fatoriais de instrumentos de medida.

No que tange às implicações práticas, a dissertação ofereceu evidências sobre as propriedades psicométricas da estrutura interna do inventário SENNA e sua adequação para ser utilizada para a avaliação de competências socioemocionais no âmbito educativo.

Adicionalmente, a pesquisa contribuiu a aplicação do instrumento em outro contexto de diversas características que as do Rio de Janeiro, o que permitiu gerar maiores evidências sobre sua adequação psicométrica para diversas populações.

Como limitações, destaca-se o caráter limitado da amostra, sendo por conveniência e com a participação de um maior número de escolas públicas do que escolas privadas; e a distribuição não normal dos dados o que limita a representatividade e acurácia dos resultados. Por outro lado, não se utilizaram testes de invariância de medida ou análises que correspondem ao modelo da Teoria de Resposta ao Item, que poderiam ter fornecido maiores evidências sobre as propriedades psicométricas do instrumento e seus itens.

Por fim, como agenda de pesquisa sugere-se: (a) analisar as características dos itens a través do modelo da Teoria de Resposta ao Item; (b) continuar avaliando as propriedades psicométricas da dimensão de Locus de Controle Externo e sua contribuição ao modelo teórico

da escala; (c) avaliar a distinção teórica entre os construtos socioemocionais do instrumento SENNA e os construtos relacionados ao Modelo de Cinco Grandes Fatores; (d) aplicar o inventário SENNA em diferentes amostras de diversas características no contexto brasileiro para continuar obtendo evidências de validade do instrumento.

ANEXO 1: Estrutura factorial do inventário *Social and Emotional (or Noncognitive)****Nationwide Assessment (SENNA)****Factor loadings using Principal Axis Factoring and Promax Rotation of SENNA inventory items (N = 634)*

Item Description	NE	CO	OE	AG	EX	ELC	h ²
Eu me irrita com facilidade.	.84	.15	-.04	-.09	.13	.06	68.3%
Fico nervoso(a) com facilidade.	.82	.08	-.06	-.03	.04	.10	68.3%
Costumo perder a paciência.	.81	.06	-.02	-.11	.08	.07	66.0%
Perco a cabeça com facilidade.	.75	.06	.05	-.13	.25	.01	57.4%
Sou calmo(a) e controlo bem meu estresse.*	.73	.02	-.01	-.16	.03	-.18	55.2%
De repente fico de mal humor.	.65	.04	.03	.00	-.11	.09	48.0%
Não tenho paciência.	.63	.02	.01	-.08	.00	.08	43.1%
Evitar ficar nervoso (a).*	.63	-.08	-.01	.02	.06	-.20	40.1%
Controlar seus sentimentos.*	.41	-.15	-.12	.17	-.08	-.22	25.4%
Sou meio tenso(a).	.37	-.18	.20	.06	-.22	.15	36.4%
De uma hora para outra eu fico triste.	.37	-.02	-.01	.15	-.26	.17	31.0%
Se acalmar depois de ficar muito assustado (a).*	.35	-.11	-.11	.05	-.05	-.15	17.6%
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Sou um(a) aluno(a) que se esforça.	.08	.72	-.03	.10	-.03	.01	52.2%
Faço as tarefas bem e sem desperdício de tempo.	.07	.72	.01	-.05	-.05	.10	44.7%
Sou um(a) aluno(a) cuidadoso(a) e dedicado(a).	.12	.71	-.04	.12	-.04	.00	50.8%
Terminar todo o seu dever de casa.	.00	.68	-.08	.00	.01	.02	43.0%
Estudar mesmo tendo outras coisas interessantes para fazer.	-.10	.61	-.01	.01	-.10	.08	37.4%
Prestar atenção nas aulas.	-.06	.61	.03	.00	-.14	-.02	39.1%
Deixar seus pais satisfeitos com seu desempenho na escola.	.10	.59	.02	.02	-.02	-.17	40.8%
Sou caprichoso(a) e detalhista nas tarefas escolares.	.15	.57	.09	.07	.01	-.01	37.4%
Mantenho meu material escolar sempre organizado.	.00	.54	-.15	.15	-.07	.01	31.4%
Sou distraído(a). É difícil ficar concentrado(a) nas aulas.*.	-.09	.53	-.09	-.11	-.03	-.28	44.3%
Estudar um texto para uma prova.	.01	.49	.12	.00	-.05	-.02	28.0%

Costumo ser desorganizado(a)*.	-04	.48	-10	-05	-03	-17	29.1%
Ter bom desempenho em uma prova	.03	.47	.16	-11	.09	-.02	27.7%
Costumo ser preguiçoso(a)*.	-.13	.42	-.17	-.02	.07	-.05	24.0%
<hr/>							
Tenho uma imaginação bem ativa.	-.07	-.07	.76	-.12	.03	-.11	49.4%
Eu tenho muita imaginação.	.02	-.04	.75	-.05	-.02	.02	52.2%
Tenho ideias novas e originais.	-.06	.05	.62	-.15	.14	.01	42.6%
Gosto de refletir e brincar com minhas ideias.	.00	-.06	.58	.19	.03	-.09	43.3%
Sou inventivo(a).	-.12	-.01	.51	-.07	-.06	.11	26.9%
Vários assuntos despertam minha curiosidade.	.08	.02	.50	.18	-.09	-.10	31.2%
Gosto de pensar profundamente sobre as coisas.	.02	.03	.48	.16	-.19	-.08	27.2%
Gosto de conhecer algo novo.	.11	-.08	.46	.15	.11	-.14	29.6%
Gosto de atividades artísticas.	-.02	-.07	.46	.10	-.05	-.08	21.4%
Conheço vários tipos de obras de arte, música ou literatura.	.02	.08	.37	-.04	-.04	-.01	13.9%
Consigo facilmente inventar jogos ou brincadeiras.	-.06	.10	.36	-.15	.20	.29	30.4%
<hr/>							
Não sou egoísta e gosto de ajudar os outros.	-.10	.03	-.11	.62	.00	.00	37.7%
Gosto de colaborar com os outros.	-.08	.09	.10	.60	.08	-.05	52.5%
Eu sou carinhoso com meus colegas.	-.05	-.05	-.06	.56	.15	.00	33.8%
Tento ajudar as pessoas que estão tristes ou doentes.	.13	.06	.06	.53	.09	.02	37.4%
Sou amável e legal com quase todo mundo.	-.21	.01	-.04	.52	.21	.06	42.7%
Eu me comporto gentilmente com os outros.	-.13	.08	.08	.51	-.07	-.08	35.0%
Eu me preocupo demais com tudo.	.24	-.01	.09	.45	-.15	.06	29.2%
Costumo ajudar meus colegas quando têm dificuldade.	.02	.12	.21	.38	.05	-.02	32.5%
Meus colegas gostam de mim.	.05	.03	.02	.38	.26	-.09	28.5%
Confio nas pessoas.	-.11	-.05	-.06	.37	.15	.13	19.1%
Tenho facilidade em perdoar.	-.25	-.06	.01	.37	.03	.01	20.6%
<hr/>							
Costumo ser quieto(a).	.12	-.23	-.16	-.03	.64	-.12	42.3%
Contagio os outros com meu entusiasmo.	.09	.09	.01	.23	.61	.12	51.9%
Sou reservado(a), fico mais na minha*.	.08	-.17	-.12	-.01	.60	-.20	39.3%
Sou tímido(a), inibido(a)*.	-.01	-.07	.06	-.09	.56	-.17	36.5%
Se tornar amigo (a) de outras pessoas da sua	-.06	.07	-.09	.20	.54	.05	38.5%

idade.

Gosto de conversar.	.14	-.10	.03	.21	.52	-.03	36.0%
Sou cheio(a) de energia.	-.03	.14	.09	.06	.49	.14	36.4%
Contar uma coisa engraçada para um grupo de colegas.	.08	-.05	.09	.13	.43	.15	27.5%
Sou uma pessoa feliz e ativa.	-.13	.13	.06	.15	.41	.05	34.0%
Bater um papo com uma pessoa desconhecida.	-.03	-.05	.18	.01	.40	.11	24.4%
<hr/>							
As outras pessoas me acusam de ser mentiroso(a).	-.08	.02	-.05	-.19	.12	.54	26.8%
Meus colegas pegam no meu pé.	.03	-.05	-.08	.13	.03	.53	30.1%
Sou frequentemente acusado(a) por coisas que não foram minha culpa.	-.07	-.09	.05	-.13	-.01	.49	27.9%
Sinto que tenho pouca influência em casa para decidir sobre o canal da TV.	-.07	.01	.01	.07	-.06	.42	18.9%
Sinto que é inútil me esforçar na escola porque a maioria dos alunos é mais inteligente do que eu.	.10	-.10	-.15	.01	-.11	.38	25.4%
Quando faço alguma coisa errada, sinto que existe muito pouco que posso fazer para consertar.	.08	-.04	-.13	.17	-.09	.35	18.8%
Sinto que muitas vezes não vale a pena me esforçar porque, de qualquer modo, as coisas nunca dão certo mesmo.	.11	-.29	-.10	.08	-.14	.34	35.4%
<hr/>							
Eigenvalues	9.56	5.54	4.31	3.46	2.54	1.89	
Reliability coefficient (λ^2)	.89	.88	.82	.81	.81	.66	

Notes. NE = Neuroticism, CO = Conscientiousness, OE = Openness to Experience, AG = Agreeableness, EX = Extraversion, ELC = External Locus of Control. Factor loadings over .32 appear **in bold**. Correlations between factors: NE-CO = -.25; NE-OE = -.10; NE-AG = -.19; NE-EX = -.11; NE-ELC = .24, CO-OE = .20, CO-AG .31; CO-EX = .12; CO-ELC = -.37; OE-AG = .41; OE-EX = .33; OE-ELC = .01; AG-EX = .39; AG-ELC = -.06, EX-ELC = -.18. *Inversed items.

**ANEXO 2: Estrutura factorial do inventário Escala Reduzida de Cinco Fatores de
Personalidade (ER5FP)**

*Factor loadings using Principal Components Analysis and Promax Rotation of ER5FP
Items (N = 634)*

Item description	AG	EX	CO	ES	OE	h ²
Hostil- Amigável	.86	.01	-.08	-.03	.02	68.0%
Rude-Gentil	.78	-.15	.03	.21	-.08	66.4%
Antipático-Simpático	.76	.09	-.13	.01	.06	57.6%
Indiferente-Amoroso	.64	.09	.11	-.08	-.03	50.2%
Reservado- Sociável	.10	.87	-.04	.04	-.06	75.5%
Calado- Comunicativo	.16	.85	.01	-.06	-.12	74.8%
Tímido- Extrovertido	-.17	.82	-.02	.08	.05	65.4%
Contido-Expansivo	-.09	.51	.12	.03	.21	42.8%
Desistente- Persistente	-.23	.01	.97	.07	-.11	71.2%
Inconstante-Insistente	.20	.00	.69	.03	-.09	59.6%
Desmotivado-Motivado	.05	.06	.67	-.01	.12	61.4%
Ineficiente- Eficiente	.25	-.12	.38	-.12	.31	48.4%
Nervoso-Calmo	-.06	.05	.08	.83	-.06	67.9%
Impaciente-Paciente	.18	-.03	.01	.77	-.01	68.4%
Ansioso- Tranquilo	-.02	.06	-.02	.74	.17	61.3%
Convencional-Criativo	-.11	-.08	-.14	.15	.86	62.1%
Simulado-Autêntico	.11	-.03	.11	-.03	.60	48.6%
Apático-Entusiasta	.05	.22	.00	-.10	.58	49.9%
Eigenvalues	5.10	2.04	1.72	1.20	0.96	
Reliability coefficient (λ^2)	.76	.81	.74	.73	.55	

Notes. EX = Extraversion, AG = Agreeableness, CO = Conscientiousness, ES = Emotional Stability. Factor loadings over .32 appear **in bold**. Correlations between components: AG-EX = .27; AG-CO = .50; AG-ES = .22; AG-OE = .37; EX-CO = .34, EX-ES = .07, EX-OE .37; CO-ES = .07; CO-OE = .46; ES-OE = .13.

ANEXO 3: Inventário *Social and Emotional (or Noncognitive) Nationwide Assessment*

(SENNNA)

Caro aluno(a),

Você está recebendo um questionário que vai nos ajudar a saber mais sobre você. Não existem respostas certas ou erradas. Você deve responder com a maior sinceridade possível, pois as suas respostas são importantes para nos ajudar a melhorar a educação oferecida a você e a seus colegas.

Obrigado pela sua participação!

INSTRUÇÕES

1 - Marque as respostas das questões utilizando caneta esferográfica com tinta na cor azul ou preta, conforme mostra o exemplo abaixo

QUESTÃO X:

2 - O uso do corretivo não é permitido.

Avalie na escala abaixo o quanto você consegue:	1 Nada	2 Pouco	3 Mais ou menos	4 Muito	5 Totalmente
1. Terminar todo o seu dever de casa.					
2. Se tornar amigo (a) de outras pessoas da sua idade.					
3. Evitar ficar nervoso (a).					
4. Estudar mesmo tendo outras coisas interessantes para fazer.					
5. Contar uma coisa engraçada para um grupo de colegas.					
6. Controlar seus sentimentos.					
7. Prestar atenção nas aulas.					
8. Permanecer amigo (a) de pessoas da sua idade.					
9. Se acalmar depois de ficar muito assustado (a).					
10. Deixar seus pais satisfeitos com seu desempenho na escola.					
11. Bater um papo com uma pessoa desconhecida.					
12. Evitar pensamentos ruins.					
13. Ter bom desempenho em uma prova.					
14. Contar a um amigo que não se sente bem.					
15. Estudar um texto para uma prova.					
16. Dizer a outras pessoas da sua idade que eles estão fazendo algo que você não gosta.					

Abaixo, mostramos algumas características pessoais que podem ou não ter a ver com você. Para responder às perguntas, pense em como você é/se sente/se comporta na maioria das situações.	1 Nada Não tem nada a ver comigo	2 Pouco Tem um pouco a ver comigo	3 Mais ou menos Às vezes tem, às vezes não tem a ver comigo	4 Muito Tem muito a ver comigo	5 Totalmente Tem tudo a ver comigo
17. Sou um(a) aluno(a) que se esforça.					
18. Perco a cabeça com facilidade.					
19. Sou amável e legal com quase todo mundo.					
20. Tenho ideias novas e originais.					
21. Sou um(a) aluno(a) cuidadoso(a) e dedicado(a).					
22. Eu me irrita com facilidade.					
23. As outras pessoas me acusam de ser mentiroso(a).					
24. Eu sou carinhoso com meus colegas.					
25. Tenho uma imaginação bem ativa.					
26. Sou caprichoso(a) e detalhista nas tarefas escolares.					
27. De repente fico de mal humor.					
28. Sinto que é inútil me esforçar na escola porque a maioria dos alunos é mais inteligente do que eu.					
29. Tenho facilidade em perdoar.					
30. Tenho dificuldade em manter minha atenção em atividades que demorem alguns meses para terminar.					
31. Fico nervoso(a) com facilidade.					
32. Sou frequentemente acusado(a) por coisas que não foram minha culpa.					
33. Eu me comporto gentilmente com os outros.					
34. Sou inventivo(a).					
35. Faço as tarefas bem e sem desperdício de tempo.					
36. Não tenho paciência.					
37. Conheço vários tipos de obras de arte, música ou literatura.					
38. Não ligo que outros usem minhas coisas.					
39. Mantenho meu material escolar sempre organizado.					
40. De uma hora para outra eu fico triste.					
41. De maneira geral, estou satisfeito(a) comigo mesmo(a).					
42. Gosto de colaborar com os outros.					
43. Gosto de refletir e brincar com minhas ideias.					
44. Sou meio desleixado(a), não tenho cuidado na hora de fazer as coisas.					
45. Costumo perder a paciência.					
46. Sinto que a melhor maneira de lidar com os problemas é apenas não pensar neles.					
47. Confio nas pessoas.					
48. Novas ideias e novos projetos desviam minha atenção dos anteriores.					
49. Desvio minha atenção com muita facilidade.					

Abaixo, mostramos algumas características pessoais que podem ou não ter a ver com você. Para responder às perguntas, pense em como você é/se sente/se comporta na maioria das situações.	1 Nada Não tem nada a ver comigo	2 Pouco Tem um pouco a ver comigo	3 Mais ou menos Às vezes tem, às vezes não tem a ver comigo	4 Muito Tem muito a ver comigo	5 Totalmente Tem tudo a ver comigo
50. Sou calmo(a) e controlo bem meu estresse.					
51. Costumo ajudar meus colegas quando têm dificuldade.					
52. Gosto de atividades artísticas.					
53. Costumo ser preguiçoso(a).					
54. Sou meio tenso(a).					
55. Brigo com os outros e acabo conseguindo com que eles façam o que eu quero.					
56. Gosto de conhecer algo novo.					
57. Sou distraído(a). É difícil ficar concentrado(a) nas aulas.					
58. Eu me preocupo demais com tudo.					
59. Meus colegas pegam no meu pé.					
60. Não sou egoísta e gosto de ajudar os outros.					
61. Costumo ser desorganizado(a).					
62. Sinto que muitas vezes não vale a pena me esforçar porque, de qualquer modo, as coisas nunca dão certo mesmo.					
63. Começo bate-boca com os outros.					
64. Gosto de pensar profundamente sobre as coisas.					
65. Sou uma pessoa feliz e ativa.					
66. Quando faço alguma coisa errada, sinto que existe muito pouco que posso fazer para consertar.					
67. Tento ajudar as pessoas que estão tristes ou doentes.					
68. Eu tenho muita imaginação.					
69. Costumo ser quieto(a).					
70. Meus colegas gostam de mim.					
71. Gosto de ver programas de TV que falam de ciência.					
72. Sou cheio(a) de energia.					
73. Tenho muitas dúvidas se sou competente.					
74. Vários assuntos despertam minha curiosidade.					
75. Sou reservado(a), fico mais na minha.					
76. Sinto que tenho pouca influência em casa para decidir sobre o canal da TV.					
77. Consigo facilmente inventar jogos ou brincadeiras.					
78. Gosto de conversar.					
79. Gostaria muito de viajar e conhecer o estilo de vida de outros povos.					
80. Sou tímido(a), inibido(a).					
81. Acredito que as pessoas boas nos esportes já nasceram assim.					
82. Gosto da companhia das pessoas.					

<p>Abaixo, mostramos algumas características pessoais que podem ou não ter a ver com você. Para responder às perguntas, pense em como você é/se sente/se comporta na maioria das situações.</p>	<p>1 Nada Não tem nada a ver comigo</p>	<p>2 Pouco Tem um pouco a ver comigo</p>	<p>3 Mais ou menos Às vezes tem, às vezes não tem a ver comigo</p>	<p>4 Muito Tem muito a ver comigo</p>	<p>5 Totalmente Tem tudo a ver comigo</p>
83. Contagio os outros com meu entusiasmo.					

ANEXO 4: Questionário socioeconômico

Caro(a) Aluno(a), para conhecê-lo(a) melhor, contamos com sua ajuda para preencher este questionário. Suas respostas são muito importantes!

Instruções:

Assinale apenas **UMA ALTERNATIVA POR QUESTÃO!**

Não existem respostas certas ou erradas. Selecione a alternativa que mais se aproxima de sua realidade.

1. Qual é o seu sexo?

- A) Masculino.
- B) Feminino.

2. Como você se considera?

- A) Branco(a).
- B) Pardo(a).
- C) Negro(a).
- D) Amarelo(a).
- E) Indígena.

3. Qual é o mês do seu aniversário?

- A) Janeiro
- B) Fevereiro
- C) Março
- D) Abril
- E) Maio
- F) Junho
- G) Julho
- H) Agosto
- I) Setembro
- J) Outubro
- K) Novembro
- L) Dezembro

4. Qual é a sua idade?

- A) 12 anos ou menos.
- B) 13 anos.
- C) 14 anos.
- D) 15 anos
- E) 16 anos.
- F) 17 anos.
- G) 18 anos.
- H) 19 anos ou mais.

5. Você mora com sua mãe?

- A) Sim.
- B) Não.
- C) Não. Moro com outra mulher responsável por mim.

6. Sua mãe ou a mulher responsável por você saber ler e escrever?

- A) Sim.
 B) Não.
 C) Não sei.

7. Até que série/ano sua mãe ou a mulher responsável por você estudou?

- A) Nunca estudou ou não completou a 4ª série/5º ano (antigo primário).
 B) Completou a 4ª série/5º ano, mas não completou a 8ª série/9ºano (antigo ginásio).
 C) Completou a 8ª série/9ºano, mas não completou o Ensino Médio(antigo 2º grau).
 D) Completou o Ensino Médio, mas não completou a Faculdade.
 E) Completou a Faculdade.
 F) Não sei.

8. Seu pai ou homem responsável por você saber ler e escrever?

- A) Sim.
 B) Não.
 C) Não sei.

9. **Você é natural de que cidade?** _____ Estado: _____

10. Seus pais são naturais de que cidade?

a. Mãe

Cidade _____ Estado: _____

b. Pai

Cidade _____ Estado: _____

Considerando onde você mora, responda as seguintes questões:	Sim	Não
10. Sua rua é asfaltada ou tem calçamento?	(A)	(B)
11. Sua residência tem energia elétrica?	(A)	(B)
12. Sua residência tem água na torneira?	(A)	(B)
13. Sua rua tem coleta de lixo?	(A)	(B)
14. Tem alguém que mora com você que recebe bolsa família?	(A)	(B)
15. Tem empregada doméstica ou faxineira trabalhando na sua residência?	(A)	(B)

Quanto dos seguintes itens existem no local onde você mora?	Sim	Não
16. Banheiro	(A)	(B)
17. Geladeira com freezer separado	(A)	(B)
18. Máquina de lavar roupa (não é tanquinho)	(A)	(B)
19. Aparelho de DVD	(A)	(B)
20. Automóvel (carro/moto)	(A)	(B)
21. Dicionário de Língua Portuguesa e/ou outras línguas	(A)	(B)

22. Sem considerar livros escolares, jornais e revistas, quantos livros existem no local onde você mora?

- A) Não tenho livros na minha residência.
 B) O bastante para encher uma prateleira (1 a 20 livros).
 C) O bastante para encher uma estante (21 a 100 livros).
 D) O bastante para encher várias prateleiras (mais de 100 livros).

23. Com qual frequência você vê seus pais ou responsáveis lendo (jornais, revistas, livros etc.)?

- A) Sempre.
- B) Às vezes.
- C) Raramente.
- D) Nunca.

Rígido(a)	___ ___ ___ ___ ___ ___	Flexível
Ansioso(a)	___ ___ ___ ___ ___ ___	Tranquilo(a)
Instável	___ ___ ___ ___ ___ ___	Estável
Hostil	___ ___ ___ ___ ___ ___	Amigável