



UNIVERSIDADE FEDERAL DE MINAS GERAIS  
Faculdade de Medicina  
Programa de Pós-Graduação em Medicina Molecular

Victor Polignano Godoy

**AVALIAÇÃO MULTIDIMENSIONAL DO TRANSTORNO DO DÉFICIT DE  
ATENÇÃO E HIPERATIVIDADE (TDAH) E DO SLUGGISH COGNITIVE TEMPO  
(SCT) EM ADULTOS BRASILEIROS.**

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Orientador: Leandro Fernandes Malloy-Diniz

Coorientador: Alexandre Luiz de Oliveira Serpa

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#### AVALIAÇÃO MULTIDIMENSIONAL DO TRANSTORNO DO DÉFICIT DE ATENÇÃO E HIPERATIVIDADE (TDAH) E DO SLUGGISH COGNITIVE TEMPO (SCT) EM ADULTOS BRASILEIROS

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## RESUMO

A relação entre o Transtorno de Déficit de Atenção/Hiperatividade (TDAH) e o Sluggish Cognitive Tempo (SCT) é objeto de investigação científica crescente, principalmente em amostras de crianças e adolescentes, sendo aquelas com adultos comparativamente escassas. O SCT é associado ao TDAH de apresentação desatenta e ao eixo internalizante e não se associa ou se correlaciona fracamente com hiperatividade-impulsividade. Funções executivas (FEs) e percepção temporal foram implicadas previamente nos mecanismos cognitivos do SCT, mas não apresentaram padrões consistentes de resultados. O principal objetivo desta investigação foi mensurar a validade incremental da Escala Barkley de Disfunções Executivas (BDEFS) em relação a sintomas de TDAH e de SCT em adultos. Além disso, testou-se a relação entre FEs, percepção temporal, sintomas de TDAH e de SCT, queixas de saúde mental do eixo internalizante, variáveis sociodemográficas e de saúde geral. As hipóteses específicas foram: (1) os participantes com sintomas mais elevados de SCT teriam maiores escores nos fatores da BDEFS; (2) o TDAH e o SCT apresentariam um padrão distinto de relação com outros sintomas psiquiátricos, especialmente com os eixos internalizante e externalizante; e (3) as escalas adaptadas para o Brasil apresentariam indicadores de ajuste psicométrico favoráveis. Além da BDEFS, foram traduzidos e adaptados transculturalmente dois instrumentos de acordo com os parâmetros internacionais recomendados: o Inventário de Concentração do Adulto (ICA) que mensura sintomas de SCT e o Questionário de Percepção Subjetiva do Tempo (QPST) que avalia componentes da consciência temporal. Os dois primeiros artigos abordaram as evidências de validade dos novos questionários usando técnicas de análise fatorial. No terceiro artigo formaram-se grupos com e sem sintomas significativos de desatenção e hiperatividade-impulsividade a partir de pontos de corte, sendo comparados por meio de correlações e de testes t. Adicionalmente, empregou-se modelos de regressões lineares múltiplas para se investigar os preditores de SCT, desatenção e hiperatividade-impulsividade. O QPST apresentou uma estrutura de três fatores latentes com 10 itens e evidências aceitáveis de confiabilidade. Já sobre o ICA, replicou-se a estrutura unifatorial do SCT com 10 dos 16 itens do estudo original, além de índices de confiabilidade satisfatórios. As análises fatoriais convergente e discriminante do ICA em relação a sintomas internalizantes, de desatenção e hiperatividade confirmaram a hipótese de maior associação do SCT com sintomas de desatenção e do eixo internalizante. Já no terceiro artigo, os grupos, principalmente o de desatenção, apresentaram diferenças de grande magnitude de efeito em FEs, SCT e em percepção temporal. Os preditores das regressões que mais contribuíram para a variância explicada em cada modelo foram fatores da BDEFS: Autocontrole para o grupo de hiperatividade/impulsividade, Gerenciamento de tempo para o de desatenção e Organização/Resolução de problemas para o de SCT. Confirmou-se, então, que o SCT apresenta um padrão diferente de associação com as variáveis analisadas se comparado ao TDAH, especialmente nas disfunções executivas. Isso reforça a hipótese do SCT enquanto psicopatologia distinta do TDAH. Estudos com amostras nacionalmente representativas contribuirão para a aplicabilidade clínica dos questionários, além de ampliar a investigação da relação entre as síndromes abordadas.

**Palavras-chave:** transtorno do déficit de atenção e hiperatividade; funções executivas; percepção do tempo; adultos.



## ABSTRACT

The relationship between Attention Deficit/Hyperactivity Disorder (ADHD) and Sluggish Cognitive Tempo (SCT) is a subject of growing scientific investigation, mainly in child and teenagers samples, being comparatively scarce those with adults. The SCT is associated with ADHD inattentive presentation and the internalizing psychopathological dimension and does not associate or weakly correlates with hyperactivity-impulsivity. Executive functions (EFs) and temporal perception have been implicated previously in the cognitive mechanisms of SCT, but have not shown consistent response patterns. The main goal of this investigation was to measure the incremental validity of the Barkley Deficits in Executive Functioning Scale (BDEFS) in relation to ADHD and SCT symptoms in adults. In addition, the relationship between EFs, temporal perception, ADHD and SCT symptoms, internalizing mental health complaints, sociodemographic and general health variables was tested. The specific hypotheses were: (1) participants with higher SCT symptoms would have higher scores on the BDEFS factors; (2) ADHD and SCT would present a distinct pattern of relationship with other psychiatric symptoms, especially with the internalizing and externalizing dimensions; and (3) the scales adapted for the Brazilian context would present favorable psychometric fit indicators. Besides the BDEFS, two instruments were translated and cross-culturally adapted according to the recommended international parameters: the Adult Concentration Inventory (ACI) that measures symptoms of SCT and the Subjective Time Questionnaire (STQ) that assesses components of temporal awareness. The first two papers addressed the validity evidence for the abovementioned questionnaires using factor analysis techniques. The third article sample was split in two groups with and without significant symptoms of inattention and hyperactivity-impulsivity based on cutoff points, and compared them using correlations and t-tests. Additionally, multiple linear regression models were used to investigate predictors of SCT, inattention, and hyperactivity-impulsivity. The STQ showed a three latent factor structure with 10 items and acceptable evidence of reliability. As for the ACI, the single-factor structure of the SCT was replicated, with 10 of the 16 items from the original study, and satisfactory reliability indexes. The convergent and discriminant factor analyses of the ACI in relation to internalizing, inattention, and hyperactivity symptoms confirmed the hypothesis of a greater association of the SCT with inattention and internalizing symptoms. In the third article is shown differences of large effect size in EFs, SCT, and temporal perception, especially among the inattention group. The predictors of the regressions that contributed most to the explained variance in each model were BDEFS factors: Self-control for the hyperactivity/impulsivity group, Time management for the inattention group, and Organization/problem solving for the SCT group. Then, it was confirmed that the SCT presents a different pattern of association with the analyzed variables compared to ADHD, especially in the executive dysfunctions domain. This reinforces the hypothesis of SCT as a distinct psychopathology from ADHD. Studies with nationally representative samples will contribute to the clinical applicability of the scales, in addition to broadening the investigation of the relationship between these syndromes.

**Keywords:** attention deficit-hyperactivity disorder; sluggish cognitive tempo; executive functions; temporal perception; adult.

## LISTA DE ABREVIATURAS E SIGLAS

ACI	Adult Concentration Inventory
ADHD	Attention Deficit-Hyperactivity Disorder
ADHD - I	Attention Deficit-Hyperactivity Disorder - Inattentive presentation
ADHD - HI	Attention Deficit-Hyperactivity Disorder - Hyperactive-Impulsive presentation
ASD	Autism Spectrum Disorder
ASRS-18	Adult Self-Report Scale
BCa	Bias Corrected and Accelerated
BCEC	Brazil Criteria of Economic Classification
BDEFS	Barkley Deficits in Executive Functioning Scale
CDD	Concentration Deficit Disorder
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CNVs	Copy Number Variants
CR	Composite Reliability index
DSM	Diagnostic and Statistical Manual of Mental Disorders
EFA	Exploratory Factor Analysis
ELE	Estimated Life Expectancy
GWAS	Genome-wide association studies
ISPOR	International Society for Pharmacoeconomics and Outcomes Research
ITC	International Test Commission
KMO	Kaiser-Meyer-Olkin
MEL	Melbourne Decision-Making Questionnaire
NNFI	Non-Normal Fit Index
O.R.	Odds ratio
PCA	Principal Component Analysis
RDWLS	Robust Diagonally Weighted Least Squares
RMSEA	Root Mean Square Error of Approximation
SCT	Sluggish Cognitive Tempo
SPSS	Statistical Package for Social Sciences
SRMSR	Standardized Root Mean Square Residual

SRQ-20	Self-Report Scale
STQ	Subjective Time Questionnaire
TEA	Transtorno do Espectro Autista
TCC	Terapia Cognitivo-Comportamental
TDAH	Transtorno do Déficit de Atenção e Hiperatividade
TLI	Tucker Lewis Index
WLSMV	Weighted Least Squares Mean and Variance

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## 1 INTRODUÇÃO

### 1.1 Breve histórico

De acordo com Lange et al. (2010), a investigação científica do Transtorno do Déficit de Atenção e Hiperatividade (TDAH) se inicia com Sir Alexander Crichton em 1798. Crichton descreveu características comportamentais similares às encontradas no TDAH que até hoje estão presentes em manuais diagnósticos, como a dificuldade de regulação atencional e o papel genético na etiologia do transtorno. Todavia, outras proposições se mostraram equivocadas, a exemplo de que o TDAH remeteria na maior parte dos casos no fim da puberdade (Lange et al., 2010). Já em 1845, o médico alemão Heinrich Hoffmann descreveu casos clínicos de crianças com sintomas hiperativos e, posteriormente, daquelas que exibiam padrões de desatenção, contribuindo para a divulgação mais sistemática do que viria a ser duas das apresentações do TDAH (Albrecht et al., 2015). Por sua vez, Sir George Frederic Still escreveu o primeiro artigo científico relacionado ao TDAH em 1902, descrevendo vinte casos de crianças com sintomas. A proposta de Still se baseava em um “defeito no controle moral”, apesar da normalidade física e da inteligência preservada dos indivíduos (Doyle, 2004). Em período próximo, a epidemia de encefalite letárgica (1917 – 1928) ressaltou a ligação entre problemas de comportamento infantis e insultos cerebrais. Crianças afetadas pela encefalite exibiam alterações comportamentais e cognitivas similares às encontradas no TDAH após a recuperação do quadro agudo (Albrecht et al., 2015).

Novamente a neurobiologia foi ligada aos sintomas que futuramente seriam colocados sob o nome de TDAH quando a benzedrina em 1937 e, posteriormente, o metilfenidato em 1944 se mostraram surpreendentemente eficazes na redução de sintomas hiperativos e de desatenção (Doyle, 2004). Nos anos 40 se propôs o rótulo de “lesão cerebral mínima” para o conjunto de disfunções observado no TDAH (Lange et al., 2010). Pouco tempo depois alterou-se o nome para “disfunção cerebral mínima”. A segunda edição do Manual Diagnóstico e Estatístico dos Transtornos Mentais – DSM-II (American Psychiatric Association, 1968) pela primeira vez definiu um transtorno relacionado com as características conhecidas do TDAH, a chamada “Reação Hiperkinética da Criança”. A terceira edição do DSM (American Psychiatric

Association, 1980) incluiu o quadro “Transtorno do Déficit de Atenção” com e sem hiperatividade. A nomenclatura atual TDAH foi, enfim, inserida na revisão do DSM-III em 1987 (American Psychiatric Association, 1987), mas sem subtipos definidos. Conclui-se, portanto, que há pelo menos 200 anos existem descrições clínicas relacionadas ao TDAH.

## 1.2 Epidemiologia e etiologia

A prevalência do TDAH foi estimada em 5,29% (Polanczyk et al., 2007) em crianças e adolescentes ao redor do mundo. Fayyad et al., (2017) encontraram 2,8% de prevalência para o TDAH adulto utilizando amostras de 20 países. Nøvik et al. (2006) conduziram uma análise com dados longitudinais de crianças entre 6 e 18 anos de idade em dez países europeus e encontraram proporções diferentes entre os gêneros: de 3 homens para 1 mulher até 16 homens para 1 mulher afetada. Nussbaum (2011) relatou que meninas apresentaram mais sintomas de desatenção, menos comportamentos disruptivos e menos problemas escolares, o que poderia levar a um padrão de encaminhamento enviesado aos serviços especializados e, conseqüentemente, às desproporções comumente observadas na infância e adolescência, haja vista que na fase adulta a prevalência praticamente se torna equivalente. Levantamentos realizados pela Organização Mundial de Saúde (OMS) em dez países encontraram uma taxa média de persistência do TDAH de 50%, variando de 32,8% a 84,1% dependendo da nação (Lara et al., 2009). Os principais preditores na infância para a persistência do transtorno na idade adulta segundo metanálise de Caye et al., 2016 foram: severidade do quadro (*Odds Ratio* – O.R. 2,33), comorbidade com Transtorno Depressivo Maior (O.R. 1,8) e comorbidade com Transtorno de Conduta (O.R. 1,85).

Em convergência com as descrições históricas do TDAH, a herdabilidade foi confirmada como um importante fator etiológico. Nikolas et al. (2010) apontaram que 71% da variância de sintomas de desatenção são explicados por fatores genéticos, bem como 73% da variância de hiperatividade. Parentes de primeiro grau de indivíduos diagnosticados com TDAH apresentam de 2 a 4 vezes mais chances do que a população geral em exibir sintomas do transtorno (Monuteaux et al., 2009). Na tentativa de se reconhecer o papel de genes candidatos especificamente ligados ao



TDAH, estudos de genética molecular foram empreendidos. Segundo Faraone & Larsson (2019), os genes que tiveram relevância estatística em metanálises foram: do transportador de serotonina (5HTT), do receptor 1B de serotonina (5HTR1B), do transportador de dopamina (DAT1), do receptor D4 de dopamina (DRD4), do receptor D5 de dopamina (DRD5) e um gene relacionado com a regulação proteica da vesícula sináptica (SNAP25). Em menor escala, foram relacionados dois outros genes: um ligado a morfogênese e proliferação neuronal (BA1AP2) e outro que atua no transportador da dopamina (SLC6A3). *Genome-wide association studies* (GWAS) foram conduzidos na tentativa de se confirmar de forma ampla os resultados encontrados em ensaios moleculares, mas, até então, os achados foram frustrantes. Todavia, os GWAS demonstraram que aproximadamente um terço da herdabilidade do TDAH ocorre por meio de variantes comuns (Faraone & Larsson, 2019). Já um estudo de revisão sistemática encontrou uma importante associação entre escores poligênicos, sintomas de TDAH, menor volume cerebral, menor nível socioeconômico e maior intensidade de sintomas externalizantes (Ronald et al., 2021). Por fim, *Copy Number Variants* (CNVs), isto é, deleções ou duplicações de segmentos genômicos significativos, mostraram resultados encorajadores, especialmente em genes que regulam receptores nicotínicos que exercem modulação na transmissão dopaminérgica (Faraone & Larsson, 2019). Como CNVs são relativamente raros na população, podem ter implicação importante na etiologia do TDAH.

Ainda que a alta herdabilidade seja replicada em diversos estudos, variáveis ambientais também influenciam o desenvolvimento do TDAH. A prematuridade (Nigg et al., 2020) foi o fator mais comumente associado e com maior magnitude de efeito. Baixo peso ao nascer, independentemente da prematuridade, foi uma variável importante em alguns estudos e em outros não (Sciberras et al., 2017). Fumo, exposição intrauterina a toxinas, uso de álcool e de outras drogas durante a gestação foram apontados em algumas investigações como contribuintes etiológicos, mas em metanálises e revisões não se mostraram significativos (Sciberras et al., 2017). Nota-se que os fenômenos supramencionados são relacionados com etiologias de outros transtornos e condições médicas, não sendo exclusivamente direcionados ao TDAH. Vias alternativas de explicação vem sendo exploradas para entender a contribuição do ambiente. Por exemplo, alguns estudos estão investigando a possível relação do TDAH com processos inflamatórios maternos durante a gestação e outros se centram

nas complexas interações epigenéticas (Nigg et al., 2020). Uma proposição de destaque relaciona o temperamento caracterizado por maiores níveis de raiva e dificuldade de se recuperar de explosões com o surgimento do TDAH. A tendência à desregulação emocional poderia prejudicar a maturação de funções corticais superiores (como as funções executivas), além de evocar reações negativas do ambiente, o que retroalimentaria as dificuldades (Nigg et al., 2020). Essa hipótese converge com achados de maior desregulação emocional em indivíduos adultos com TDAH, especialmente de apresentação combinada (Adler et al., 2020).

Em termos de neuroimagem estrutural, diversas áreas foram relacionadas à fisiopatologia do TDAH. De forma consistente entre estudos, a redução do volume dos núcleos da base foi evidenciada em crianças com o transtorno (Boon, 2020). Do ponto de vista neuroquímico essa região é extremamente rica em dopamina e envia projeções ao córtex pré-frontal e ao tálamo, áreas também apontadas na fisiopatologia do transtorno. A espessura cortical globalmente se encontra reduzida em indivíduos com TDAH (Boon, 2020). Alterações no tálamo, cerebelo, corpo caloso e na massa branca foram reportadas em alguns estudos (Vieira de Melo et al., 2018). A redução da espessura do córtex e do volume dos gânglios da base foram relacionados com maior intensidade de sintomas do TDAH. Estudos de neuroimagem funcional, por sua vez, apontam para um funcionamento alterado da circuitaria fronto-estriado-cerebelar, além da implicação de *hubs* integrantes do *default mode network* (Boon, 2020).

### 1.3 Diagnóstico e achados neuropsicológicos

Em artigo de declaração de consenso entre pesquisadores associados à *World Federation of ADHD*, Faraone et al., 2021 apontaram as dificuldades cognitivas mais frequentemente encontradas em grupos de indivíduos com TDAH: resolução de problemas abstratos, memória operacional, atenção concentrada, atenção sustentada e memória verbal, todas de pequena a média magnitude. Nos estudos analisados, indivíduos com TDAH apresentaram tendência moderada a escolher recompensas pequenas e imediatas em favor de recompensas postergadas. Adicionalmente, decisões de risco e tendência à impulsividade foram observadas. Já em uma metanálise, Pievsky & McGrath (2018), encontraram as habilidades cognitivas mais comumente impactadas no TDAH: variabilidade do tempo de reação,

inteligência/desempenho, vigilância, memória operacional e inibição. Todavia, esses achados variam entre grupos etários e foi reportado um viés do financiamento farmacêutico no tamanho de efeito dos déficits. Em suma, observa-se que as possibilidades de dificuldades cognitivas são variadas, o que leva a uma importante heterogeneidade entre indivíduos com TDAH.

O processamento de informação temporal é uma das dificuldades cognitivas frequentemente encontradas no TDAH, mesmo quando se controla a interrelação do processamento temporal com outras habilidades como funções executivas e atenção (Noreika et al., 2013). Em geral, esse constructo multifacetado é avaliado por tarefas objetivas de estimação, produção ou discriminação temporal, além da consciência/perspectiva temporal mensurada por escalas (Wittmann, 2009). Hart et al. (2012) realizaram uma metanálise para avaliar o envolvimento de regiões cerebrais e a habilidade de estimação temporal em pacientes com TDAH. Os autores demonstraram o envolvimento consistente de regiões esquerdas do córtex pré-frontal inferior, cerebelo e área inferior do lobo parietal. Nota-se que esses achados se relacionam ao hemisfério esquerdo, ao passo que disfunções atencionais e de funções executivas são comumente ligadas ao circuito fronto-estriatal direito. Smith et al. (2002) encontraram que crianças com TDAH superestimam o tempo em tarefas de discriminação temporal do que aquelas sem o transtorno. Walg et al. (2015) reproduziram esse achado. Níveis maiores de impulsividade foram correlacionados com menor orientação para o futuro e com menores intervalos de tempo reproduzidos objetivamente (Wittmann et al., 2011). Todavia, assim como outras habilidades cognitivas, o processamento temporal nem sempre se encontra deficitário em pessoas com TDAH, limitando o uso de testes dessa habilidade em baterias com finalidade diagnóstica (Ptacek et al., 2019).

Barkley (2019) considera que os testes neuropsicológicos tradicionalmente utilizados nas avaliações apresentam validade preditiva insuficiente em relação ao diagnóstico do TDAH em decorrência da baixa validade ecológica da maioria dos instrumentos. Neste sentido, Barkley (2019) propõe que questionários sejam priorizados na avaliação de suspeitas de TDAH porque: (1) apresentam descrições de dificuldade cotidiana do paciente, (2) ampliam o tempo de referência de mensuração do comportamento de minutos para meses, (3) alcançam níveis de maior

complexidade de funcionamento do que testes de único domínio e (4) possuem custos bem mais acessíveis do que a administração de testes.

Em resposta a Barkley (2019), Mapou (2019) sugeriu que a avaliação neuropsicológica tradicional para o diagnóstico do TDAH realmente não é o padrão ouro, mas sim o emprego de entrevistas semiestruturadas. Todavia, ele argumenta que o conceito de avaliação implica em bem mais do que o uso de testes com a finalidade diagnóstica. A avaliação neuropsicológica pretende investigar comorbidades, propor acomodações educacionais e ocupacionais, além de averiguar se alguém pode estar simulando ou exagerando dificuldades para obter benefícios secundários. Outros argumentos sustentam a possível utilidade do exame neuropsicológico no contexto do TDAH. Pritchard et al. (2014) compararam desfechos relevantes de crianças que foram diagnosticadas via avaliação neuropsicológica e aquelas que não. Os pais de crianças que passaram pela avaliação reportaram ter se envolvido mais em treinamento de pais, apresentarem maior adesão na farmacoterapia de seus filhos e buscaram por serviços educacionais extras do que os cuidadores de crianças diagnosticadas de outra forma. Segundo os autores, esses resultados podem sugerir uma utilidade do exame neuropsicológico para além do diagnóstico. Donders (2020), por sua vez, investigou em sua revisão sistemática a validade incremental da avaliação neuropsicológica no diagnóstico de vários transtornos neuropsiquiátricos e, no caso do TDAH, o procedimento auxiliou na predição da evolução do transtorno e de outros desfechos associados com moderada magnitude.

Reunindo os resultados e as observações dos estudos supramencionados, conclui-se que: (1) o exame neuropsicológico tradicional não é recomendável para o mero diagnóstico do TDAH ao passo que (2) entrevistas e escalas se mostram isoladamente melhores preditores diagnósticos do que os testes e (3) a avaliação se mostra especialmente útil na proposição de intervenções escolares, ocupacionais, além de auxílio em diagnósticos diferenciais e de comorbidades.

Neste aspecto, é importante ressaltar a alta prevalência de co-ocorrência de transtornos com o TDAH. Em uma amostra de crianças e adolescentes, Mohammadi et al. (2020) encontraram que os transtornos mais comumente encontrados junto ao TDAH na amostra utilizada foram Transtornos de Ansiedade e Transtornos de Comportamento Disruptivo. Meninas com TDAH apresentaram maiores taxas de

comorbidade com Transtornos de Ansiedade e de Humor e meninos com Transtorno de Oposição Desafiador. Em adultos, os transtornos mais comumente associados ao TDAH são Transtornos de Humor, Transtornos de Ansiedade, Transtorno por Uso de Substâncias e Transtornos de Personalidade (Katzman et al., 2017). Já em um estudo de base populacional com 40 mil indivíduos, Solberg et al. (2017) analisaram os padrões de comorbidade de acordo com o gênero em adultos com TDAH. Mulheres apresentaram maior risco de exibirem sintomas internalizantes, de bipolaridade e de Transtornos de Personalidade enquanto homens tiveram maior risco para dependência de substâncias e Esquizofrenia. Transtorno do Espectro Autista (TEA) e Transtornos de Aprendizagem também são frequentemente encontrados em indivíduos com TDAH (Mayes et al., 2000).

É importante destacar um *cluster* de sintomas associado ao TDAH denominado de *Sluggish Cognitive Tempo* (SCT). Esse conjunto é caracterizado por dois grandes grupos de sintomas: um relacionado a maior frequência de devaneios e o outro com menor nível de atividade/sonolência (Becker et al., 2016). O SCT apresenta correlações moderadas com sintomas de TDAH, mas, em termos de dimensões, se associa mais fortemente com a desatenção do que com a hiperatividade-impulsividade (Becker & Barkley, 2018). Quando a correlação entre sintomas de desatenção e de SCT é removida, a correlação com sintomas de hiperatividade-impulsividade se torna estatisticamente insignificante ou de menor magnitude (Becker et al., 2016). Além disso, existem evidências de que os sintomas de SCT tem maior relação com sintomas internalizantes do que com aqueles de natureza externalizante (Becker et al., 2016). Em termos de prejuízos psicossociais, sintomas de SCT se relacionam em maior extensão com problemas sociais (Marshall et al., 2013) e na fase adulta com mais problemas ocupacionais e acadêmicos (Barkley, 2012). Em termos de habilidades cognitivas, existem resultados mistos de diferenciação de associação com SCT e com TDAH (Becker & Barkley, 2018). Por exemplo, a relação entre processamento temporal e sintomas autorrelatados de SCT em adultos foi investigada por Sorrell (2019) e não se encontrou uma associação estatisticamente significativa de sintomas com tarefas de estimação temporal, mas sim com escalas relacionadas com o gerenciamento e percepção de tempo. Já em relação ao TDAH, foram reportadas associações entre sintomas do transtorno com tarefas objetivas de

estimação e reprodução temporal, além das medidas baseadas em questionários (Noreika et al., 2013).

Alguns autores defendem que o SCT seria uma outra apresentação do TDAH enquanto outros argumentam que o SCT seria um transtorno diferente (Becker & Barkley, 2018). Um dos casos descritos por Crichton seria supostamente de SCT e a inclusão do Transtorno do Déficit de Atenção sem hiperatividade no DSM-III são levantados como precursores do quadro de SCT (Becker et al., 2014). Barkley defende que em uma próxima revisão do DSM deveria se criar uma meta-categoria de transtornos de atenção, englobando aqueles atualmente nomeados como TDAH e também o SCT (Barkley, 2015). O autor ainda sugere que o termo “*sluggish*” é preconceituoso e deveria ser substituído por outro mais neutro. Por isso, ele sugeriu o nome Transtorno do Déficit de Concentração (Barkley, 2015). Becker advoga que ao invés de se considerar o SCT como um transtorno separado, categórico, pode se entender o SCT como uma dimensão transdiagnóstica (Becker & Barkley, 2018). Ele ainda sugere que ao invés de se usar o termo transtorno, a palavra síndrome seria mais adequada, levando, assim, à denominação: Síndrome do Déficit de Concentração (Becker & Barkley, 2018). Apesar dessas proposições, ainda não existe consenso sobre a independência do SCT, bem como não estão claras questões como etiologia, prognóstico e tratamento e nem mesmo a utilidade clínica de se mensurar esses sintomas (Garner et al., 2010).

Por fim, no caso do TDAH em adultos, particularidades sintomáticas devem ser levadas em consideração. A *British Association for Psychopharmacology*, por meio de artigo publicado por Bolea-Alamañac et al. (2017), propôs uma lista ampliada e modificada de sintomas no tocante a adequação de contexto etário e na ênfase na irritabilidade, impaciência e no manejo da frustração.

#### 1.4 Tratamento

De acordo com uma série de metanálises, a primeira linha de tratamento do TDAH seria a farmacoterapia, principalmente com o uso de psicoestimulantes (Catalá-López et al., 2017). Esses fármacos atuam, essencialmente, inibindo os transportadores de dopamina e de noradrenalina, permitindo maiores concentrações desses neurotransmissores na fenda sináptica (Cortese, 2020). Os efeitos colaterais

mais comuns associados aos psicoestimulantes são perda de apetite, perda de peso, boca seca, insônia e náusea, embora não tenha sido reportado aumento da probabilidade para eventos adversos de maior risco (Catalá-Lopéz et al., 2017).

Cunill et al. (2016) realizaram uma metanálise e observaram que os pacientes que faziam farmacoterapia junto a psicoterapia apresentavam considerável redução da taxa de descontinuação do uso dos fármacos em comparação ao grupo que só realizava farmacoterapia. Todavia, os autores não encontraram maiores taxas de eficácia para o grupo de tratamento conjunto em relação ao uso da farmacoterapia isolada. De forma similar, Lambez et al. (2020) performaram uma metanálise e encontraram que a adição de psicoterapia ao tratamento medicamentoso pouco adicional em termos de eficácia. Contudo, ao comparar o resultado de intervenções não farmacológicas em pacientes sem uso de medicação, a eficácia foi de pequena a moderada para todas as intervenções, indicando o potencial uso de outras formas de tratamento em caso de impossibilidade da farmacoterapia. Exercício físico foi a modalidade que produziu melhores resultados em medidas cognitivas objetivas. Treinamento de pais para pré-escolares é a abordagem de primeira escolha para crianças dessa faixa etária (Caye et al., 2018). Existem algumas recomendações que consideram a interação entre o nível de eficácia dos tratamentos com a gravidade do TDAH. Caye et al. (2018) propuseram que pacientes com poucos prejuízos realizassem preferencialmente o tratamento não farmacológico, ao passo que os de média gravidade fizessem farmacoterapia e os de severidade intensa recebessem o tratamento combinado. Fullen et al. (2020) encontraram na metanálise realizada que o tratamento psicológico para adultos com TDAH com maior nível de efetividade foi a Terapia Cognitivo-Comportamental (TCC) seguida de protocolos de Mindfulness, Terapia Dialética Comportamental e Neurofeedback. López-Pinar et al. (2019) reportaram que intervenções do tipo TCC foram eficazes no tratamento de comorbidades em adultos com TDAH. Tratamentos psicológicos baseados em Mindfulness se mostram promissores (Nimmo-Smith et al., 2020), ainda que os estudos até então conduzidos tenham amostras pequenas e importantes indicações de vieses.

## 1.5 Estrutura da dissertação

Esta dissertação foi organizada em 3 artigos, além de uma introdução geral. Todos os artigos foram escritos em inglês e seguiram o padrão de formatação da revista a qual se objetiva submeter. Todos os artigos passarão por revisão de inglês com profissionais especializados antes da submissão. O primeiro artigo foi intitulado de “*The Brazilian Portuguese version of the Subjective Time Questionnaire (STQ-BP): cultural adaptation and psychometric properties*” e aborda o estudo da tradução, adaptação transcultural e as propriedades psicométricas iniciais de uma escala de autorrelato de percepção temporal. Esse artigo foi publicado na Revista Debates em Psiquiatria.

O segundo artigo denominado “*Cross-cultural adaptation and factor structure of the Brazilian version of the Adult Concentration Inventory (ACI)*” visa reportar o processo de tradução, adaptação cultural, estrutura fatorial, confiabilidade, além de levantar evidências de validade preliminares para uma escala de autoavaliação de sintomas de *Sluggish Cognitive Tempo* (SCT). Esse artigo foi publicado na Revista Debates em Psiquiatria.

Por fim, o terceiro artigo intitulado “*Executive functions contribute to the differences between Attention deficit/hyperactivity disorder (ADHD) and sluggish cognitive tempo (SCT) in adults.*” procurou investigar a relação entre sintomas de SCT, TDAH, percepção temporal e disfunções executivas em adultos por meio de diferentes análises estatísticas. Este artigo foi publicado no *Journal of Attention Disorders*.



## 2 OBJETIVOS

### 2.1 Objetivo principal

Investigar a relação entre disfunções executivas, percepção temporal e sintomas do Transtorno do Déficit de Atenção e Hiperatividade (TDAH) e o cluster *Sluggish Cognitive Tempo* em adultos brasileiros.

### 2.2 Objetivos específicos

- a. Traduzir e adaptar culturalmente o *Adult Concentration Inventory* (ACI) e o *Subjective Time Questionnaire* (STQ) para o português brasileiro;
- b. Investigar a relação entre sintomas de TDAH, de SCT e disfunções executivas;
- c. Investigar a relação entre sintomas de TDAH, de SCT e percepção temporal;
- d. Analisar a relação entre disfunções executivas e julgamento temporal.

### 3 THE BRAZILIAN PORTUGUESE VERSION OF THE SUBJECTIVE TIME QUESTIONNAIRE (STQ-BP): CULTURAL ADAPTATION AND PRELIMINARY PSYCHOMETRIC PROPERTIES.

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#### 3.1 Abstract

**Objective:** Time awareness has been associated with many relevant outcomes in Mental Health. The Subjective Time Questionnaire (STQ) is a self-report scale with 26 items that assess the subjective judgment of different time lengths. This study aimed to translate, adapt and validate the STQ to Brazilian Portuguese. **Methods:** The translation and adaptation processes followed the guidelines of the International Test Commission (ITC). Ten experts compared the first translated version with the original scale. After a review, 446 participants (66.1% women) answered the STQ. Reliability and factor structure were investigated. **Results:** The average equivalence between the experts' evaluation was 69.3%. Twenty-one items showed correlations with the total score ranging from 0.250 to 0.641. A Principal Component Analysis found 6 dimensions (eigenvalues > 1). In contrast, the Exploratory Factor Analysis showed a three-factor solution with 10 items. The Confirmatory Factor Analysis supported this structure (RMSEA = 0.049; CFI = 0.991; TLI = 0.987). The Cronbach's Alpha for the final version was 0.696 and ranged from 0.643 to 0.825 for the factors. **Conclusion:** The three-factor solution suggested an adequate model. The reliability was marginally acceptable and in accordance with sparse previous findings. Overall, the results provided initial evidences of the validity and reliability for the STQ Brazilian Portuguese version.

**Keywords:** Time Perception; Self-report; Validation Study; Psychometrics.

### 3.2 Introduction

Many psychological phenomena are related to the estimated duration of events, such as planning, organizing, health, and financial choices. Delaying rewards, impulsivity, and temporal discounting are also associated with time perception (Wittmann et al., 2011). A decision-making style in patients with attention deficit-hyperactivity disorder (ADHD), centered on immediate rewards with no estimation of future consequences, is a well known feature called “temporal myopia” (Wittmann & Paulus, 2008). People with ADHD have shown impaired time estimation ability and a distinct sense of time passage compared to controls (Ptacek et al., 2019). Sluggish cognitive tempo, a symptom cluster related to ADHD, has been associated with difficulties in time processing (Sorrell & Canu, 2018). Patients with damage in the orbitofrontal cortex showed alterations in time perception, impulsivity, and reinforcement sensitivity. They also exhibited more negative emotions than individuals with lesions in other sites of the prefrontal cortex (e.g., dorsolateral cortex), which suggests an important covariance of these functions and maybe a common biological background (Berlin et al., 2004).

Time perception is a broad term related to facing time passage. However, many associated concepts need to be clarified. Time estimation is the measurement of objective time (time clock) regarding speed and accuracy; time perspective refers to the sense of past, present, and future, and time awareness encompasses the subjective judgment of time passing slowly or quickly (Wittmann & Lehnhoff, 2005). Another important distinction is between the prospective and retrospective time perception (Wittmann, 2009). The first notion is related to a period that is being experienced from seconds to minutes and the second is a judgment about a finished period from seconds to longer periods like hours, days, months, etc. Retrospective time perception is associated with memory capabilities, especially episodic memory. The retrospective judgments involve both short-term and long-term memories. It implies the more events have been stored in memory, the longer the time span seemed to have lasted.

There are several theoretical models based on the information-processing framework to explain prospective time perception. A prominent explanation relies on a pacemaker emitting pulses analog to an internal clock (Matthews & Meck, 2016). The pulses flow into an accumulator when the sustained attention is focused on time information, an “attention gate”. The length of a current event is compared to previously stored estimations on the working memory module that retrieves information from episodic memory. Similar to other sensory modalities, some findings pointed out that time perception also follows the scalar metric property described in Weber’s Law (Allman et al., 2014). Cordes, Williams, & Meck (2007) proposed that time and other metrics like space, quantity, and symbolic number representation may have a shared substrate in the parietal cortex. In such view, time processing occurs in a common magnitude system.

Despite the progress in time perception research, remains unclear its specific neurobiological mechanisms. Allman et al. (2014) implied structures such as motor areas (pre-supplementary, supplementary and premotor cortices), basal ganglia, prefrontal cortex, inferior olive, thalamus, and cerebellum. The authors also suggested that striatum-thalamocortical networks proceed in parallel with olivocerebellar circuits to estimate the duration of an event. These pathways may play different roles in time processing, although their interconnections let a unified sense of time passage.

Otherwise, Wittmann (2009) claimed that time perception is an embodied process mediated by somatosensorial and visceral signals processed in the insular cortex. The author highlighted the compatibility of that hypothesis with the pacemaker-accumulator model because the information may be stored in the insula. Manipulations and interventions that target bodily sensations such as mindfulness produce subjective time alterations. Wittmann et al. (2015a) evaluated time perception using psychophysical tasks and scales in a sample comprising experienced meditations and controls matched. Notwithstanding the absence of difference between the groups in the objective tasks, the meditators reported more time dilatation and a slower judgment of time passage.

To increase the research on time awareness, psychometric and standardized instruments are necessary. Nevertheless, many scales and questionnaires are unavailable in cultural contexts of emerging countries. The primary aim of this paper is to validate the Brazilian Portuguese version of the Subjective Time Questionnaire

(STQ). For this purpose, different psychometric evaluations were conducted, such as principal component analysis (PCA), exploratory factor analysis (EFA), confirmatory factor analysis (CFA), reliability measurements, and correlations. The authors do not have a priori prediction about the factor structure of STQ. In particular, this study set out to examine the cultural semantic equivalence of STQ versions and to provide a form of the questionnaire based on psychometric evidence.

### 3.3 Methods

#### 3.3.1 The Subjective Time Questionnaire

Wittmann & Lehnhoff (2005) created a Likert scale with two major parts to assess time awareness. The first section evaluated retrospectively the passage of pastime intervals (e.g., “How fast did the previous week pass for you?”). Answer options varied from very slowly (-2) to very fast (2). The original authors also included two questions about the present time perception and four others related to how specific periods across life span have been passed (childhood, youth, and adulthood in different ages). The second set of questions comprises ten statements about time pressure/time compression and time expansion/time affluence (five statements each) that assess the subjective impressions of time passage. There is a subset with three metaphors of fast time perception and the same quantity of items for time slowness. The anchors for the second part were from strong rejection (0) to strong approval (4). The values for each sentence of time pressure and time expansion were collapsed into a single index by the mean. Subsequently, many alterations have been proposed for the scale. For example, Wittmann et al. (2015a) included a set of items that evaluated future time intervals and a visual analog answer format. Di Giorgio et al. (2020) did not include the metaphors section, and they selected specific items of the retrospective judgment of the pastime segment.

#### 3.3.2 Translation procedures

The translation and cultural adaptation of STQ followed the advised procedures of best practices of the International Society for Pharmacoeconomics and Outcomes

Research–ISPOR (Wild et al. 2005) and the International Test Commission (ITC, 2017). The first step was to get permission to use the scale for scientific purposes by the Ph.D. Marc Wittmann, the principal author of the questionnaire. Second, two authors (VPG and LFMD) independently translated the scale into Brazilian Portuguese. The third researcher (ALOS) established the conciliation between the versions. This earlier version was back-translated into English by a professor with a bachelor's degree in Arts and earlier experience in English-speaking countries. The back-translated form was sent to the original writer to determine the semantic correspondence. In sequence, the suggestions were considered and a preliminary version was sent to bilingual Brazilian experts in Psychology to evaluate potential linguistic biases and differences. All authorities have at least a master's degree and fluent English level. An inquiry was made in the Google Forms® with the items in Portuguese and English. There were boxes for further comments and three options of answer under their perception of linguistic correspondence: equivalent, partially equivalent, and not equivalent. Answers were evaluated, and an index was calculated by the sums of equivalence for each item and all scale. The final version was concluded and applied in a broader survey to analyze the dimensions of STQ and other relevant psychometric information.

### 3.3.3 Sample

Participants were recruited through advertisements in the researcher's social media and word of mouth. The broader survey using the STQ had the approval of the Ethics Committee of the Federal University of Minas Gerais under the number: 07570312.9.0000.5149. All participants had to read the free and informed consent term before answering the questionnaire. The eligibility criteria were age (between 18 and 65 years old) and the ability to understand all statements and instructions.

### 3.3.4 Data analysis

The Kaiser-Meyer-Olkin (KMO) indicator and Bartlett's Test of Sphericity were calculated to estimate the potential of the data to be reduced into dimensions. Principal Component Analysis (PCA) with the orthogonal rotation Varimax with Kaiser

normalization was conducted to assess the underlying components of the STQ. To determine the retained number of dimensions, the Kaiser criteria was used (Eigenvalues > 1). Pearson present-moment correlations between the items and the total score were obtained with bootstrapping procedure (a thousand simulations). The Cronbach's Alpha was calculated for the full scale and its components. Items with cross-loadings and smaller correlations with the total score were excluded. The SPSS version 26 was used in those analyzes.

In line with Watkins (2018), the desired value of KMO is  $\geq 0.7$  and Bartlett's Test of Sphericity should be significant ( $p < 0.05$ ). The Cronbach's Alpha may be greater than 0.7 to indicates an acceptable internal consistency (Tavakol & Dennick, 2011). The same value is expected for the Composite Reliability index (CR), although some cautions are necessary because of the influence of the number of items (Valetini & Damásio, 2016).

An Exploratory Factor Analysis (EFA) was performed in the open-source software Factor V.10.10.03 (Ferrando & Lorenzo-Seva, 2017). A polychoric correlation matrix was calculated with the extraction method Robust Diagonally Weighted Least Squares (RDWLS) (Asparouhov & Muthen, 2010). Parallel Analysis was used to calculate the number of factors with the Varimax rotation. KMO and Bartlett's Test of Sphericity were calculated again. Model fit was evaluated with the Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), Non-Normal Fit Index (NNFI) which is equivalent to the Tucker Lewis Index (TLI), and the Chi-Squared Test.

Confirmatory Factor Analysis (CFA) was modeled in the R software (R Core Team, 2020) with the lavaan package (Rosseel, 2012). The model was estimated using the Weighted Least Squares Mean and Variance (WLSMV) with the Satorra-Bentler correction. Model fit estimators were the Chi-Squared test, CFI, TLI, RMSEA, SRMR. The CR index was got in the calculator made by Colwell (2016) for each factor as well as the complete scale.

The suggested cutoffs for absolute fit indices were: SRMR below 0.08; RMSEA under 0.06 and Chi-Squared test with  $p > 0.05$  (Schreiber et al., 2006). Concerning the comparative fit indices, the cutoffs were: close to or above 0.95 for CFI, NNFI, and TLI (Hu & Bentler, 1999). Considering the studies' sample size, the number of items, and factors of the CFA model, the adjusted cutoffs developed by the calculator with Monte

Carlo simulations of Wolf & McNeish (2020) based on McNeish & Wolf (2020) were: SRMR below 0.048, RMSEA under 0.064 and CFI greater than 0.972.

### 3.4 Results

#### 3.4.1 Expert panel

Ten Brazilian psychologists (7 women; 70%) were invited to investigate the semantic similarity between STQ versions. They speak fluently English and all live in Minas Gerais state. Fifty percent finished the master's degree, 20% have been doing the doctoral level and the other 30% are Ph.D. Forty percent described themselves as neuropsychologists, another 40% as clinical psychologists, 10% as a professor (undergraduate level), and 10% like a researcher of psychological assessment.

#### 3.4.2 Sociodemographic data (validation sample)

The study included 446 participants (295 women; 66.1%) ranging from 18 to 63 years old ( $M = 34,99$  years,  $SD = 10.7$ ). Most of them were from the Southwest region of Brazil (71.74%). The majority was single (53.4%), with college degree (30.3%) and medium to high socioeconomic level (33.9%). In relation to previous mental health diagnoses, 51.8% of the participants denied any mental health diagnosis. The three most reported diagnoses were: ADHD (18.16%), Depressive Disorders (14.79%), and Anxiety Disorders (8.29%).

#### 3.4.3 Expert review

The evaluation showed a general equivalence of 69.3% between the original and the translated versions. Thirty percent of the items had a partial equivalence and only 0.7% exhibited no semantic correspondence. At the item level, the smallest score of equivalence was 40%. All items that got less than 80% of equivalence were scrutinized. The suggestions of the experts were acknowledged and the final version had done.



#### 3.4.4 Item-total score correlation

As shown in Table 3-1, two items (19 and 24) had a not significant correlation with the total score ( $p > 0.05$ ). Item 25 presented a small and negative correlation. Two items had a tiny and positive correlation (17 and 26). The others presented positive correlations varied from 0.250 to 0.641.

#### 3.4.5 Principal component analysis

The KMO for the PCA was 0.855 and Bartlett's Test of Sphericity was significant ( $\chi^2 (325, N = 446) = 4581.39, p < 0.001$ ). Both values suggested that the matrix data was suitable for PCA. The Kaiser criteria for component retention based on eigenvalues  $> 1$  showed 6 dimensions.

Figure 3-1 shows the scree plot for the PCA.

According to Table 3-2, items 2, 4, 17, 19, 25, and 26 had cross-loadings. The items with higher correlations with the total score and appropriate performance in PCA were: 3, 5, 6, 11, 12, 13, 15, 16, 18 and 20.

Figure 3-1 — screen plot for the PCA.

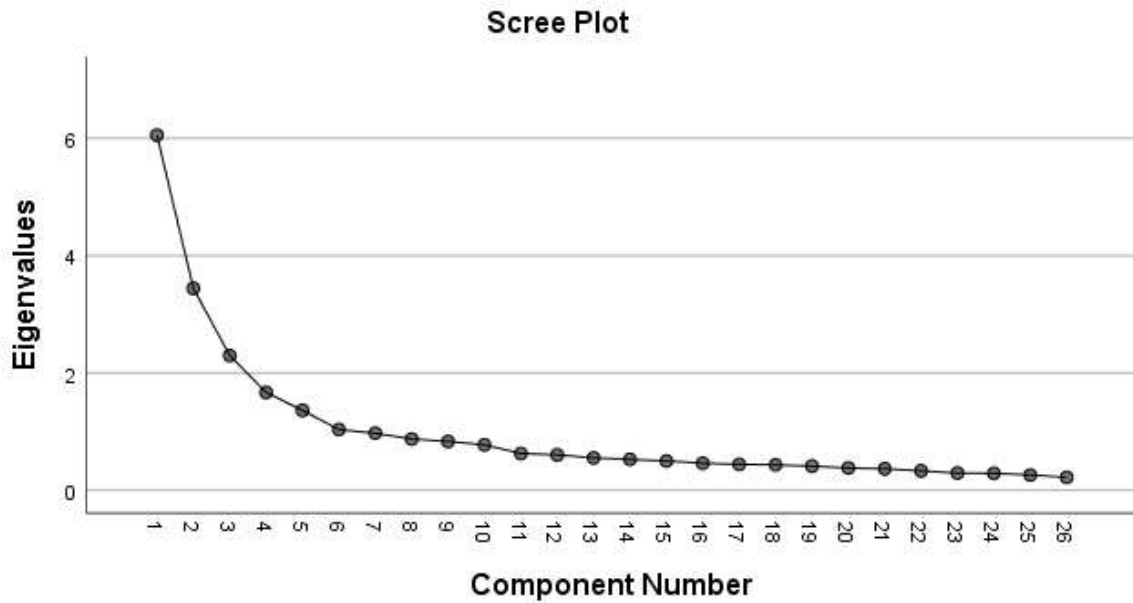


Table 3-1— the rotated matrix resulted of PCA.

Item	C1	C2	C3	C4	C5	C6
1	0.663					
2			0.316	0.351		
3	0.702					
4	0.717				0.325	
5	0.661					
6	0.453					
7				0.839		
8				0.779		
9					0.737	
10					0.696	
11		0.862				
12		0.712				
13		0.861				
14	0.709					
15		0.568				
16			0.821			
17	-0.393		0.497			0.385
18			0.756			
19		-0.638	0.424			
20			0.807			
21	0.758					
22	0.695					
23	0.737					
24						0.867
25	-0.51					0.405
26	-0.316		0.528			0.319

Note: C1 to C6: components of PCA.

Table 3-2 - item-total score correlation and experts' analyzes.

Item	Sentence (Portuguese)	Equivalent	Partially equivalent	Not equivalent	r (Bootstrapping Sample)
1	Quão rapidamente o tempo geralmente passa para você?	0.6	0.3	0.1	0.418*
2	Quão rapidamente você espera que a próxima hora passe?	0.5	0.5	0	0.250*
<b>3</b>	<b>Quão rapidamente a última semana passou para você?</b>	<b>0.4</b>	<b>0.6</b>	<b>0</b>	<b>0.467*</b>
4	Quão rapidamente o último mês passou para você?	0.4	0.6	0	0.484*
<b>5</b>	<b>Quão rapidamente o último ano passou para você?</b>	<b>0.4</b>	<b>0.6</b>	<b>0</b>	<b>0.421*</b>
<b>6</b>	<b>Quão rapidamente os últimos 10 anos passaram para você?</b>	<b>0.4</b>	<b>0.6</b>	<b>0</b>	<b>0.386*</b>
7	Quão rapidamente sua infância (<12 anos) passou?	0.4	0.6	0	0.299*
8	Quão rapidamente sua adolescência (13- 19 anos) passou?	0.4	0.6	0	0.359*
9	Quão rapidamente sua vida adulta entre 20 e 29 anos passou?	0.4	0.6	0	0.423*
10	Quão rapidamente sua vida adulta entre 30 e 39 anos passou?	0.4	0.6	0	0.28*
<b>11</b>	<b>Eu não tenho tempo suficiente para completar minhas tarefas.</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0.455*</b>
<b>12</b>	<b>Eu frequentemente me sinto pressionado pelo tempo.</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0.53*</b>
<b>13</b>	<b>Eu frequentemente não tenho tempo suficiente para me dedicar a coisas importantes.</b>	<b>0.8</b>	<b>0.2</b>	<b>0</b>	<b>0.471*</b>

Item	Sentence (Portuguese)	Equivalent	Partially equivalent	Not equivalent	r (Bootstrapping Sample)
14	Eu frequentemente acho que o tempo está passando rápido demais.	0.9	0.1	0	0.592*
<b>15</b>	<b>Eu preciso definir prioridades porque eu não consigo fazer todas as coisas que eu gostaria.</b>	<b>0.5</b>	<b>0.5</b>	<b>0</b>	<b>0.514*</b>
<b>16</b>	<b>Meu tempo parece ocioso.</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0.5*</b>
17	Eu frequentemente penso que o tempo simplesmente não quer passar.	0.7	0.2	0.1	0.141*
<b>18</b>	<b>Eu frequentemente me sinto entediado.</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0.456*</b>
19	Eu tenho bastante tempo.	0.5	0.5	0	NS
<b>20</b>	<b>Eu frequentemente tenho gasto meu tempo sem fazer nada.</b>	<b>0.9</b>	<b>0.1</b>	<b>0</b>	<b>0.438*</b>
21	O tempo é um trem bala (de alta velocidade)	0.7	0.3	0	0.641*
22	O tempo é um cavalo desembestado.	0.9	0.1	0	0.641*
23	O tempo é como uma corredeira.	0.8	0.2	0	0.638*
24	O tempo é tão vasto como o céu.	1	0	0	NS
25	O tempo é como um mar calmo, parado.	1	0	0	-0.208*
26	O tempo é como uma música monótona (tediosa).	1	0	0	0.165*
	All scale	0.693	0.3	0.007	1*

*Note:* \* = significant at  $p < 0.01$ ; NS = not significant ( $p > 0.05$ ); items in bold: selected for EFA; r: Pearson Correlations.

### 3.4.6 Exploratory Factor Analysis

The KMO for the EFA was 0.761 and the Bartlett's was  $\chi^2 (45, N = 446) = 1882.5$ ,  $p < .001$ . Both results suggested the data's appropriateness for EFA. PA indicated 2 dimensions when the 95th percentile is considered and 3 factors when the means are contemplated. The Kaiser method based on eigenvalues pointed out 3 factors. Fit measures were:  $\chi^2 (45, N = 446) = 3250.36$ ,  $p < .001$ , NNFI = 0.935, CFI = 0.974, RMSEA = 0.102 and the SRMR = 0.042. RMSEA had a value higher than what is recommended and the NNFI had a borderline tolerable value. CFI and SRMR had acceptable results. The items in each factor were: 3, 5, and 6 into the first factor (F1) named as Retrospective Time Intervals; 11, 12, 13, and 15 related to Time Pressure and 16, 18, and 20 named Time Expansion (Table 3-3).

Table 3-3 - the rotated matrix resulted of EFA.

Item	F1	F2	F3
3	0.543		
5	0.931		
6	0.500		
11		0.936	
12		0.789	
13		0.896	
15		0.661	
16			0.821
18			0.715
20			0.780

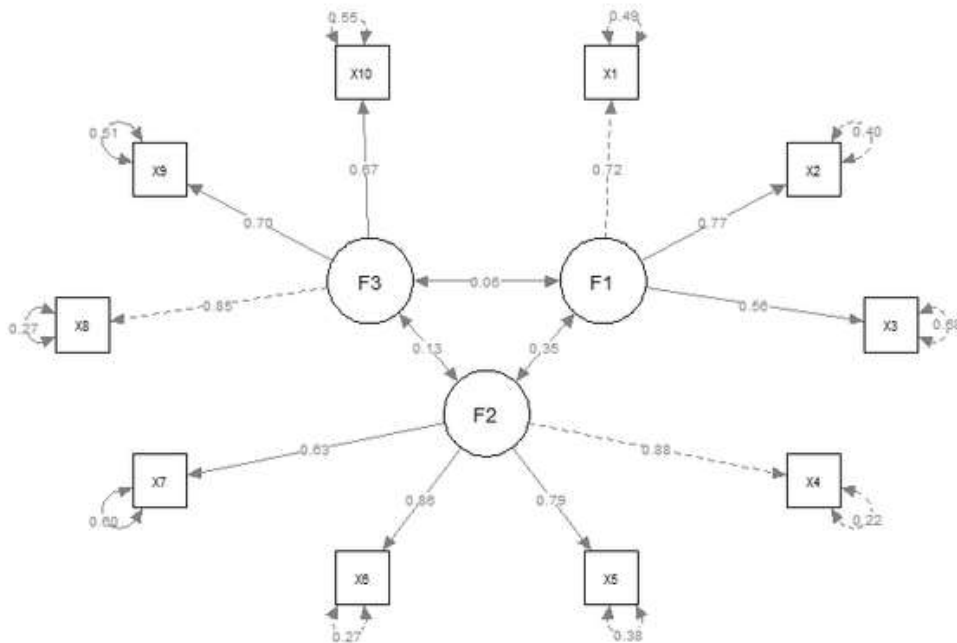
**Note:** F1: Retrospective Time Intervals; F2: Time Pressure; F3: Time Expansion. Loadings lower than 0.3 are omitted.

### 3.4.7 Confirmatory Factor Analysis

The fit measures for the CFA model were:  $\chi^2 (45, N = 446) = 3833.4$ ,  $p < .001$ , CFI = 0.991, TLI = 0.987, RMSEA = 0.049 (CI 90%: 0.032–0.059,  $p > 0.05$ ), SRMR = 0.055. These values were appropriate when traditional cutoffs were pondered. Meanwhile, considering the dynamic cutoffs previously calculated, the SRMR is marginally above the suggestion (0.055 x 0.048).

The standardized factor loadings for each item were: 0.717 (item 3), 0.772 (item 5), 0.563 (item 6) for F1; 0.884 (item 11), 0.789 (item 12), 0.857 (item 13), 0.632 (item 15) for F2 and 0.855 (item 16), 0.7 (item 18) and 0.668 (item 20) for F3. The covariances between F1 and F2 was 0.35, F1 with F3 was 0.06 and F2 with F3 was 0.13 (Figure 3-2).

Figure 3-2— latent structure of STQ final version according to the CFA.



Cronbach’s Alpha for the final version is marginal also for the Restrospective Time Intervals (lower than the cutoff of 0.7). CR values were satisfactory for all measures (Table 3-4).

Table 3-4 - the Cronbach’s Alpha and the Composite Reliability index (CR) for the full version of STQ, the final version and its factors.

Variable	Cronbach’s $\alpha$	CR
Full version (26 items)	0.763	-
Final version (10 items)	0.696	0.927

Retrospective Time Intervals Factor	0.643	0.728
Time Pressure Factor	0.825	0.872
Time Expansion Factor	0.765	0.788

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### 3.5 Discussion

Several limitations to the present study need to be acknowledged. First, the convenience sample was selected during the early coronavirus pandemic wave (first semester of 2020). It was possible to cause some response bias. For example, Di Giorgio et al. (2020) found that Italian mothers experienced more time expansion and less time pressure during the lockdown. They changed their sleep pattern as well they felt more sadness. In other words, the answers could be exaggerated in some way and lessened in another because of this powerful contextual stressor. Second, there are some intrinsic concerns about the representativeness of the convenience sample. The dis-balance between women and men is very pronounced (6,6 woman for 1 man). Also, there is a greater proportion of higher educated individuals compared to the Brazilian average and the authors found a geographic concentration of the sample in the Southwest region. Further research should be carried out to show the measurement invariance of STQ across such categories. Third, the EFA and the CFA were executed using the same sample, which is considered a methodological hindrance. Fourth, the estimation method WLSMV for the CFA produces an overestimation of model fit indices. To minimize this influence, the authors calculated specific interpretation parameters. Although, there is not a recommended standard procedure to solve such limitations. Fifth, there is not a complete report of the STQ factor structure in the literature. It limited the comparison of the CFA model showed here.

Overall, the experts' judgments supported the sentences' semantic equivalence. Some specific metaphors and expressions are uncommon in Portuguese, which made the translation process more complex. The PCA results showed an intricate pattern of dimensions that differs greatly from the first proposition of Wittmann & Lehnhoff (2005). The authors did not perform an EFA or a CFA, though they collapsed the values into means according to their perception of conceptual adequacy.

As found in the current paper, items that represented distinct time subjective dimensions were highly correlated and items that were assumed to be associated with each other did not meet a statistical criterion of relationship. This inconsistency may be because of the multidimensionality of STQ and even the contradictory nature of its underlying constructs in terms of semantics. The relatively small correlations between item and the total score reinforced this idea. Otherwise, the fact that the Brazilian STQ presented a different factor structure from the original one points to the possibility that the phenomenon of interest is influenced by cultural variables. Certain metaphors and concepts about the perception of time may exist in the Anglo-Saxon tradition, but may be find no correspondences in the Brazilian and Latin cultures. This hypothesis could lead to important differences in psychometric properties because of the distance between the item contents and the reality experienced by the respondents.

The findings related to the PCA and correlational analyzes resulted in a smaller set of items which could affect the constructs' representativeness. Wittmann et al. (2015b) reported a version of STQ with 15 items and a three-factor structure. Although, the authors did not describe this solution and the relationship with the broader version of STQ. They informed 8 items of time pressure (Cronbach's  $\alpha = 0.813$ ), 5 items of time expansion/boredom (Cronbach's  $\alpha = 0.822$ ) and 2 others associated with routines in life (Cronbach's  $\alpha = 0.625$ ). The CFA model explained 56.7% of the variance. The present paper also found a three-factor model. However, the number of items differs from Wittmann et al. (2015b): the adaptation resulted in ten items. The internal consistencies are similar to time pressure (Cronbach's  $\alpha = 0.825$ ) and a little lower for time expansion (Cronbach's  $\alpha = 0.765$ ). The third factor found here is not equivalent to Wittmann et al. (2015b) because the researchers added new items related to routines not previously present in Wittmann & Lehnhoff (2005). Despite the sparse information about the psychometric properties of STQ, it is important to note that many papers used isolated items based on the study design. For example, Wittmann et al. (2015a) inserted items of the future time dimension. Di Giorgio et al. (2020) did not include metaphors of time and selected only 13 items of the pool. Witowska et al. (2020) used five questions about pastime intervals. It shows that the focus of the researches using the STQ is evaluating specific subjective time dimensions without psychometric meticulousness.



Taken as a whole, this study indicates that STQ is a valid psychometric self-report scale to measure time awareness with three crucial dimensions: time pressure, time expansion, and retrospective time intervals. Measures constructed following rigorous translation and cross-cultural adaptation steps are essential for the advancement of applied research in Neuropsychology and related disciplines. Instruments such as the STQ provide clinical assessment of constructs that were virtually restricted to theoretical research. Therefore, it is innovative that the STQ can be used by Brazilian clinicians and it could be useful for developing further investigations of time perception in Brazil.

### 3.6 Acknowledgements

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### 3.7 Disclosure

The authors report no conflicts of interest.

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#### **4 ADULT CONCENTRATION INVENTORY (ACI) BRAZILIAN PORTUGUESE VERSION: CROSS-CULTURAL ADAPTATION AND VALIDATION STUDY.**

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##### 4.1 Abstract

**Objectives:** Sluggish Cognitive Tempo (SCT) designates a group of symptoms related to impairments in valuable life domains. The aims were to translate, adapt and validate a psychometrically informed scale of SCT, the Adult Concentration Inventory (ACI), for the Brazilian context. **Method:** The scale was translated, back-translated, and evaluated by an expert panel. After the semantic equivalence analysis, 446 participants (295 women) aged 18 to 65 years (M = 34.99, SD = 10.7) answered an internet-based survey. An Exploratory Factor Analysis (EFA) was conducted with the

items of the ACI, Adult Self Report Scale (ASRS-18), the Self-Report Questionnaire (SRQ-20) to evaluate the convergent and discriminant validity of ACI items. A Confirmatory Factor Analysis (CFA) was performed to test the ACI latent structure. Correlations between ACI, ASRS-18 and SRQ-20 were also calculated. Results: The experts' semantic equivalence analyzes pointed to 85% of average agreement. The EFA with ACI, ASRS-18, and SRQ-20 showed 10 ACI items with acceptable convergent and discriminant validity. The most suitable solution in the CFA was the one-factor model (RMSEA = 0.039 [IC90%: 0.0 – 0.09]; CFI = 0.997; TLI = 0.996). The reliability was satisfactory ( $\alpha = 0.920$ ). The correlations between ACI measures and the ASRS-18 inattention were high. Conversely, the correlations with the ASRS-18 hyperactivity-impulsivity were of medium intensity and when controlling for inattention became non-significative. Conclusion: Overall, the preliminary results showed the reliability and validity of the ACI Brazilian Portuguese version. Further studies should focus on determining the generalization and measurement invariance of these findings.

**Keywords:** sluggish cognitive tempo; attention deficit-hyperactivity disorder; adult; self-report; psychometrics.

## 4.2 Introduction

Sluggish Cognitive Tempo (SCT) is a collection of symptoms related to daydreaming, slowed moving, drowsiness, mental confusion, apathy, and feeling spacey. This cluster has been explored majorly within the background of Attention Deficit-Hyperactivity Disorder (ADHD). There was early evidence pointing to a strong relationship between SCT and inattention symptoms (Becker et al., 2016). In a meta-analytic review, Becker et al. (2016) analyzed 19,000 individuals from 23 independent samples. The authors performed factorial analyses, founding a separate factor for SCT concerning ADHD.

Becker et al. (2016) highlighted the fact of the researches about SCT are just beginning, despite the growth of publications in the last decades. There is no strong support to understand SCT than a "pure inattentive" form of ADHD. At the same time, there is insufficient data to draw a conclusion about a separate disorder (Becker et al., 2016). A more parsimonious hypothesis is the transdiagnostic implication of SCT. For

example, Ekinçi et al. (2021) verified that higher symptoms of SCT were associated with Autism Spectrum Disorder (ASD) and multiple anxiety disorders in children with ADHD. Brewe et al. (2020) investigated the incidence of SCT in a small sample comprised of young adults with ASD. Almost a third showed significant SCT symptoms which were associated with more executive functioning problems and higher levels of depression. In a similar direction, Mayes et al. (2020) performed a study with mothers' ratings of 1,436 children with autism, 1,056 with ADHD without ASD, and 186 controls. Fifty-nine percent of the ASD sample had at least 1.5 standard deviations higher in the SCT scale compared to 40% with ADHD inattentive and 30% with ADHD combined presentation. In sum, there is no consensus about the specific nosology of SCT, despite the advance in the characterization of the phenomena.

In terms of association with other behavioral problems, internalizing symptoms are strongly correlated to SCT meanwhile there is a weak correlation with externalizing spectrum disorders (Becker et al., 2014). Social withdrawal is one of the most important impairments associated with SCT as well as loneliness and suicide risk (Becker et al., 2020). Fredrick et al. (2020) demonstrated an association between mind-wandering, rumination, and SCT symptoms beyond ADHD symptomatology. Becker et al. (2014) presented the connection between SCT and sleep problems in children. Flannery et al. (2016) reported an association between SCT and crucial outcomes in a college sample after controlling symptoms of ADHD, anxiety, and depression. Higher SCT levels pleaded to poorer study skills, more executive functions impairments in daily life, and greater difficulties in domains of life such as education, work, finances, and household tasks. ADHD inattentive (ADHD-IN) presentation did not associate with those impairments when SCT symptoms entered the model. In summary, the functional impairments related to SCT seem to be independent of the association with ADHD symptoms. This assumption leads to an important implication for future researches.

In adults, SCT seemed to contribute to a wider level of heterogeneity of ADHD. Kamradt et al. (2018) found that adults with higher SCT symptoms exhibited more depressive, anxious, -persistent inattentive symptoms, and more impairments in professional and social domains. Barkley (2012) examined a nationally representative sample of adults from the U. S and found that 6.8% of the sample exhibited higher levels of ADHD in contrast to 5.8% with more intense SCT symptoms. 54% of those

with higher levels of SCT met the criteria for ADHD. The ADHD group was considerably younger than the SCT group. The groups with more SCT symptoms had more impairments in Self-Organization/Problem Solving subscale. The SCT-only group had more problems in the work domain compared to the others. Becker et al. (2018) described a similar pattern of difficulties. Individuals with higher levels of SCT symptoms showed more difficulties in Self-Organization/Problem Solving and Self-Management to Time than the ADHD inattentive group.

The biological underpinnings of SCT are much less clear compared to the findings of ADHD research. Bolat et al. (2020) performed a study to investigate the genetic influence in the SCT presentation. They described that the group with ADHD symptoms without SCT had more 4R homozygosity for the DRD4 gene meanwhile the group with SCT without ADHD symptoms exhibited a higher proportion of the 7R allele. In addition, they found no significant difference between those groups in the neuropsychological measures. Firat et al. (2020) reported that daydreaming in pretreatment predicts more inattention as well as more overall ADHD symptoms at school after one month of methylphenidate therapy. McBurnett et al. (2017) suggested the efficacy of atomoxetine to treat SCT.

To investigate the psychometric properties of the SCT scales, Becker (2020) performed a systematic review. The author found 9 instruments, six stand-alone SCT questionnaires, and three inserted in broader ADHD measures. Only two scales are targeted to adults. All included SCT contents of daydreaming and drowsiness, despite the divergence among other psychopathological features. Regarding the factorial structure, six scales presented a unidimensional model, and the others vary from 2 to 3-factor solutions. Some studies tested a bifactor model. The internal consistencies are acceptable (all > 0.7). The measures of SCT showed a satisfactory test-retest reliability across weeks to one year. These results suggested that SCT scales have encouraging psychometric properties.

One of those measures was the Adult Concentration Inventory–ACI (Becker et al., 2016). The authors made a meta-analysis to define the best items that assess SCT symptoms in adults. Based on these findings, the ACI was created. To evaluate the validity and reliability of ACI, they conducted a study with 3,172 college students from U. S (Becker et al., 2018). Ten items demonstrated convergent and discriminant

validity from internalizing symptoms and ADHD inattentive dimension. Six items were added to capture other SCT features, totalizing 16 items.

The aims of this study were 1) To investigate the content and construct validity of the ACI for the Brazilian context. 2) To test the dimensionality and reliability of ACI. 3) To examine convergent and divergent validity of ACI from ADHD-IN and internalizing symptoms.

### 4.3 Methods

#### 4.3.1 Translation procedures

The translation and cross-cultural adaptation followed the guidelines of the International Test Commission (ITC, 2017) and the International Society for Pharmacoeconomics and Outcomes Research–ISPOR (Wild et al. 2005). First, two researchers independently translated the scale into Brazilian Portuguese. A third researcher compared these versions and conciliate them. An English professor with a bachelor's degree in Arts back-translated the first synthesis version. The researchers sent it to the original author of ACI who analyzes the semantic correspondence. All considerations were pondered to assure the construct representability. After the modifications' appreciation, ten bilingual Brazilian experts in Psychology evaluated potential linguistic differences and imprecisions. All of them had at least a master's degree and a fluent English level. They scrutinized the equivalence between the Brazilian Portuguese and English versions with three options of answer: equivalent, partially equivalent, and not equivalent. The authors evaluated the results and calculated an index to represent the overall equivalence. Qualitative information was also considered. To analyze the dimensionality and other psychometric properties of the Brazilian ACI version, a broader survey was performed.

#### 4.3.2 Sample

The participants were recruited through advertisements in the researcher's social media and word of mouth. The broad survey using the ACI had the approval of the Ethics Committee of the Federal University of Minas Gerais under the number:



07570312.9.0000.5149. The eligibility criteria were age (from 18 to 65 years old) and the understanding of the statements and instructions. All participants had to accept the free and informed consent term before starting the survey.

### 4.3.3 Measures

#### 4.3.3.1 Adult Concentration Inventory (ACI)

The self-report scale includes 16 items of SCT symptoms: 13 previously identified in a meta-analysis (Becker et al., 2016) and 3 added to assess mental confusion features. The items are based on a four Likert scale ranging from 0 to 3 (0 = not at all, 1 = sometimes, 2 = often, 3 = very often) considering the past six months. There is another part that measures impairments in daily functioning related to SCT symptoms. In this part, the answers were rated on a five-point scale (from 0 = no difficulty to 4 = severe difficulty). Becker et al. (2018) did not include this set of items in their statistical analyses. Only 10 items demonstrated both convergent and discriminant validity from ADHD-IN and internalizing symptoms. The Cronbach's Alpha for the 10 items version was 0.89.

#### 4.3.3.2 Adult Self-Report Scale (ASRS-18)

The scale measures ADHD symptoms according to the A criterion of the Diagnostic and Statistical Manual for Mental Disorders—Fourth Edition (DSM-IV; APA, 2000). The scale has 18 items, the first 9 are related to inattention (ADHD-IN), and the others comprised hyperactivity/impulsivity (ADHD-H/I) dimension (Adler et al., 2006). The ASRS-18 is rated on a five-point Likert scale (0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = very often). The original version had a Cronbach's  $\alpha$  of 0.88. Mattos et al. (2006) translated and adapted ASRS-18 into Brazilian Portuguese.

#### 4.3.3.3 Self-Report Scale (SRQ-20)

The SRQ is a screening measure with 20 yes-no questions that assess frequent complaints related to anxiety, depression, and psychosomatic disorders (Harding et al., 1980). The first Brazilian Portuguese version was published by Mari & Williams

(1986). In a study with 1,688 women from multiple Brazilian locations, Paraventi et al. (2015) tested different latent structures for the SRQ-20. The most suitable model was a three-factor solution: anxiety/depression, disability, and somatic symptoms. The reliabilities were calculated in the present study as a result of an absence of this information.

#### 4.3.4 Data analysis

The means of the expert panel answers were calculated to compare the semantic equivalence. This procedure is similar to the Content Validity Index (ICV). Correlations between the 16 items of SCT symptoms and among the suggested total scores were performed.

Following earlier studies about SCT scales, an Exploratory Factor Analysis (EFA) was conducted to evaluate the convergent and discriminant validity of ACI in comparison to ADHD-IN and internalizing symptoms. For this purpose, the sample was randomly divided into two subsamples (A and B). SCT items were expected to show high loadings on the SCT factor (at least 0.6 in one sample and 0.5 in the other) and low loadings on the ADHD-IN and Anxiety/Depression factors (less than 0.3 in both samples). In convergence, the ADHD-IN and Anxiety/Depression were expected to have high loadings into their factors and low loadings on the SCT factor. Only the items that demonstrated convergent and discriminant validity from ADHD-IN and Anxiety/Depression were retained to perform EFA and CFA. A one-factor SCT solution was tested to replicate the previous study of ACI. Finally, correlations among SCT, ADHD-IN, and internalizing symptoms were calculated.

Subsamples A and B were used to cross-validate the convergent and discriminant validity. Subsample A was employed to perform the EFA of the Brazilian ACI version. Subsample B was hired for the CFA of ACI. Other analyses were performed with the complete sample.

Pearson correlations were calculated with the bootstrapping procedure (a thousand simulations). The reliability was evaluated by the Cronbach's Alpha ( $\alpha$ ), McDonald's Coefficient ( $\omega$ ), and the Composite Reliability index (CR). The Cronbach's Alpha may be greater than 0.7 to indicate an acceptable internal consistency (Tavakol & Dennick, 2011). The CR was obtained using the calculator of Colwell (2016).

The open-source software Factor V.10.10.03 (Ferrando & Lorenzo-Seva, 2017) executed the Exploratory Factor Analysis. The extraction method Robust Diagonally Weighted Least Squares (RDWLS) resulted in a polychoric correlation matrix (Asparouhov & Muthen, 2010). To determine the retained factors' number, Parallel Analysis (PA) with the Robust Promin rotation was used. The Kaiser retention method was also calculated (Eigenvalues > 1). To estimate the data's potential to the EFA, the Kaiser-Meyer-Olkin (KMO) indicator and Bartlett's Test of Sphericity were assessed. Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR) or the Root Mean Square of Residuals (RMSR),  $c^2$ ,  $c^2/df$ , Comparative Fit Index (CFI), Non-Normal Fit Index (NNFI which is equivalent to the Tucker Lewis Index - TLI) were calculated to assess the model's goodness-of-fit.

The R software (R Core Team, 2020) with the lavaan package (Rosseel, 2012) executed the CFA. The estimation method was the Weighted Least Squares Mean and Variance (WLSMV) with the Satorra-Bentler correction. Model fit estimators were the Chi-Squared test,  $c^2/df$  ratio, CFI, TLI, RMSEA, and SRMR. Also, the McDonald's Coefficient ( $\omega$ ) was calculated in R.

KMO values higher than 0.7 and Bartlett's Test of Sphericity with  $p < 0.05$  are acceptable parameters as specified by Watkins (2018). According to Schreiber et al. (2006), the cutoffs for absolute fit indices were: SRMR below 0.08; RMSEA under 0.06, and Chi-Squared test with  $p > 0.05$ . The chi-square/df ratio should be less than 3. Concerning the comparative fit indices, the suggested cutoffs were: close to or above 0.95 for CFI, NNFI, and TLI (Hu & Bentler, 1999).

## 4.4 Results

### 4.4.1 Sociodemographic data

The study included 446 participants (295 women; 66.1%) ranging from 18 to 63 years old ( $M = 34,99$  years,  $SD = 10.7$ ). Most of them were from the Southwest region of Brazil (71.74%). The majority was single (53.4%), with a college degree (30.3%) and medium to high socioeconomic level (33.9%). In relation to previous mental health diagnoses, 51.8% of the participants denied any mental health diagnosis. The three

most reported diagnoses were: ADHD (22.9%), Depressive Disorders (20.4%), and General Anxiety Disorder (15.2%).

#### 4.4.2 Semantic equivalence

The overall correspondence between the original scale and the ACI-translated version was 85%. 14.2% of the items had a partial equivalence and only 0.8% exhibited no semantic correspondence as showed in Table 1. For the 10-items version, the correspondence rate was 82%. The partial equivalence showed 16% of agreement and 2% reached no semantic equivalence. Three items (2, 4, 12) demonstrated a semantic equivalence rate lower than 0.8.

#### 4.4.3 Item-total score correlations

As showed in Table 4-1, all items had statistical significant correlations with the estimated total scores ( $p < 0.01$ ). The magnitudes were medium to strong. Only the correlation between item 21 and the full ACI version total score exhibited a relatively weak result ( $r = 0.369$ ).

#### 4.4.4 Inter-item correlations

As summarized in Table 4-2, the correlations among the 16 items concerning the SCT symptoms were all statistically significant ( $p < 0.01$ ) and varied from 0.378 to 0.758.

#### 4.4.5 Convergent and Discriminant Validity of SCT, ADHD-IN and Internalizing symptoms

For the subsample A, the Bartlett's sphericity test was significant ( $\chi^2(496) = 2423.5$ ;  $p < 0.001$ ) and the Kaiser-Meyer-Olkin (KMO) was 0.965. These results

indicated the suitability of the matrix to perform an EFA. The parallel analysis indicated a two-factor solution with 62.07% of explained variance meanwhile the Kaiser criteria pointed to a three-factor solution. The goodness-of-fit indexes were adequate ( $\chi^2 = 312.175$ ,  $df = 403$ ,  $p > 0.001$ ;  $\chi^2/df = 0.774$ ; RMSEA = 0.00; RMSR = 0.535; CFI = 1.075; NNFI = 1.093).

For the subsample B, the KMO was 0.959 and the Bartlett's sphericity test was significant ( $\chi^2 (496) = 2423.5$ ;  $p < 0.001$ ). Also, the parallel analysis suggested a two-factor solution (60.44% of explained variance) and the Kaiser criteria pointed to a three-factor solution. The goodness-of-fit indexes were satisfactory ( $\chi^2 = 85.59$ ,  $df = 403$ ,  $p > 0.001$ ;  $\chi^2/df = 0.212$ ; RMSEA = 0.00; RMSR = 0.0504; CFI = 1.043; NNFI = 1.053).

Only 10 items (1, 2, 3, 4, 5, 6, 8, 10, 14, and 16) reached both criteria for convergent and discriminant validity about ADHD-IN and anxiety/depression symptoms across the subsamples A and B as showed in Table 4-3.

Table 4-1 - ACI item-total scores correlations.

Item	Sentence (Portuguese)	Equivalent	Partially equivalente	Not equivalent	r24	r16	r10
<b>1</b>	<b>Eu sou devagar para fazer as coisas.</b>	<b>0.9</b>	<b>0.1</b>	<b>0</b>	<b>0.594</b>	<b>0.627</b>	<b>0.666</b>
<b>2</b>	<b>Meus pensamentos parecem turvos, como se estivessem envoltos em neblina.</b>	<b>0.5</b>	<b>0.5</b>	<b>0</b>	<b>0.767</b>	<b>0.788</b>	<b>0.798</b>
<b>3</b>	<b>Eu fico olhando para o vazio.</b>	<b>0.8</b>	<b>0.2</b>	<b>0</b>	<b>0.69</b>	<b>0.727</b>	<b>0.737</b>
<b>4</b>	<b>Me sinto sonolento ou sem energia durante o dia.</b>	<b>0.5</b>	<b>0.3</b>	<b>0.2</b>	<b>0.698</b>	<b>0.713</b>	<b>0.743</b>
<b>5</b>	<b>Eu perco minha linha de raciocínio.</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0.801</b>	<b>0.817</b>	<b>0.808</b>
<b>6</b>	<b>Eu não sou muito ativo.</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0.659</b>	<b>0.693</b>	<b>0.727</b>
7	Eu me perco nos meus próprios pensamentos.	1	0	0	0.794	0.799	-
<b>8</b>	<b>Eu me canso facilmente.</b>	<b>0.9</b>	<b>0.1</b>	<b>0</b>	<b>0.742</b>	<b>0.748</b>	<b>0.776</b>
9	Eu esqueço o que eu ia dizer.	0.9	0.1	0	0.714	0.745	-
<b>10</b>	<b>Eu me sinto confuso.</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0.787</b>	<b>0.811</b>	<b>0.799</b>
11	Eu não me sinto motivado para fazer as coisas.	0.8	0.2	0	0.759	0.758	-
12	Minha mente viaja longe sem que eu perceba.	0.5	0.5	0	0.763	0.785	-
13	Minha mente fica bagunçada.	0.8	0.2	0	0.823	0.830	-
<b>14</b>	<b>Meu raciocínio parece lento ou mais devagar.</b>	<b>0.8</b>	<b>0.2</b>	<b>0</b>	<b>0.666</b>	<b>0.713</b>	<b>0.756</b>
15	Eu sonho acordado (viajo).	1	0	0	0.682	0.695	-
<b>16</b>	<b>Eu sinto dificuldade para colocar meus pensamentos em palavras.</b>	<b>0.8</b>	<b>0.2</b>	<b>0</b>	<b>0.691</b>	<b>0.712</b>	<b>0.716</b>
17	Trabalho ou emprego	1	0	0	0.711	-	-
18	Educação ou estudos	0.8	0.2	0	0.749	-	-
19	Relacionamentos com amigos.	1	0	0	0.657	-	-
20	Relacionamentos com parceiros românticos.	0.9	0.1	0	0.621	-	-
21	Criação dos filhos	0.9	0.1	0	0.369	-	-
22	Organização da rotina	0.9	0.1	0	0.734	-	-
23	Cuidados diários (banho/higiene pessoal, exercício físico, alimentação).	0.8	0.2	0	0.642	-	-
24	Conseguir ter uma boa noite de sono.	0.9	0.1	0	0.513	-	-
	Full scale	0.85	0.142	0.008	-	-	-
	16-item version	0.825	0.1625	0.0125	-	-	-
	10-item version	0.82	0.16	0.02	-	-	-

**Note:** Items in bold are included in the final 10-item version. All correlations were significant at  $p < 0.01$ . r24: Pearson correlations with the 24-item ACI total score; r16: Pearson correlations with the 16-item ACI total score; r10: Pearson correlations with the 10-item ACI total score.

Item	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1															
2	.444**	1														
3	.401**	.639**	1													
4	.432**	.480**	.486**	1												
5	.464**	.589**	.552**	.559**	1											
6	.522**	.471**	.437**	.571**	.484**	1										
7	.414**	.626**	.551**	.478**	.681**	.510**	1									
8	.427**	.531**	.494**	.733**	.625**	.595**	.527**	1								
9	.384**	.495**	.520**	.500**	.714**	.426**	.593**	.553**	1							
10	.413**	.699**	.571**	.493**	.664**	.470**	.624**	.520**	.620**	1						
11	.485**	.550**	.459**	.601**	.563**	.610**	.550**	.597**	.497**	.590**	1					
12	.424**	.552**	.558**	.466**	.586**	.463**	.714**	.479**	.557**	.586**	.569**	1				
13	.404**	.710**	.568**	.492**	.650**	.449**	.700**	.544**	.545**	.758**	.585**	.708**	1			
14	.522**	.598**	.506**	.451**	.563**	.462**	.441**	.487**	.517**	.590**	.510**	.467**	.542**	1		
15	.386**	.479**	.485**	.412**	.511**	.379**	.594**	.425**	.489**	.507**	.439**	.702**	.623**	.378**	1	
16	.414**	.537**	.459**	.391**	.589**	.464**	.535**	.418**	.531**	.586**	.478**	.524**	.607**	.515**	.453**	1

Table 4-2 - ACI inter-item correlations.

Note: \*\* = significance level at  $p < 0.01$

Table 4-3 — exploratory factor analysis results for the ACI Brazilian version, ASRS-IN and SRQ-20 Anxiety/Depression

Item	Sample A			Sample B		
	SCT	ADHD-IN	ANX/DEP	SCT	ADHD-IN	ANX/DEP
SRQ2		0.421				0.315
SRQ6			0.525			0.575
SRQ9			0.889			0.682
SRQ10	-0.338		0.749			0.555
SRQ15			0.722			0.743
SRQ16			0.659	0.362		0.713
SRQ17			0.904			0.813
ASRS1		0.693			0.912	
ASRS2		0.908			0.916	
ASRS3	0.336	0.556			0.777	
ASRS4		0.929			0.778	
ASRS5		0.985			0.831	
ASRS6		0.800			0.857	
ASRS7		0.900			0.945	
ASRS8		0.870			0.844	
ASRS9		0.662			0.642	
ACI1	0.657			0.757		
ACI2	0.648			0.793		
ACI3	0.616			0.730		
ACI4	0.724			0.577		
ACI5	0.817			0.764		
ACI6	0.668			0.882		
<b>ACI7</b>	<b>0.524</b>	<b>0.350</b>		<b>0.489</b>	<b>0.423</b>	
ACI8	0.705			0.656		
<b>ACI9</b>	<b>0.791</b>			<b>0.520</b>	<b>0.436</b>	
ACI10	0.746			0.787		
<b>ACI11</b>	<b>0.483</b>			<b>0.510</b>		<b>0.416</b>
<b>ACI12</b>	<b>0.459</b>	<b>0.467</b>		<b>0.307</b>	<b>0.495</b>	
<b>ACI13</b>	<b>0.375</b>	<b>0.456</b>		<b>0.510</b>	<b>0.307</b>	
ACI14	0.660			0.865		
<b>ACI15</b>	<b>0.429</b>	<b>0.359</b>		<b>0.450</b>		
ACI16	0.694			0.561		

*Note:* Factor loadings above 0.3 are omitted. Items in bold did not reach the criteria for divergent validity. SCT = Sluggish Cognitive Tempo; ADHD-IN: Attention deficit hyperactivity-disorder inattention symptoms; ANX/DEP: anxiety/depression.



#### 4.4.6 Exploratory and Confirmatory Factor Analyses for the SCT one-factor model

Kaiser-Meyer-Olkin (KMO) was 0.88 and the Bartlett's sphericity test was significant ( $c^2(45) = 1678.1$ ;  $p < 0.001$ ), demonstrating the suitability of the data to perform an EFA. A two-factor solution was indicated by the parallel analysis (69.07% of explained variance). However, the Kaiser criteria pointed to a one-factor solution (**Erro! Fonte de referência não encontrada.**). The goodness-of-fit measures were:  $c^2 = 123.22$ ,  $df = 35$ ,  $p < 0.001$ ;  $c^2/df = 3.5$ ; RMSEA = 0.107; RMSR = 0.0722; CFI = 0.984; NNFI = 0.979). The RMSEA, RMSR and  $c^2/df$  were higher than the recommended standards. However, the CFA fit indices were suitable ( $c^2 = 46.864$ ,  $df = 35$ ,  $p > 0.001$ ;  $c^2/df = 1.33$ ; RMSEA = 0.039 (IC90%: 0.0 – 0.09); RMSR = 0.06; CFI = 0.997; TLI = 0.996). As shown in Table 4-4, the ACI items showed loadings ranging from 0.663 to 0.866 on the SCT factor ( $M_{loadings} = 0.76$ ,  $SD_{loadings} = 0.060$ ).

Figure 4-1— one-factor model of the ACI Brazilian version.

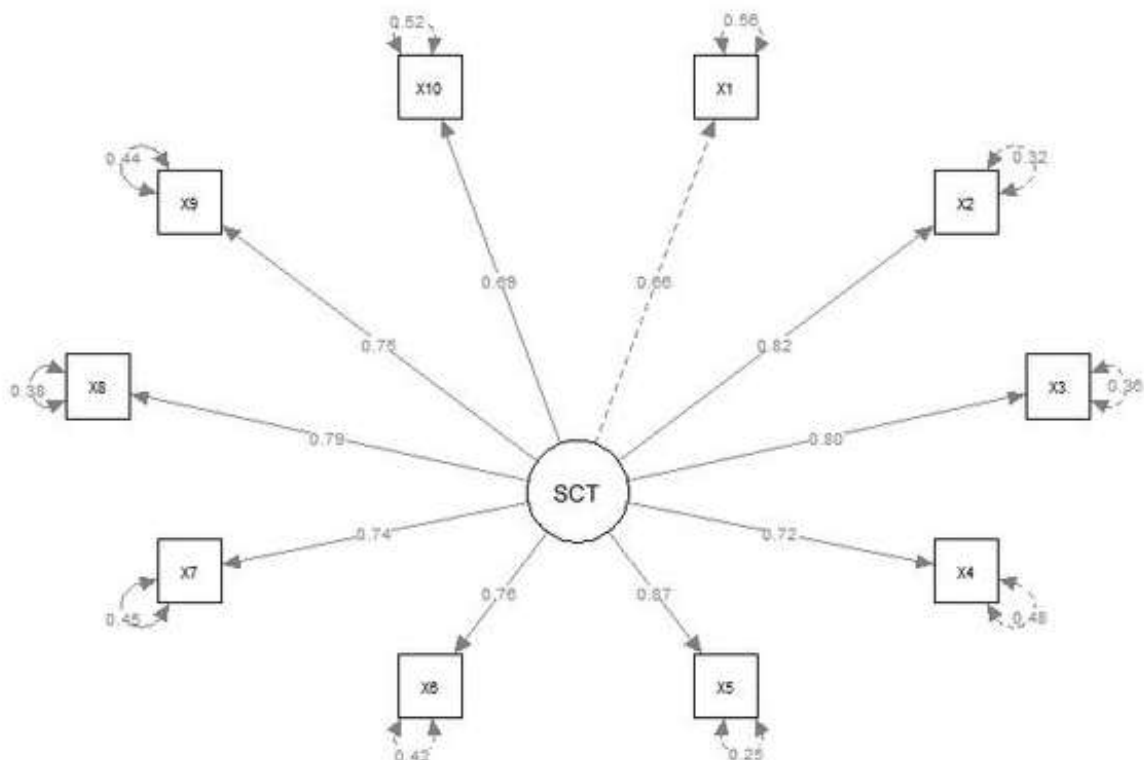


Table 4-4 — standardized factor loadings of the 10-item ACI version.

Item	Loadings
ACI1	0.663
ACI2	0.823
ACI3	0.799
ACI4	0.720
ACI5	0.866
ACI6	0.762
ACI8	0.739
ACI10	0.786
ACI14	0.750
ACI16	0.693

#### 4.4.7 Reliability

The results indicated a satisfactory reliability of the 10-item ACI solution: ( $\omega = 0.94$ ;  $\alpha = 0.92$  and  $CR = 0.932$ ). Table 5 presented the Cronbach's Alpha for the other scales. For the ACI full version (24 items) the  $\alpha$  was 0.95 and for the 16-item version, the  $\alpha$  was 0.947.

#### 4.4.8 Correlations between ACI, SRQ-20 and ASRS-18

All were statistically significant ( $p < 0.001$ ) as summarized in Table 4-5. The results between the ACI measures and ASRS-IN varied from 0.726 to 0.805. Specifically, the correlation between the full ACI total score and the ASRS-IN reached 0.805, the higher value among all found coefficients. The associations between ACI measures and ASRS-H/I were in medium intensity (from 0.428 to 0.541). SRQ-20 Somatic factor showed medium size coefficients with all ACI dimensions ( $0.524 > r > 0.509$ ) meanwhile SRQ-20 Disability factor exhibited higher associations ( $0.78 > r > 0.652$ ). The SRQ-20 Anxiety/Depression dimension had an intermediate pattern of association with ACI measures. Overall, ACI had stronger associations with ASRS-IN and SRQ-Disability and weaker correlations with ASRS-H/I. After controlling the association between the SCT 10-item version total score and ASRS-IN, the correlation between the SCT 10-item version total score and ASRS-H/I became non-significant ( $r$

= - 0.025;  $p > 0.01$ ). On other hand, the correlation between SRQ-20 Anxiety/Depression and ACI 10-item version total score when controlling ASRS-IN remained significant and with a medium size ( $r = 0.448$ ,  $p < 0.01$ ).

Table 4-5 - correlations between ACI measures, ASRS-18 dimensions and SRQ-20 factors.

Scale / Dimension	ACI Full	ACI 16	ACI 10	SRQ Total	SRQ AnxDep	SRQ Disab	SRQ Somatic	ASRS Total	ASRS-IN	ASRS-H/I
ACIFull	1									
ACI16	0.973	1								
ACI10	0.943	0.977	1							
SRQTotal	0.749	0.738	0.727	1						
SRQAnxDep	0.625	0.618	0.605	0.891	1					
SRQDisab	0.780	0.769	0.763	0.929	0.833	1				
SRQSomatic	0.524	0.517	0.509	0.808	0.564	0.595	1			
ASRSTotal	0.758	0.726	0.652	0.628	0.502	0.615	0.485	1		
ASRS-IN	0.805	0.785	0.726	0.589	0.455	0.615	0.412	0.908	1	
ASRS-H/I	0.541	0.501	0.428	0.536	0.446	0.48	0.462	0.885	0.608	1
Cronbach $\alpha$	0.95	0.947	0.92	0.874	0.754	0.860	0.602	0.929	0.926	0.875

**Note:** ACIFull = 24 items of ACI; ACI16 = 16-item ACI version; ACI10 = 10-item ACI version; SRQTotal = total sum of the 20 items of SRQ; SRQAnxDep = factor of the SRQ-20 related to anxious and depressive symptoms; SRQDisab = SRQ-20 factor called Disability; SRQSomatic = factor of the SRQ-20 related to somatic concerns; ASRSTotal = total score of ASRS=18; ASRS-IN = total score of inattention symptoms of ASRS-18; ASRS-H/I = total score of the hyperactivity-impulsivity dimension of ASRS-18.

#### 4.5 Discussion

The present study investigated preliminary evidence of the validity of the Brazilian ACI version. In terms of semantic equivalence, some items displayed differences in their content. However, the considerations of the expert panel were evaluated to improve the item wording. Overall, the equivalence was acceptable. Moreover, the ACI items showed medium to strong correlations within them as well between the total scores. The one-factor solution demonstrated satisfactory goodness-of-fit indices, replicating the finding of Becker et al. (2018).

In the EFA for the estimation of convergent and discriminant validity of ACI, 10 items met the criteria. Although, these 10 items were distinct from those found in Becker et al (2018). There was not a clear explanation of the non-reproduction of Becker et al. (2018). A hypothesis is a cultural influence on the meanings of ACI items. For example, Takeda et al. (2019) did not find the same structure of an SCT scale made for U.S. adults in a Japanese sample. Conversely, Jung et al. (2019) reported that a 15-item SCT parent rating for adolescents replicated the item content in a South Korean sample. However, four items of the self-report version failed to exhibit

convergent and divergent validity. These items assessed slow processing speed and mental confusion. The authors hypothesized that stigmas associated with the items' content could influence the endorsement by the adolescent. Parent and teacher versions showed consistently positive results about the validity of these items. Another source of non-replicability could be difficulty in self-evaluation regarding mental confusion and slow processing speed. Surprisingly, the present study found a satisfactory convergent and discriminant validity of items related to these SCT dimensions.

In convergence with Takeda et al. (2019), SCT became non statistically significant correlated with ADHD-H/I after controlling for ADHD-IN. On the other hand, SCT symptoms remained associated with internalizing symptoms after controlling for ADHD-IN. The correlations patterns also demonstrated that SCT was stronger associated with internalizing symptoms than ADHD-IN was. This phenomenon named "dissociation" for some authors (Takeda et al., 2019) supported the singularity of SCT in relation to the ADHD-IN dimension.

The Cronbach's Alpha of the adapted ACI was satisfactory and slightly higher than the value of 0.89 reported in Becker et al. (2018). Despite the differences between the study's designs and cultural uniqueness, the internal consistency of the Brazilian version was comparable to Becker et al. (2018). Moreover, the McDonald's Coefficient and the Composite Reliability index supported the consistency of the final 10-item

#### 4.5.1 Limitations

First, selection bias is a potential source of concern. The participants were recruited from the community by virtual advertisements in social media and the word of mouth. A personal interest in ADHD (e.g., a positive diagnosis) could be a reason for the participation. We found a higher proportion of ADHD diagnoses compared to the populational prevalence. Also, we did not perform a specific clinical evaluation about the psychiatric status of these individuals. Second, the data were collected based solely on self-report rating scales. Multimethod and multi-informant designs could be useful to minimize the limitations of a research design based on only one source. To date, there is not a gold standard interview to measure SCT symptoms which limited the validation process to scale ratings. Third, the preponderance of

women to men was high in our sample. Further investigations regarding measurement invariance should demonstrate whether this imbalance is determinant to the generalization of our results. This assumption is also true for other sociodemographic characteristics. Fourth, using a cross-sectional study, we did not calculate test-retest reliability or the predictive validity of the ACI score for clinical purposes. Longitudinal studies using ACI would clarify this concern. Finally, the sample size was relatively small, especially to perform Structural Equation Modelling (SEM) analysis.

#### 4.6 Conclusion

To our knowledge, this is the first study aimed to adapt an SCT measure designed for adults in Brazil. Preliminary evidence of psychometric validity and reliability supported the use of the Brazilian Portuguese ACI version. In addition, these results contributed to the investigation of ADHD, SCT, and internalizing symptoms. Future research should explore whether the ACI is invariant across gender, age, and educational backgrounds.

#### 4.7 Author contribution

Victor P. Godoy contributed to data collection, designed the study, conducted the statistical analysis, drafted the initial manuscript, reviewed and revised the version submitted. Alexandre L. O Serpa and Leandro F. Malloy-Diniz conceptualized and designed the methodological and statistical procedures, contributed to interpretation of the results, reviewed and revised the manuscript.

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#### 4.9 Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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## 5 EXECUTIVE FUNCTIONS CONTRIBUTE TO THE DIFFERENCES BETWEEN ATTENTION DEFICIT/HYPERACTIVITY DISORDER (ADHD) AND SLUGGISH COGNITIVE TEMPO (SCT) IN ADULTS.

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### 5.1 Abstract

**Objectives:** A increasing number of studies have been showing the psychological differences between the attention deficit-hyperactivity disorder (ADHD) and sluggish cognitive tempo (SCT). This paper analyses the relationship between mental health and sociodemographic variables, executive functions, ADHD inattentive (ADHD-IN), ADHD hyperactivity-impulsivity (ADHD-H/I) and SCT symptoms in adults.

**Method:** A cross-sectional, exploratory and comparative design was used. 446 participants (295 women) aging from 18 to 63 years old (M = 34,99 years, SD = 10.7)

were recruited through advertisements on the internet. All answered a survey based on rating scales. Correlations, t independent tests and regression analyses were conducted. **Results:** Both ADHD groups showed more executive functioning problems and time perception distortions in comparison to the group without statistically significantly ADHD symptoms. However, the ADHD-IN group was higher associated with these difficulties in comparison to the ADHD-H/I. The ADHD-IN also had a higher association with SCT symptoms. The regression results demonstrated that ADHD-IN was more related to Self-Management to time, ADHD-H/I to Self-Restraint and SCT to Self-Organization/Problem Solving. **Conclusion:** This paper supported the distinction between SCT and ADHD symptoms in important dimensions such as executive functions, temporal perception, and internalizing symptoms. Further studies would employ more robust statistical approaches and other measurement techniques.

**Keywords:** sluggish cognitive tempo; attention-deficit/hyperactivity disorder; adult; executive functioning; depressive symptoms.

## 5.2 Introduction

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental condition characterized by attentional difficulties, impulsivity, and motor overactivity (Nigg et al., 2020). Impairments in functions such as arousal regulation (Strauß et al., 2018), temporal reward discounting (de Castro Paiva et al., 2019), executive functioning (Silverstein et al. 2020), temporal processing (Carelli & Wiberg, 2012), emotional regulation (Nigg et al., 2020), social cognition (Bora & Pantelis, 2016), rejection sensitivity (Bondü & Esser, 2015) and motor abnormalities (Hyde et al., 2021) have been related to ADHD which contribute to its heterogeneity. To recognize ADHD in adulthood and its clinical management, the British Association for Psychopharmacology published a guideline (Bolea-Alamañac et al. 2014) suggesting an expanded list of symptoms including affective liability and age-appropriate presentations of ADHD cardinal symptoms. In the same line, Adler et al. (2017) found four areas of adult ADHD symptoms: executive dysfunction/inattention, impulsivity, hyperactivity, and emotional decontrol. The Diagnostic and Statistical Manual of Mental Disorders - 5th version (DSM-V; APA, 2013) requires an onset before 12 years old

meanwhile ADHD often persists into adulthood, despite the divergence of the percentage of remitted and non-remitted cases. In a ten-year follow-up study, Biederman et al. (2010) found 78% of persistence according to at least one evaluation criterion. Sibley et al. (2017) performed a study to estimate the persistence rates and figured out that 60% of the sample met the criteria for continuity of symptoms and 41% satisfied both symptom presence and daily impairments in adulthood, so ADHD is not only a pediatric syndrome as previously believed.

In adulthood, ADHD is linked to many undesired outcomes like higher rates of unemployment, homelessness, academic underachievement, occupational failures, accidental serious injuries, car crashes, sleep problems, greater likelihood of smoking, and increased alcohol consumption (Agnew-Blais et al., 2018; Schiavone et al., 2019). Beuchaine et al. (2020) found that adults with ADHD have a fourfold higher suicide risk related to financial distress, which is a common challenge for these individuals. According to Barkley & Fischer (2018), adults with clinical ADHD have a 12.7-year reduction in estimated life expectancy (ELE) compared to nonpersistent cases.

Furthermore, ADHD has a high comorbidity rate with externalizing spectrum disorders, whereas the causal mechanisms of association remain unclear. Mediators among these phenomena have been proposed, such as impulsivity trait (Beauchaine et al., 2017). Evidence showed a complex pattern of influence between ADHD symptoms, environmental practices (ineffective, coercive, and critical parenting), and biological factors (heritability, neurotransmission, and brain pathways) in the comorbidity etiology. Extra-familial relationships such as deviant peer group affiliation also play an important role (Frick & Nigg, 2012). Despite the relationship between ADHD and substance use disorders (Molina & Pelham, 2014), there are many controversial findings due to age-specific effects and the interplay with specific temperamental features. In response to the ADHD complexity, researchers started to investigate endophenotypes a few decades ago (Castellanos & Tannock, 2002), however many findings are inconsistent or inconclusive (e.g., Figueiredo et al., 2021). This scenario results from shared components with multiple disorders, the existence of phenocopies (under the equifinality principle), measurement problems, and worldwide inequalities in mental health researches. Therefore, transactions across different levels of analysis are necessary to explain the heterogeneity and complexity of ADHD as well as its comorbidities.

A special case that contributes to the diversity of ADHD is a symptom cluster comprised of lethargy, underactivity, apathy, daydreaming, slow thinking, excessive sleep, and being easily lost in thoughts named Sluggish Cognitive Tempo (SCT) which is more related to internalizing symptoms, especially to depression. ADHD inattentive (ADHD-IN) is highly correlated to SCT (Willcutt et al., 2014), however, when controlling ADHD-IN symptoms, SCT became correlated to externalizing symptoms to a lesser degree or even with a negative direction of association (Becker et al., 2016). Deficits in inhibitory control, working memory, processing speed, and attention (encompassing arousal, vigilance, and orientation) have been related to SCT symptomology (Creque & Willcutt, 2021). The current view of SCT points out a syndrome of internal distractibility compared to the predominancy of external inattention of ADHD-I (Becker & Barkley, 2021). This vision is supported by the unique association of SCT with maladaptive mind-wandering (Fredrick et al., 2020). A pathological pathway under investigation is the association between deficits in executive functions (especially in working memory and inhibition), temporal processing, and mind-wandering (Sorrell & Canu, 2018). According to this hypothesis, individuals with higher executive dysfunctions could have impairments in processing time-related information which contribute to more mind-wandering experiences (Sorrell & Canu, 2018). Sorrell, 2019 found an association between time processing self-reported measures and SCT symptoms, but not with performance-based tasks.

In addition, SCT was related to daily life impairments such as social withdraw, intense emotional regulation difficulties, and worse sleep quality (Becker & Willcutt, 2019). According to some views, SCT would be called Concentration Deficit Disorder (CDD) because of the derogatory term "sluggish" regarding the possible processing speed deficit. However, Kofler et al. (2019) found that SCT symptoms are related to slower working memory, not to processing speed while Becker et al. (2020) found a differential association between self and parent-reported SCT symptoms and processing speed tasks with graphomotor requests in an adolescent sample. These findings suggested that name is not precise to describe the cognitive nature of SCT. To evaluate SCT symptoms there are only rating scales, despite their good psychometric properties and latent cluster analysis results (Becker, 2020).

The primary purpose of this study was to investigate the relationship between executive dysfunctions in daily life, temporal subjective perception, ADHD, and

internalizing symptoms in adults. Specifically, this study aimed to test the hypothesis that SCT symptoms would be more associated with different aspects of executive functions and temporal awareness distortions than ADHD-IN presentation (Sorrell, 2019). A secondary aim was to explore the relationship of ADHD and SCT symptoms with health and sociodemographic variables.

### 5.3 Method

#### 5.3.1 Procedure

The study design was exploratory, cross-sectional, and comparative based on a convenience sample. The participants were recruited from all Brazilian regions through advertisements on the internet. A questionnaire built-in Google Forms® was shared in social media (e.g., Facebook® e Instagram®). A YouTube® channel called “Academia do TDAH” also released the link on the internet. Eligibility criteria were age (between 18 and 65 years old) and absence of comprehension difficulties. To evaluate the target symptoms and to get the health record and sociodemographic data, the researchers used rating scales (described in detail below). After reading the free and informed consent term, the participants answered the questionnaire. The project was approved by the Federal University of Minas Gerais Ethics Committee under the number: 07570312.9.0000.5149. They received an alert in case of a blank answer to avoid missing data.

#### 5.3.2 Participants

The study included 446 participants (295 women; 66.1%) ranging from 18 to 63 years old ( $M = 34,99$  years,  $SD = 10.7$ ). Most of them were from the Southwest region (71.74%), especially from Minas Gerais (33.8%) and São Paulo (30.71%) states. The majority of the sample was single (53.4%), with a college degree (30.3%) and medium to high socioeconomic level (B2; 33.9%). In relation to the occupational status, 2.91% were unemployed, 0.67% retired, 1.56% homemakers, 17.48% students, 12.33% psychologists, 9.64% teachers and professors of different academic levels, and 3.81% of autonomous professionals (Table 5-1).

Concerning previous mental health diagnoses (Table 5-2), 51.8% of the participants denied any condition. The most-reported diagnoses were: ADHD (22.9%), Depressive Disorder (20.4%), General Anxiety Disorder (15.2%), Bipolar Disorder (2.5%), Panic Disorder (2%), Obsessive-Compulsive Disorder (1.8%), and Autism Spectrum Disorder (0.9%). Of those who said to pursuit at least one psychiatric diagnosis, 40% have another comorbid condition (19.28% of the total sample). Only 8 cases reported neurological problems such as headaches, seizures, and cerebrovascular accidents (1.79% in total).

Table 5-1 - sample sociodemographic description.

Variable	Frequency	Percentage (%)
<b>Marital status</b>		
Single	238	53.4
Married/living together	164	36.8
Separated/divorced	32	7.2
Widower	10	2.2
<b>Education Level</b>		
Incomplete elementary school	5	1.1
Complete elementary school	2	0.4
Incomplete high school	6	1.3
Complete high school	40	9
Incomplete college	118	26.5
Complete college	135	30.3
Post-baccalaureate diploma	73	16.4
Master's or doctorate degree	67	15
<b>Socioeconomic status</b>		
A	90	20.2
B1	92	20.6
B2	151	33.9
C1	76	17
C2	28	6.3
D/E	9	2
<b>Regions of Householding</b>		
North	9	2.01
Northwest	43	9.64
Centre west	23	5.15
Southwest	320	71.74

South	51	11.43
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Table 5-2 - sample health characteristics.

Variable	Frequency	Percentage (%)
Previous mental health diagnosis		
Yes	215	48.2
No	231	51.8
Current use of psychiatric drugs		
Yes	175	39.2
No	271	60.8
Previous neurological conditions		
Yes	10	2.24
No	436	97.76
Other health conditions/diseases		
Yes	149	33.4
No	297	66.6
Current use of other medications		
Yes	177	39.7
No	269	60.3

### 5.3.3 Measures

#### 5.3.3.1 Adult Concentration Inventory (ACI)

Becker et al. (2016) carried out a meta-analysis to identify the more accurate items describing SCT symptoms and found 13 sentences. Becker et al. (2018) added three others to capture the mental confusion feature of SCT. To measure the impairments in daily functioning related to SCT, the authors wrote the second part of ACI with eight items. As a consequence, the ACI final version has 16 items in the first section and 8 in the second. However, Becker et al. (2018) did not examine the second in terms of psychometrics. The 16 items are rated on four-point Likert scale (0 = not at all, 1 = sometimes, 2 = often, 3 = very often) according to the past six months. The additional 8 items are scored on a five-point scale from no difficulty (0) to severe difficulty (4). In the exploratory and confirmatory factor analysis, only 10 items showed an adequate convergent and discriminant validity. The ACI Brazilian version demonstrated a one-factor solution with 10 items (Godoy et al., 2021a). The Cronbach's Alpha was 0.93.



### 5.3.3.2 Adult Self-Report Scale (ASRS-18):

Adler et al. (2006) created the ASRS-18 to measure presence/absence of ADHD symptoms according to the A criterion of the Diagnostic and Statistical Manual for Mental Disorders – Fourth Edition (DSM-IV; APA, 2000). Each of the 18 items reflects a specific description of ADHD manifestations in DSM-IV. The scale is rated on five-point Likert scale (0 = *never*, 1 = *rarely*, 2 = *sometimes*, 3 = *often*, 4 = *very often*). The original English version had a Cronbach's  $\alpha$  of 0.88. The questionnaire was translated and adapted into Brazilian Portuguese by Mattos et al. (2006).

### 5.3.3.3 Barkley Deficits in Executive Functioning Scale (BDEFS):

The BDEFS has 89 items that assesses executive functioning problems in daily life based on a 4-point scale (1 = *not at all*, 2 = *sometimes*, 3 = *often*, and 4 = *very often*). The theoretical background is based on a neuropsychological and evolutionary perspective of the inhibitory control role for the EF adequate development. The BDEFS Brazilian Portuguese version was adapted by Godoy et al. (2015). The factors with their internal consistencies are: Time Management ( $\alpha = 0.95$ ), Organization/Problem Solving ( $\alpha = 0.95$ ), Self-Restraint ( $\alpha = 0.91$ ), Motivation ( $\alpha = 0.91$ ), Emotional Regulation ( $\alpha = 0.93$ ). The Cronbach's Alpha for the full scale is 0.98.

### 5.3.3.4 The Brazil Criteria of Economic Classification (BCEC):

The Brazilian Association of Research Companies developed a tool for economic classification according to the number of domestic appliances, the educational level of the householder, and the quality of home water and electricity supplies (ABEP, 2015). There is a point system ranging from 0 to 100 leading to six categories: A (high socioeconomic status), B1 and B2 (medium-high socioeconomic status), C1 and C2 (medium-low socioeconomic status) and D-E (low-poor socioeconomic level). Each category is related to an estimated monthly household income: A (R\$25554.33), B1 (R\$11279.14), B2 (R\$5641.64), C1 (R\$3085.48), C2 (R\$1748.59), and E (R\$719.81). In the present study, BCEC was used to measure socioeconomic levels.

#### 5.3.3.5 The Melbourne Decision-Making Questionnaire (MEL):

Cotrena, Branco & Fonseca (2018) published the Brazilian Portuguese version of MEL.

Twenty-two items reflect four categories of decision-making approaches: vigilance (an adaptative style, related to a careful evaluation of opportunities), hypervigilance (influenced by an anxious mood), procrastination (delay decisions), and buck-passing (transfer responsibilities to others). There are three rating options: "Not true for me" (0), "Sometimes true" (1) and "True for me" (2): The internal consistencies of MEL Brazilian version factors are: vigilance ( $\alpha = 0.857$ ), buck-passing ( $\alpha = 0.853$ ), procrastination ( $\alpha = 0.791$ ) and hypervigilance ( $\alpha = 0.664$ ).

#### 5.3.3.6 Self-Report Scale (SRQ-20):

The World Health Organization (WHO) created a screening rating scale with 20 items that assess frequent complaints related to anxiety, depression, and psychosomatic syndromes integrated into a group called Common Mental Disorders (Harding et al., 1980). The response options are dichotomic (yes-no questions). Many cut-offs were proposed for clinical use since the scale publication. The first Brazilian version was published by Mari & Williams (1986). According to Paraventi et al. (2015) the most suitable solution for the Brazilian SRQ-20 version was a three-factor model. The dimensions were anxiety/depression, disability, and somatic symptoms. Godoy et al. (2021) reported the Cronbach's Alpha for the overall SQR-20: 0.874.

#### 5.3.3.7 Subjective Time Questionnaire (STQ):

In a study designed to measure the relationship between subjective time perception and age,

Wittmann & Lehnhoff (2005) developed a Likert scale with two parts to assess time awareness. The first one has 10 questions concerning the personal time experience in past (8 items) and present (2 items). Four items about the past captured the sense related to a previous delimited time (one week, month, year and decade). The other four questions assessed how fast time had passed: childhood (age <12

years old), youth (13 to years), adulthood 1 (20 to 29) and adulthood 2 (30 to 39). The response anchors are from very slowly (-2) to very fast (2). The second part has ten statements about time pressure and time expansion (five statements each) plus three metaphors of fast time perception and the same quantity of items for time slowness. The anchors were from strong rejection (0) to strong approval (4). The mean value for each category in the second part was calculated to provide the basis for statistical analysis. The Brazilian version of STQ showed a suitable three-factor model comprised of Time Expansion, Time Pressure and Retrospective Time Intervals (Godoy et al., 2021b) using 10 items. The Cronbach's Alpha was 0.696 for the overall scale and ranged from 0.643 to 0.825 for its factors.

#### 5.3.4 Statistical Analysis

The Shapiro-Wilk test evaluated the data distribution. In addition, kurtosis and asymmetry were calculated. The bootstrapping procedure carried out with a thousand simulations and the Bias Corrected and Accelerated (BCa) method (Haukoos & Lewis, 2005) in the SPSS v26.0. A 95% confidence interval for all analyses was obtained. The Pearson product-moment correlations were significant at the level of  $p < 0.05$ . The point-biserial correlations dealt with dichotomic variables. The correlations' direction and the magnitude were reported. To compare the means of BDEFS, ACI, and STQ between the groups with and without inattention (ADHD-IN) and hyperactivity-impulsivity (ADHD-H/I) symptoms formed by ASRS-18 cutoff scores, Student *t*-tests for independent samples were used. Levene test assessed the assumption of homogeneity of variances and, if applicable, the Levene correction was used. The Cohen's *d* was determined to estimate the effects sizes of the *t*-tests. Multiple linear regressions were performed to measure the influence of executive functioning, temporal perception, decision making, internalizing symptoms on the independent variables (SCT, ADHD-IN, and ADHD-H/I) applying the forward method. The residuals were plotted and analyzed.

### 5.4 Results

#### 5.4.1 Correlations

As showed in Table 5-3, none scale had a significant correlation with the variable “other diseases” ( $p > 0.01$ ). The highest correlations were related to the BDEFS total score. The use of psychiatric drugs was associated with BDEFS and ASRS-18 in a similar magnitude. For the ACI scale, the correlations with gender and neurological conditions were significant at  $p < 0.05$  and with small intensity. The STQ total score did not correlate statistically significantly ( $p > 0.05$ ) with neurological conditions and gender.

As summarized in Table 5-4, all correlations were significant ( $p < 0.01$ ) and with a positive direction of association. The results involving the BDEFS total score and ADHD dimensions were the strongest. The ACI total score was more related to the ASRS-18 Inattention dimension than the ASRS-18 Hyperactivity-Impulsivity subscale.

According to Table 5-5, all correlations were positive and statistically significant ( $p < 0.001$ ). The ACI total score was strongest associated with the BDEFS total score ( $r = 0.796$ ), but to a similar degree with the SRQ-20 ( $r = 0.727$ ). The ASRS-18 had the highest correlation with BDEFS ( $r = 0.845$ ). The correlations between ASRS-18, SRQ-20, STQ and, ACI were of a similar magnitude.

Table 5-3 - point-biserial correlations with the 95% confidence interval of bootstrapping between the total scores of the interested scales, gender and health variables.

Dichotomic variable	BDEFS	ACI	STQ	ASRS-18
Gender	0.174* (0.072 – 0.270)	0.107** (0.010 – 0.204)	0.032*** (-0.056 – 0.128)	0.154* (0.064 – 0.249)
Mental health diagnosis	0.413* (0.330 – 0.490)	0.350* (0.267 – 0.433)	0.261* (0.178 – 0.346)	0.385* (0.302 – 0.465)
Psychiatric drugs	0.332* (0.247 – 0.421)	0.276* (0.192 – 0.360)	0.188* (0.085 – 0.275)	0.331* (0.25 – 0.409)
Neurological conditions	0.153* (0.052 – 0.247)	0.096** (- 0.005 – 0.199)	0.086*** (-0.009 – 0.180)	0.134* (0.043 – 0.225)
Other diseases	0.063*** (-0.036 – 0.167)	0.043*** (-0.050 – 0.139)	-0.017*** (-0.113 – 0.080)	0.046*** (-0.044 – 0.145)

Note: In brackets = 95% confidence interval; BDEFS = Barkley Deficits in Executive Functioning Scale; ACI = Adult Concentration Inventory; STQ = Subjective Time Questionnaire; ASRS-18 = Self-Report Scale; \* = significance level at  $p < 0.001$ ; \*\* = significance level at  $p < 0.05$ ; \*\*\* = not significant.

Table 5-4 - point-biserial correlations between ADHD psychopathological dimensions reported by the participants in the ASRS-18 scale and total scores of ACI, STQ, BDEFS, SRQ-20 e MEL.

Variable	ACI	STQ	BDEFS	SRQ-20	MEL
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ASRS-18 Hyperactivity	0.368* (0.287- 0.449)	0.405* (0.331 – 0.476)	0.523* (0.45 – 0.59)	0.451* (0.366 – 0.527)	0.321* (0.235 – 0.4)
ASRS-18 Inattention	0.574* (0.513 – 0.627)	0.484* (0.418– 0.55)	0.764* (0.723 – 0.805)	0.461* (0.379 – 0.54)	0.392* (0.307 – 0.474)

Note: In brackets = 95% confidence interval; BDEFS = Barkley Deficits in Executive Functioning Scale; ACI = Adult Concentration Inventory; STQ = Subjective Time Questionnaire; ASRS-18 = Self-Report Scale; \* = significance level at  $p < 0.001$ .

Table 5-5 - Pearson correlations with bootstrapping intervals between the total scores of BDEFS, ASRS-18, SRQ-20, MEL, STQ and ACI.

Scale	Pearson correlations					
	BDEFS	ASRS-18	SRQ-20	MEL	STQ	ACI
BDEFS	1					
ASRS-18	0.845* (0.818 – 0.870)	1				
SRQ-20	0.682* (0.628 – 0.735)	0.628* (0.568 – 0.684)	1			
MEL	0.557* (0.490 – 0.517)	0.462* (0.389 – 0.530)	0.514* (0.442 – 0.577)	1		
STQ	0.639* (0.579 – 0.696)	0.628* (0.560 – 0.687)	0.609* (0.553 – 0.663)	0.489* (0.402 -0.568)	1	
ACI	0.796* (0.759 – 0.828)	0.652* (0.6 – 0.704)	0.727* (0.679 – 0.767)	0.584* (0.513 – 0.647)	0.597* (0.521 – 0.666)	1

Note: In brackets = 95% confidence interval; BDEFS = Barkley Deficits in Executive Functioning Scale; ACI = Adult Concentration Inventory; STQ = Subjective Time Questionnaire; ASRS-18 = Self-Report Scale; \* = significance level at  $p < 0.001$ .

#### 5.4.2 ADHD groups comparisons

As showed in Table 5-6, the ADHD-H/I group reported more executive disfunction ( $M = 235.2$ ,  $SD = 50.93$ ) than those without significant symptoms in such dimension ( $M = 169.21$ ,  $SD = 52.13$ ) ( $t(444) = 65.99$ ,  $p < 0.01$ , 95% CI [55.96, 76.02], Cohen's  $d = 1.27$ ). The participants of the ADHD-H/I group also informed more SCT symptoms ( $M = 16.77$ ,  $SD = 6.69$ ) than the group without ADHD-H/I complaints ( $M = 11.01$ ,  $SD = 7.15$ ) ( $t(444) = 8.34$ ,  $p < 0.01$ , 95% CI [4.4, 7.11] Cohen's  $d = 0.823$ ). Finally, the ADHD-H/I group presented more distorted temporal judgments ( $M = 29.45$ ,  $SD = 5.34$ ) than the group without significant hyperactivity-impulsivity symptoms ( $M = 24.04$ ,  $SD = 6.13$ ) ( $t(444) = 9.34$ ,  $p < 0.01$ , 95% CI [4.27, 6.54] Cohen's  $d = 0.922$ ).

Table 5-6 - comparison between the means of the total scores of BDEFS, ACI and STQ in participants with and without symptoms of ADHD-H/I defined by ASRS-18 cutoff.

		M	SD	<i>t</i>	Df	p value	Diff.	95% CI of medium difference		Effect Size (Cohen's d) with 95% CI
								Lower limit	Upper limit	
Executive disfunction	Without	169.21	52.13	12.92	444	0.001	65.99	55.96	76.02	1.27 [1.064 - 1.486]
	With	235.20	50.93							
Sluggish Cognitive Tempo	Without	11.01	7.15	8.34	444	0.001	5.76	4.4	7.11	0.823 [0.622 - 1.024]
	With	16.77	6.69							
Temporal perception	Without	24.04	6.13	9.34	444	0.001	5.4	4.27	6.54	0.922 [0.719 - 1.124]
	With	29.45	5.34							

*Note:* Executive disfunction is based on the BDEFS total score; Sluggish Cognitive Tempo is calculated from the ACI total score; Temporal perception is measured by the STQ total score; M = mean; SD = standard deviation; *t* = value of the *t* test for independent samples; Df = degrees of freedom; p value = statistical significance; Diff = medium difference; CI = Confidence Interval.

As summarized in Table 7, there was a significant effect for executive disfunction ( $t(402.93) = 92.75, p < 0.01, 95\% \text{ CI } [84.86, 100.27]$  Cohen's  $d = 2.33$ ), with the ADHD-IN group ( $M = 242.8, SD = 42.59$ ) reporting higher levels of executive problems in comparison to the group without significant inattentive symptoms ( $M = 150.04, SD = 35.92$ ). The ADHD-IN group reported more SCT symptoms ( $M = 17.73, SD = 6.51$ ) than those without ADHD-IN complaints ( $M = 9.08, SD = 5.83$ ) ( $t(444) = 14.78, p < 0.01, 95\% \text{ CI } [7.47, 9.8]$ , Cohen's  $d = 1.4$ ). Participants with more ADHD-IN symptoms reported higher scores of distorted subjective time judgments ( $M = 29.32, SD = 5.34$ ) ( $t(444) = 11.65, p < 0.01, 95\% \text{ CI } [5.2, 7.25]$ , Cohen's  $d = 1.1$ ) in comparison to the group without significant inattention symptoms ( $M = 23.11, SD = 5.83$ ).

Table 5-7 - comparison between the means of the total scores of BDEFS, ACI and STQ in participants with and without symptoms of ADHD-IN defined by ASRS-18 cutoff.

		M	SD	<i>t</i>	Df	p value	Diff.	95% CI of medium difference		Effect Size (Cohen d)
								Lower limit	Upper Limit	
Executive Disfunctions	Without	150.04	35.92	24.62	402.93	0.001	92.75	84.86	100.27	2.338 [2.097-2.579]
	With	242.80	42.59							
Sluggish Cognitive Tempo	Without	9.08	5.83	14.78	444	0.001	8.64	7.47	9.8	1.40 [1.196-1.611]
	With	17.73	6.51							
Temporal Perception	Without	23.11	5.83	11.65	444	0.001	6.21	5.2	7.25	1.10 [0.906 - 1.306]
	With	29.32	5.34							

Note: Executive disfunction is based on the BDEFS total score; Sluggish Cognitive Tempo is calculated from the ACI total score; Temporal perception is measured by the STQ total score; M = mean; SD = standard deviation; *t* = value of the *t* test for independent samples; Df = degrees of freedom; p value = statistical significance; Diff = medium difference; CI = Confidence Interval.

### 5.4.3 Multiple Linear Regressions

Multiple linear regression was run to predict ADHD-H/I score from the subscales of STQ (Time Expansion, Time Pressure, and Retrospective Time Intervals), SRQ (Somatic, Disability, and Anxiety/Depression), MEL (Vigilance, Hypervigilance, Procrastination, and Buck-passing), BDEFS (Self-Management to time, Self-Organization/Problem Solving, Self-Restraint, Self-Motivation, and Self-Regulation of Emotions), ASRS-IN subscale and the ACI total score (Table 5-8). Only Self-Restraint (BDEFS), Somatic complaints (SRQ-20), Time Pressure (STQ), Time Expansion (STQ), and SCT (ACI) added statistically significantly to the prediction,  $p < 0.05$ . These variables statistically significantly predicted ADHD-H/I,  $F(5, 440) = 99.769$ ,  $p < 0.001$ ,  $R^2_{adjusted} = 0.531$ . The variable that predicted higher ADHD-H/I symptoms was the BDEFS subscale Self-Restraint (44.3% of the variance).

Table 5-8 - results of the multiple linear regression between ADHD-H/I symptoms and other variables.

Predictors	Unstandardized Coefficients <i>Beta</i>	<i>t</i>	Sig.	<i>R</i> <sup>2</sup> <i>adjusted</i>	<i>DR</i> <sup>2</sup> <sub>Raw</sub>
(Constant)	-1.873	-1.981	0.048	-	-
Self-Restraint	0.328	13.026	0.000	0.443	0.444
Somatic	0.892	5.567	0.000	0.493	0.051
Time Pressure	0.383	5.391	0.000	0.515	0.024
Time Expansion	0.289	3.119	0.002	0.520	0.005
Sluggish Cognitive Tempo	-0.132	-2.651	0.008	0.526	0.007

Note: *t* = *t* test result; sig = statistical significance level; *DR*<sup>2</sup><sub>Raw</sub> is related to the change of the raw *R*<sup>2</sup> value.

The abovementioned subscales (see results of regression analysis of ADHD-H/I) were used in a multiple linear regression to predict ADHD-IN. Self-Management to time (BDEFS), Self-Motivation (BDEFS), ASRS-H/I, Self-Organization/Problem-Solving (BDEFS), Hypervigilance (MEL), Anxiety/Depression (SRQ-20), and SCT (ACI) added statistically significantly to the prediction,  $p < 0.05$  (Table 5-9). The prediction model was also statistically significantly,  $F(8, 437) = 306.071$ ,  $p < 0.001$ , and accounted for 84.6% of the variance ( $R^2_{adjusted} = 0.846$ ). The strongest weight in the model was obtained to the BDEFS subscale Self-Management to time (76.9% of the variance).

Finally, multiple linear regression was carried out to determine the extent to which the same subscales of the previous regressions can predict SCT scores (

Table 5-10). The regression model predicted 78% of the variance. The model was suitable for predicting SCT scores ( $F(8, 437) = 198.067$ ,  $p < 0.001$ ;  $R^2_{adjusted} = 0.780$ ). As seen in Table 10, Self-Organization/Problem solving (BDEFS), Disability (SRQ-20), Time Expansion (STQ), Self-Restraint (BDEFS), ADHD-IN (ASRS-18), Hypervigilance (MEL), ADHD-H/I (ASRS-18), and Somatic complaints (SRQ-20) statistically significantly contributed to the model ( $p < 0.05$ ). Self-Organization/Problem solving (BDEFS) contributed to 66.8% of the model's variance.

Table 5-9 - results of the multiple linear regression between ADHD-IN symptoms and other variables.

Predictors	Unstandardized Coefficients	<i>t</i>	Sig.	<i>R</i> <sup>2</sup> <i>Adjusted</i>	<i>DR</i> <sup>2</sup> <sub>Raw</sub>
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	<i>Beta</i>				
(Constant)	-1.324	- 1.428	0.154	-	-
Self-Management to time	0.221	11.339	0.000	0.769	0.770
Self-Motivation	0.206	6.717	0.000	0.803	0.034
ADHD-H/I	0.184	7.089	0.000	0.828	0.026
Self-Organization/Problem Solving	0.040	2.179	0.030	0.838	0.010
Vigilance	- 0.172	- 3.94	0.122	0.840	0.003
Hypervigilance	0.255	3.311	0.001	0.844	0.004
Anxiety/Depression	- 0.277	- 2.596	0.010	0.845	0.001
Sluggish Cognitive Tempo	0.087	2.028	0.043	0.846	0.001

Note: t = t test result; sig = statistical significance level;  $DR^2_{Raw}$  is related to the change of the raw  $R^2$  value.

Table 5-10 - results of the multiple linear regression between SCT symptoms and other variables.

Predictors	Unstandardized	<i>t</i>	Sig.	$R^2$ <i>Adjusted</i>	$DR^2_{Raw}$
	Coefficients <i>Beta</i>				
(Constant)	- 2.776	- 4.42	0.000	-	-
Self-Organization/Problem solving	0.187	11.138	0.000	0.668	0.669
Disability	0.753	8.591	0.000	0.761	0.093
Time Expansion	0.177	2.852	0.005	0.764	0.004
Self-Restraint	- 0.48	- 2.256	0.025	0.768	0.005
ADHD-IN	0.138	3.922	0.000	0.774	0.006
Hypervigilance	0.174	2.332	0.020	0.776	0.003
ADHD-H/I	- 0.083	- 2.626	0.009	0.778	0.002
Somatic complaints	0.252	2.221	0.027	0.780	0.002

Note: t = t test result; sig = statistical significance level;  $DR^2_{Raw}$  is related to the change of the raw  $R^2$  value.

## 5.5 Discussion

The main goal of the present study was to explore the association between executive functions, temporal perception, ADHD, SCT, and internalizing symptoms in adults. We hypothesized that SCT would be more connected to temporal perception

distortions and problems in executive functions than the relationship between the same psychological phenomena and the ADHD-IN dimension. To test the previous hypothesis, t-tests for independent samples and regression analysis were performed. Additionally, we verified correlations between SCT and ADHD groups regarding health variables. The associations between the selected scales, health, and demographic factors demonstrated that non-neuropsychiatric diseases did not relate to any psychological dimension. On the other hand, the current use of psychiatric drugs had high correlations with ASRS-18 and BDEFS. STQ did not correlate with gender, but ACI did. ACI was stronger correlated to ADHD-IN than to ADHD-H/I. The BDEFS reached a strong correlation with ASRS-18. Among the formed ADHD-H/I group, there was more significant executive dysfunction (Cohen's  $d = 1.27$ ), distorted temporal judgments (Cohen's  $d = 0.922$ ), and SCT symptoms (Cohen's  $d = 0.823$ ). The ADHD-IN also presented statistically significant differences in those variables, but with another pattern of effect sizes: executive functions impairments (Cohen's  $d = 2.33$ ), SCT symptoms (Cohen's  $d = 1.4$ ), and distorted temporal judgments (Cohen's  $d = 1.1$ ). Distinct BDEFS subscales were the most important predictors in regression analysis for ADHD-H/I, ADHD-IN, and SCT.

We observed that SCT was more related to ADHD-IN than ADHD-H/I in correlations, t-tests, and regression analysis. It was also notable the correlation between SCT and internalizing symptoms measured by SRQ-20. These results supported the notion that SCT is more related to ADHD-IN and internalizing symptoms. However, ADHD is largely recognized to be stronger associated with externalizing problems. This pattern of findings contributed to the differentiation between SCT and ADHD (Kamradt et al., 2018). In the regression analysis, the strongest predictor for SCT was the Self-Organization/Problem-solving factor followed by Disability, Time Expansion, and Self- Restraint. ADHD-IN was a weak predictor of SCT in our regression model. Alternatively, ADHD-IN was predicted mostly by Self-Management to time, Self-Motivation, ADHD-H/I, and Self-Organization/Problem Solving. Finally, ADHD-H/I was associated in a higher degree with Self-Restraint, Somatic complaints, Time Pressure, and Time Expansion. Contrary to our hypothesis, SCT was not more related to executive functions or time perception in general than ADHD presentations. These psychopathological dimensions were related differently to specific executive functions clusters as well in Barkley (2012). The author described that ADHD-IN

contributed more to Self-Management to time and Self-Motivation than SCT or ADHD-H/I. SCT accounted for a higher proportion of variance in Self-Organization/Problem Solving, Self-Discipline, and Self-Regulation of Emotions. Becker et al. (2018) demonstrated that higher levels of SCT and ADHD-IN predicted more deficits in Self-Organization/Problem-Solving, but only ADHD-IN was related to Self-Motivation. Both SCT and ADHD-IN predicted greater functional impairment than ADHD-H/I. Although, Becker et al. (2018) found that ADHD-IN was more associated with Self-Organization/Problem-Solving than SCT.

Contrary to our hypothesis, time perception was not associated in a special degree with SCT in comparison to ADHD dimensions. In the regression analysis, Time Pressure accounted for 2.4% of the variance of ADHD-H/I while Time Expansion predicted 0.5% of the same dimension. To a similar degree, Time Expansion predicted 0.4% of the SCT variance. It is not entirely surprising that ADHD-H/I is related to Time Pressure since these distortions have been described in earlier results. Park & Lee (2021) conducted a pilot study with adults with SCT and ADHD symptoms that showed the reduced speed commonly found in SCT could be influenced by difficulties in selective attention, especially in circumstances of high demands. Conversely, the ADHD group performed better in the selective attention task under high loads. These results proposed that the usual notion of time processing deficits in SCT result from other cognitive processes such as attention control. Kim & Kim (2020) described that groups of participants with SCT symptoms had more deficits in orienting network while the ADHD groups presented more dysfunctions in the attention executive control. In sum, specific deficits in complex abilities such as executive functioning, attention, and temporal processing could explain the different aspects of cognitive impairments in ADHD and SCT.

### 5.5.1 Limitations

This study had many limitations. The study design was cross-sectional, without a control group or an external validation of an ADHD diagnosis. It implied that the regression analysis used here does not imply causality, but association. Further longitudinal studies with experimental control could investigate more properly the causal relationships between the focused phenomena in this paper. Sample bias is

very likely due to the form of the participants' recruitment, gender proportion, socioeconomic characterization, and geographical location. The exclusion criteria were only the understanding of the questions. For future studies, deeper evaluations concerning psychiatric features could be useful. Another relevant limitation was the only use of self-report measures. Questionnaires are susceptible to some response bias and an external evaluation could corroborate the results in a more objective fashion. Beyond that, the relationship with other measures could help the investigation of convergence/divergence between multiple informants and methods. The sample size is not small overall, but it limited the statistical power to perform more advanced analysis. To deal with such limitations, we used bootstrapping procedures whenever was possible.

## 5.6 Conclusion

In summary, the present findings implicate that ADHD and SCT have different patterns of association with internalizing symptoms and executive functioning. Temporal distortions were found in both conditions. Regarding executive functions, our results replicated Barkley (2012) in which Self-Management to time was more related to ADHD-IN while SCT was higher associated with Self-Organization/Problem solving. Future research on SCT, ADHD, and cognitive abilities might extend these conclusions investigating the mechanisms of influence in the levels of behavior, cognition, and neurobiology.

## 5.7 Author contribution

Victor P. Godoy contributed to data collection, designed the study, conducted the statistical analysis, drafted the initial manuscript, reviewed and revised the version submitted. Alexandre L. O Serpa and Leandro F. Malloy-Diniz conceptualized and designed the methodological and statistical procedures, contributed to interpretation of the results, reviewed and revised the manuscript.

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#### 5.9 Declaration of conflicting interests

The author(s) declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Alexandre L. O. Serpa has no conflicts to disclose. Victor P. Godoy and Leandro F. Malloy-Diniz received royalties from sales of the adapted version of Barkley Deficits in Executive Functioning Scale (BDEFS) since 2019 paid by Hogrefe Press in Brazil.

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## 6 CONCLUSÃO GERAL

Esta dissertação pretendeu investigar a relação entre disfunções executivas, sintomas de TDAH, características de SCT, percepção temporal e disfunções executivas em adultos brasileiros recrutados pela internet. Procedimentos de tradução e de adaptação cultural de dois questionários foram necessários para que se pudesse avaliar dois construtos alvo: percepção temporal e sintomas de SCT. Dessa forma, o primeiro objetivo específico foi o levantamento das propriedades psicométricas preliminares da versão brasileira do Subjective Time Questionnaire (STQ). A análise de juízes apontou para uma taxa de concordância global marginalmente aceitável na medida em que alguns itens tiveram divergências importantes de equivalência. Todas as observações foram criteriosamente consideradas para que se pudesse determinar a versão que seria usada na coleta. O perfil de correlações e o resultado da Análise de Componentes Principais permitiu que se determinasse quais itens seriam retidos para a Análise Fatorial Exploratória e, posteriormente, para a Confirmatória. Dez itens agrupados em três fatores latentes subjacentes se mostram adequados. A confiabilidade dos fatores se mostrou aceitável. Constatou-se, portanto, que o STQ apresenta um perfil psicométrico complexo se todos os itens são levados em consideração. Não se abrangeu de forma exaustiva a interação entre todos os itens. Optou-se por uma estrutura final simplificada baseada nos dados psicométricos.

No tocante ao estudo das propriedades psicométricas do Adult Concentration Inventory (ACI), tentou-se replicar os procedimentos utilizados em Becker et al. (2018). O painel de juízes apresentou uma taxa de equivalência semântica alta entre as duas versões. A Análise Fatorial Exploratória do ACI em conjunto com um instrumento de avaliação de sintomas de TDAH e outro destinado a queixas internalizantes possibilitou a investigação da validade discriminante e divergente dos itens do ACI. Dos 16 itens previamente traduzidos para o português, 10 apresentaram baixas cargas fatoriais cruzadas com itens de desatenção e do eixo internalizante. Esses dez itens foram, portanto, utilizados na Análise Fatorial Confirmatória do ACI que apontou para uma estrutura unifatorial. Apesar das correlações de alta magnitude entre o SCT e o TDAH, observou-se que quando se controla a interação entre SCT e sintomas de desatenção, a correlação do SCT com sintomas de hiperatividade-impulsividade se torna não estatisticamente significativa. A confiabilidade, mensurada

por diferentes parâmetros, se mostrou satisfatória. Conclui-se que a versão brasileira do ACI se mostra robusta psicometricamente e pode representar um importante auxílio em pesquisas relativas ao SCT no Brasil. Nota-se, ainda, que os sintomas de SCT não podem ser reduzidos ao espectro do TDAH ou mesmo de sintomas ansiosos-depressivos, consistindo em uma entidade que, ao menos do ponto de vista psicométrico, é independente.

Finalmente, o terceiro artigo investigou sintomas de TDAH, SCT, percepção temporal, disfunções executivas, além de características sociodemográficas. A variável gênero se mostrou correlacionada com disfunções executivas, sintomas de TDAH e de SCT em pequena magnitude, em favor de maior relação com o gênero masculino. Percepção temporal não sofreu influência significativa do gênero. O diagnóstico de qualquer condição psiquiátrica se correlacionou com disfunções executivas, sintomas de TDAH, sintomas de SCT e percepção temporal, variando de pequena a média magnitude de efeito. O uso de psicofármacos se correlacionou significativamente com todas as variáveis supramencionadas, ainda que em maior intensidade com disfunções executivas e sintomas de TDAH. Doenças neurológicas se correlacionaram com disfunções executivas e TDAH em pequena magnitude e não se correlacionaram com sintomas de SCT e percepção temporal. Doenças de outra natureza não apresentaram correlações estatisticamente significativas com nenhum dos construtos. Foram criados dois grupos de participantes a partir dos sintomas de TDAH: um relacionado ao ponto de corte para desatenção (DA) e outro a hiperatividade-impulsividade (H/I). O grupo DA se mostrou mais relacionado com SCT do que o H/I no teste t e também via correlações. O grupo com sintomas de H/I apresentou diferenças maiores relativas a distorções na percepção temporal do que em sintomas de SCT. O grupo DA teve maiores diferenças de médias nos três construtos: SCT, percepção temporal e disfunções executivas. Em termos das análises de regressões lineares múltiplas, os sintomas de DA foram preditos, principalmente, por dificuldades em gerenciamento de tempo enquanto os sintomas de H/I foram preditos, em maior grau, pela dimensão de auto-controle. Sintomas de SCT foram mais impactados por déficits em resolução de problemas e organização. Pode-se dizer que aspectos do funcionamento executivo autorrelatado estão diferencialmente relacionados a sintomas de DA, H/I e de SCT. Em pesquisas longitudinais futuras se poderá investigar o valor preditivo e de critério das disfunções

executivas para a estimação de diagnósticos. Além disso, como no segundo artigo, se encontrou que os sintomas de SCT interagem mais fortemente com sintomas de DA do que H/I, além de não serem redundantes a eles.

Observa-se, então, que as escalas traduzidas e adaptadas culturalmente para o contexto brasileiro apresentam evidências psicométricas suficientemente aceitáveis para permitirem seu uso em pesquisas. Adicionalmente, o SCT se mostrou específico em relação a sintomas de TDAH e do eixo internalizante. Não é possível especular se esse resultado se traduz em um transtorno distinto, mas pode-se dizer que, no mínimo, o SCT possui características próprias que adicionam heterogeneidade psicopatológica ao TDAH. Pesquisas longitudinais visando influências do tipo causa-efeito deverão ser conduzidas para que se esclareça propriamente a natureza do SCT. As disfunções executivas foram os principais preditores de SCT, DA e H/I entre todas as variáveis inseridas nos modelos de regressão. Esses dados sugerem a potencial validade incremental da BDEFS.

Por fim, todos os artigos reunidos nesta dissertação apresentam limitações semelhantes, haja vista que foram realizados a partir da mesma amostra. Viés de seleção dos participantes, discrepância da proporção entre os gêneros e não representatividade socioeconômica e geográfica em termos nacionais consistem nos principais fatores que restringem a generalização dos resultados. Em estudos futuros, esses problemas deverão ser minimizados por procedimentos mais sistemáticos de seleção e de ampliação da coleta.

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**APÊNDICE A — Versão brasileira da Escala de Percepção Subjetiva do Tempo.**  
**The Subjective Time Questionnaire (STQ) – Brazilian Portuguese Version (10 items)**

Leia as instruções com atenção em cada parte antes de responder.

<b>Parte A</b>	<b>Por favor, escolha a opção que melhor representa sua percepção do tempo. Não existem respostas certas ou erradas.</b>	<b>Muito Devagar</b>	<b>Devagar</b>	<b>Nem rápido nem devagar</b>	<b>Rápido</b>	<b>Muito rápido</b>
1	Quão rapidamente a última semana passou para você?	0	1	2	3	4
2	Quão rapidamente o último ano passou para você?	0	1	2	3	4
3	Quão rapidamente os últimos 10 anos passaram para você?	0	1	2	3	4
<b>Parte B</b>	<b>Por favor, escolha a opção que melhor representa sua concordância com as frases abaixo. Não existem respostas certas ou erradas.</b>	<b>Rejeito Totalmente</b>	<b>Rejeito</b>	<b>Neutro</b>	<b>Concordo</b>	<b>Concordo totalmente</b>
4	Eu não tenho tempo suficiente para completar minhas tarefas	0	1	2	3	4
5	Eu frequentemente me sinto pressionado pelo tempo.	0	1	2	3	4
6	Eu frequentemente não tenho tempo suficiente para me dedicar a coisas importantes.	0	1	2	3	4
7	Eu preciso definir prioridades porque eu não consigo fazer todas as coisas que eu gostaria.	0	1	2	3	4
8	Meu tempo parece ocioso.	0	1	2	3	4
9	Eu frequentemente me sinto entediado.	0	1	2	3	4
10	Eu frequentemente gasto meu tempo sem fazer nada.	0	1	2	3	4

**APÊNDICE B — Versão brasileira do Inventário de Concentração para adultos.**

**Adult Concentration Inventory (ACI) – Brazilian Portuguese version.**

Data: \_\_\_\_\_ Nome: \_\_\_\_\_

	<b>INSTRUÇÕES: Por favor, circule o quanto você acha que cada frase é verdadeira para você nos últimos <u>seis meses</u>.</b>	<b>Nunca</b>	<b>Às vezes</b>	<b>Frequentemente</b>	<b>Muito Frequentemente</b>
1	Eu sou devagar para fazer as coisas.	0	1	2	3
2	Meus pensamentos parecem turvos, como se estivessem envoltos em neblina.	0	1	2	3
3	Eu fico olhando para o vazio.	0	1	2	3
4	Me sinto sonolento ou sem energia durante o dia.	0	1	2	3
5	Eu perco minha linha de raciocínio.	0	1	2	3
6	Eu não sou muito ativo.	0	1	2	3
7	Eu me perco nos meus próprios pensamentos.	0	1	2	3
8	Eu me canso facilmente.	0	1	2	3
9	Eu esqueço o que eu ia dizer.	0	1	2	3
10	Eu me sinto confuso.	0	1	2	3
11	Eu não me sinto motivado para fazer as coisas.	0	1	2	3

12	Minha mente viaja longe sem que eu perceba.	0	1	2	3
13	Minha mente fica bagunçada.	0	1	2	3
14	Meu raciocínio parece lento ou mais devagar.	0	1	2	3
15	Eu sonho acordado (viajo)	0	1	2	3
16	Eu sinto dificuldade para colocar meus pensamentos em palavras.	0	1	2	3

**(OPCIONAL) Quanta dificuldade esses comportamentos causam em seu (sua)...**

		Nenhuma dificuldade	Dificuldade mínima	Alguma dificuldade	Dificuldade moderada	Muita dificuldade	Não se aplica
17	Trabalho ou emprego	0	1	2	3	4	n/a
18	Educação ou estudos.	0	1	2	3	4	n/a
19	Relacionamentos com amigos.	0	1	2	3	4	
20	Relacionamentos com parceiros românticos.	0	1	2	3	4	n/a
21	Criação dos filhos.	0	1	2	3	4	n/a
22	Organização da rotina.	0	1	2	3	4	
23	Cuidados diários (banho/higiene pessoal, exercício físico, alimentação).	0	1	2	3	4	
24	Conseguir ter uma boa noite de sono.	0	1	2	3	4	

## **APÊNDICE C — Termo de Consentimento Livre e Esclarecido para coleta online**

Prezado participante,

O (A) senhor(a) está sendo convidado(a) a participar de um estudo que irá investigar a adequação e normatização da Escala Barkley de Déficits no Funcionamento Executivo para o contexto brasileiro. Antes de aceitar ou negar nossa proposta, por favor, leia atentamente as informações abaixo e, após esclarecer suas dúvidas, se decidir participar do estudo, o(a) senhor(a) deverá assiná-lo.

Estas informações estão sendo fornecidas para esclarecer quaisquer dúvidas sobre o estudo “INVESTIGAÇÃO DAS CARACTERÍSTICAS PSICOMÉTRICAS E NORMATIZAÇÃO DA PARA A POPULAÇÃO BRASILEIRA” e obter o seu consentimento como participante.

Estamos realizando uma pesquisa com o objetivo de normatizar a versão Brasileira da escala Barkley Déficits no Funcionamento Executivo (BDEFS), desenvolvida para auxiliar a clínica e a pesquisa para diagnóstico de problemas relacionados déficits executivos. Caso o(a) senhor(a) concorde em participar deste estudo, deverá responder um questionário online para obtenção de informações sócio-demográficas, escalas sobre sintomas relacionados ao Transtorno de Déficit de Atenção e Hiperatividade (TDAH), a versão brasileira da Barkley Déficits no Funcionamento Executivo (BDEFS) e realizar tarefas neuropsicológicas relacionadas a funções executivas. Essa avaliação não oferece riscos à sua saúde física, uma vez que não são empregados procedimentos invasivos ou exposição a agentes químicos ou biológicos potencialmente lesivos. A pesquisa apresenta um risco mínimo contido como cansaço mental durante o preenchimento do questionário e/ou desconforto emocional em virtude de alguma possível interpretação subjetiva de algum item.

Porém cabe ressaltar que se o (a) senhor (a) se sentir desconfortável com qualquer item, poderá parar imediatamente de responder a escala, podendo descansar ou até mesmo não continuar a preenchê-la via internet. Isso poderá ocorrer



a qualquer momento. Sua participação no estudo é voluntária, ela não implica em nenhum compromisso financeiro entre você e a equipe de pesquisa. A sua participação no estudo contribuirá para melhorar a avaliação dos comportamentos decorrentes de déficits nas funções executivas, habilidades necessárias para realizarmos várias atividades do dia-a-dia, como planejar, se organizar e traçar objetivos. Você poderá negar seu consentimento ou mesmo se retirar da pesquisa em qualquer momento da execução da mesma, sem nenhum prejuízo para você.

Os resultados do estudo serão usados em trabalhos científicos, publicados em revistas especializadas e apresentados oralmente em congressos e palestras, sem nunca revelar a sua identidade. Seus dados pessoais estarão sempre em sigilo em um banco de dados protegido. Em caso de qualquer dúvida ou desconforto, o(a) senhor(a) poderá entrar em contato com o Prof. Leandro Malloy (malloy.diniz@gmail.com) ou com Victor Polignano Godoy (victorpolignano@gmail.com) ou no endereço Av. Pres. Antônio Carlos, 6627 – Faculdade de Filosofia e Ciências Humanas – Departamento de Psicologia, 3º andar / Sala 3048. Para maiores esclarecimentos sobre as questões éticas, você poderá consultar o Comitê de Ética em Pesquisa da UFMG: COEP – UFMG: Av. Pres. Antônio Carlos, 6627 – Unidade Administrativa II, 2º andar / Sala 2005 – Belo Horizonte / Minas Gerais. Telefone: (31) 3409-4592 E-mail: coep@prpq.ufmg.br

Agradecemos sua atenção e valiosa colaboração. Colocamo-nos à sua disposição para qualquer esclarecimento.

Prof. Dr. Leandro Malloy-Diniz

Prof. Adjunto do Departamento

Saúde Mental - Laboratório de Investigação em Neurociência Clínica do INCT em Medicina Molecular

Eu, (nome completo digitado em caixa de texto)

Concordo

Discordo

em participar voluntariamente no projeto INVESTIGAÇÃO DAS CARACTERÍSTICAS PSICOMÉTRICAS E NORMALIZAÇÃO DA BARKLEY DEFICITS IN EXECUTIVE FUNCTIONING SCALE (BDEFS FOR ADULTS) PARA UMA POPULAÇÃO BRASILEIRA respondendo ao questionário via internet. Declaro

que li o termo de consentimento e compreendo os objetivos dessa pesquisa, que consistem em construir a versão brasileira da escala. Estou consciente de que os resultados serão mantidos em absoluto sigilo e que serão utilizados apenas com finalidades da pesquisa.

Local de residência: (inserir cidade em caixa de texto)

Data: (gerada automaticamente pelo Google Forms)

## **ANEXO A — Parecer consubstanciado**

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## PARECER CONSUBSTANCIADO DO CEP

### DADOS DO PROJETO DE PESQUISA

**Título da Pesquisa:** INVESTIGAÇÃO DAS CARACTERÍSTICAS PSICOMÉTRICAS E NORMATIZAÇÃO DA ESCALA BARKLEY DE DÉFICITS NO FUNCIONAMENTO EXECUTIVO (BDEFS PARA ADULTOS) PARA A POPULAÇÃO BRASILEIRA

**Pesquisador:** Leandro Fernandes Malloy-Diniz

**Área Temática:**

**Versão:** 3

**CAAE:** 07570312.9.0000.5149

**Instituição Proponente:** PRO REITORIA DE PESQUISA

**Patrocinador Principal:** Financiamento Próprio

### DADOS DO PARECER

**Número do Parecer:** 1.361.587

#### Apresentação do Projeto:

O estudo consistirá na aplicação da BDEFS em uma amostra de adultos controles, para obtenção de valores de referência para interpretação da escala, e em uma amostra de adultos com diagnóstico de TDAH e com outros transtornos, como o Transtorno Afetivo Bipolar (TAB). Previsão de 240 participantes. A coleta de dados do grupo clínico ocorrerá no próprio serviço de atendimento médico (120 participantes). A seleção dos participantes do grupo controle (120) será feita a partir de divulgação da pesquisa e convite público, sendo a coleta feita via internet, de modo a permitir uma amostra representativa da população brasileira, visto que uma coleta presencial em todo o território nacional é logisticamente muito mais dispendiosa e demorada. A aplicação da versão final validada da Escala de Déficit no Funcionamento Executivo (DEFS) e das tarefas neuropsicológicas de funções executivas será realizada em serviços de atendimento médico no Rio de Janeiro e em Belo Horizonte por colaboradores do pesquisador responsável pelo projeto.

#### Objetivo da Pesquisa:

**Objetivo Primário:** a) Realizar análises psicométricas da escala para verificar a adequação do uso da BDEFS para a população geral: análise de dificuldade e discriminação dos itens, evidências de validade de construto e precisão e propor parâmetros normativos de interpretação dos escores de cada uma das seções da escala BDEFS para a população brasileira. c) Avaliar se a estrutura fatorial

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Continuação do Parecer: 1.361.587

da versão original da BDEFS se mantém quando aplicada na população brasileira. d) Comparar a pontuação obtida pelo grupo clínico com aquela obtida por participantes controles na BDEFS e) Verificar se existe correlação entre a pontuação de adultos portadores de TDAH e controles na BDEFS com o seu desempenho em tarefas neuropsicológicas de funções executivas

**Avaliação dos Riscos e Benefícios:**

**Riscos:** A pesquisa apresenta o risco mínimo contido como cansaço mental durante o preenchimento do questionário e/ou desconforto emocional em virtude de alguma possível interpretação subjetiva de algum item. Cabe ressaltar que os pesquisadores estarão atentos à integridade emocional dos participantes. Caso o participante demonstre cansaço, o preenchimento da escala poderá ser interrompido e será dado ao participante tempo para descansar e oportunidade para conversar com o pesquisador sobre eventuais dúvidas e desconfortos vivenciados ao longo da aplicação.

**Benefícios:** A partir dos resultados teremos um instrumento que poderá ser aplicado à clínica e à pesquisa na área de transtornos relacionados ao comprometimento das funções executivas no contexto brasileiro.

**Comentários e Considerações sobre a Pesquisa:**

Justificativa da Emenda: "Esta pesquisa visa traduzir, adaptar e normatizar a Escala Barkley de Funcionamento Executivo (BDEFS, em inglês) para o Brasil. As fases de tradução e adaptação transcultural já foram concluídas, mas o cronograma está atrasado devido à dificuldade de conseguir sujeitos para preencherem a escala em todo o território nacional (homens e mulheres, acima de 18 anos e até 89 anos, sem deficiência intelectual, epilepsia e esquizofrenia). Assim, para que se possa alcançar uma amostra representativa da população alvo e que permita fazer a análise fatorial da escala, é necessário que alcancemos um maior número de pessoas de forma rápida e fácil. As novas tecnologias, como a internet, nos auxiliam neste desafio e, considerando que a escala é de autorrelato e não depende de um profissional para seu preenchimento, optamos por transformar a coleta dos dados da normatização em coleta via internet por divulgação pública. cremos que isso não altera o desenho experimental da nossa pesquisa e não implica em nenhuma contraindicação maior. As únicas diferenças são: aumento possível da amostra, coleta ao invés de pessoal será online - só para a fase de normatização e a mudança, decorrente do tipo de coleta, no TCLE. Tirando isso, tudo permanece como informado na primeira versão do projeto. Essa emenda consiste, portanto, de um grande facilitador para o presente projeto e que poderá acelerar o cronograma, permitindo que ele seja finalizado e que a escala esteja disponível para uso em outras pesquisas e em contexto clínico, beneficiando pacientes.

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Continuação do Parecer: 1.361.587

**Considerações sobre os Termos de apresentação obrigatória:**

Projeto de Pesquisa; Parecer Consubstanciado, Aprovação da Câmara do Departamento de Saúde Mental da Faculdade de Medicina da UFMG; Folha de Rosto para Pesquisa Envolvendo Seres Humanos; Termo de Compromisso dos Pesquisadores; Autorização da unidade funcional; Declaração da Diretoria de Ensino Pesquisa e Extensão do Hospital das Clínicas da UFMG (DEPE); TCLE específico para COLETA ONLINE (via internet).

**Recomendações:**

Recomenda-se a aprovação da emenda ao projeto de pesquisa.

**Conclusões ou Pendências e Lista de Inadequações:**

Somos favoráveis à aprovação da emenda ao projeto "INVESTIGAÇÃO DAS CARACTERÍSTICAS PSICOMÉTRICAS E NORMATIZAÇÃO DA ESCALA BARKLEY DE DÉFICITS NO FUNCIONAMENTO EXECUTIVO (BDEFS PARA ADULTOS) PARA A POPULAÇÃO BRASILEIRA" do Pesquisador Responsável Prof. Dr. Leandro Fernandes Malloy-Diniz, com a inclusão de coleta de dados via internet, aprovação do TCLE para COLETA ONLINE e extensão do prazo da pesquisa por um ano.

**Considerações Finais a critério do CEP:**

Diante do exposto, o Comitê de Ética em Pesquisa da UFMG/ COEP-UFMG, de acordo com as atribuições definidas na Resolução CNS nº 466 de 2012 e na Norma Operacional nº 001 de 2013 do CNS, manifesta-se pela aprovação da emenda proposta ao projeto de pesquisa.

**Este parecer foi elaborado baseado nos documentos abaixo relacionados:**

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BASICAS_632889 E1.pdf	25/11/2015 18:38:40		Aceito
Projeto Detalhado / Brochura Investigador	Projeto_detalhado.docx	25/11/2015 18:26:47	Leandro Fernandes Malloy-Diniz	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE.docx	25/11/2015 14:31:18	Leandro Fernandes Malloy-Diniz	Aceito
Outros	Autorização unidade funcional.pdf	10/12/2012 13:59:49		Aceito
Outros	Depe.pdf	10/12/2012		Aceito

Endereço: Av. Presidente Antônio Carlos, 6627 2º Ad SI 2005

Bairro: Unidade Administrativa II CEP: 31.270-901

UF: MG Município: BELO HORIZONTE

Telefone: (31)3409-4592

E-mail: coep@prpq.ufmg.br

UNIVERSIDADE FEDERAL DE  
MINAS GERAIS



Continuação do Parecer: 1.361.587

Outros	Depe.pdf	13:59:04		Aceito
Outros	Termo de compromisso 2.2.pdf	02/10/2012 10:50:45		Aceito
Outros	Parecer da câmara.pdf	02/10/2012 10:49:53		Aceito
Outros	Termo de compromisso 1.2.pdf	02/10/2012 10:48:39		Aceito
Folha de Rosto	Plataforma Basil_folha de rosto-BDEFs.pdf	21/09/2012 16:11:32		Aceito

**Situação do Parecer:**

Aprovado

**Necessita Apreciação da CONEP:**

Não

BELO HORIZONTE, 10 de Dezembro de 2015

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**Assinado por:**  
**Telma Campos Medeiros Lorentz**  
(Coordenador)

Endereço: Av. Presidente Antônio Carlos, 8627 2º Ad SI 2005  
Bairro: Unidade Administrativa II CEP: 31.270-901  
UF: MG Município: BELO HORIZONTE  
Telefone: (31)3409-4592 E-mail: coep@prpq.ufmg.br

## ANEXO B — Autorização da tradução e adaptação do *Subjective Time Questionnaire*



Victor Polignano <victorpolignano@gmail.com>

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### Request

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**Marc Wittmann** <wittmann@igpp.de>  
Responder a: Marc Wittmann <wittmann@igpp.de>  
Para: Victor Polignano <victorpolignano@gmail.com>

4 de março de 2019 07:33

Dear Victor,

naturally, you can use these questionnaires. Go ahead. Looking forward to your study results.

Marc

Victor Polignano <victorpolignano@gmail.com> hat am 4. März 2019 um 06:25 geschrieben:

Dear Professor Wittmann,

My name is Victor Polignano and I am a Master's student at the Federal University of Minas Gerais (UFMG) in Brazil. The main objective of my research is investigate the relationship between time perception, ADHD and SCT symptoms.

I would like to use the Scale of Time Awareness written by you and published in the Psychological Reports in 2005. Therefore it would be helpful if you could send your allowance to translate the scale into Brazilian Portuguese and explore the psychometric properties of it. There isn't a commercial purpose.

I am looking forward to your reply.  
Thank you in advance for your help.

Yours sincerely,  
Victor.

<https://sites.google.com/site/webmarcwittmann/>

## ANEXO C — Autorização da tradução e adaptação do *Adult Concentration Inventory*



Victor Polignano <victorpolignano@gmail.com>

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### Request

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**Becker, Stephen** <Stephen.Becker@cchmc.org>  
Para: Victor Polignano <victorpolignano@gmail.com>

18 de fevereiro de 2019 14:23

Dear Victor,

Thank you for your interest in the ACI! You have my permission to translate the measure. Attached is the full measure. There are 16 items, of which 10 were supported as distinct from ADHD-IN and internalizing symptoms in our Psychological Assessment paper. That was a single study of college students, so I would recommend still including all 16 items if you have the space. It is up to you if you also wish to include the impairment items.

I appreciate that you indicated the translation would not be for a commercial purpose, as I do retain the copyright for the measure. I would also ask that you be willing to freely share the Brazilian Portuguese version of the scale. There are a number of different translations currently being prepared in different languages, and I hope to be able to collect them all and make them available online.

Please let me know if you have any question, and all the best in your research! I'll be very curious to learn what you find.

Best,

Stephen

Stephen P. Becker, Ph.D.

Associate Professor of Pediatrics

Co-Director, Psychology Fellowship Training Program

Division of Behavioral Medicine and Clinical Psychology

Cincinnati Children's Hospital Medical Center

3333 Burnet Ave. MLC 10006

Cincinnati, OH 45229-3039


Phone: 513-803-2066

FAX: 513-636-0755

E-mail: [stephen.becker@cchmc.org](mailto:stephen.becker@cchmc.org)

[Texto das mensagens anteriores oculto]

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 **Adult Concentration Inventory (ACI).pdf**  
324K



