

Measuring ADHD in Girls

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Abstract

Attention deficit hyperactivity disorder (ADHD) is often underdiagnosed or untreated in girls as they display internalizing behaviour and inattentive symptoms, which often get overlooked. The existing qualitative research and diagnostic criteria are biased toward the symptoms presented by boys. Therefore, the current study aims to address these gaps in current diagnostic practice and create a new subscale called “Measuring ADHD in Girls” that mainly focuses on the symptoms presented by girls to ensure they receive a proper diagnosis. A pool of 28 items was created based on existing scales and literature to assess the symptoms of ADHD in girls. In addition, factor analysis was used to assess the factor structure, and the reliability of the scale was assessed using inter-item correlation and item-total correlation. We hypothesized that this scale would measure six factors that are commonly displayed by girls with ADHD; however, upon further analysis, a nine-factor analysis provided a better reliability instead of six factors, as it had a TLI of 0.93 and RMSEA \leq 0.08, indicating that the scale is a good fit. The nine factors were distraction, emotional and psychological symptoms, emotionality, time management, social difficulties, inattention, lack of focus, hyperactivity, and difficulties with task-oriented coping. The results demonstrated that three items needed to be removed because they had low loadings and cross-loadings. Additionally, scale reliability analysis revealed that the degree of consistency differed across the nine factors. Finally, the potential use of this scale is to identify the symptoms that are commonly experienced by girls to ensure that they receive a correct diagnosis by creating a more gender sensitive scale for ADHD.

Keywords: ADHD in girls, inattentive symptoms, emotional and psychological symptoms, underdiagnosed, hyperactivity

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Even though attention deficit hyperactivity disorder (ADHD) is a disorder that occurs in both genders, it is more commonly diagnosed in males as they display more hyperactivity symptoms. Girls with ADHD struggle as they often display inattentive symptoms, which are more subtle and difficult to notice. Due to these factors, they are often misdiagnosed or go undiagnosed which can affect their quality of life.

Internalizing Symptoms in Girls with ADHD

Young et al.'s (2020) study addressed the issue of underdiagnosis and misdiagnosis of ADHD in girls. Their study emphasized the traditional view of ADHD as a primarily male behavioural disorder. They point out that this has led to significant disparities in diagnosis and treatment, leaving many girls and women not receiving the necessary support they need to thrive. Additionally, ADHD often presents differently in girls compared to boys. While both inattentive and hyperactive-impulsive symptoms can occur, girls often exhibit more internalizing symptoms, such as inattention, disorganization, and emotional dysregulation, rather than the externalizing symptoms such as difficulty sitting still and other impulsive behaviours that are more commonly associated with boys. Hence, these subtle symptoms are more likely to be missed by parents, teachers, and even clinicians, leading to a higher rate of missed or delayed diagnosis (Young et al., 2020). Quinn's (2005) study states that girls' tendency to internalize symptoms can lead to depression, social withdrawal, and/or feelings of inadequacy.

Gender Differences in ADHD Diagnosis and Treatment

Klefsjö et al. (2021) conducted a retrospective diagnostic study on gender differences in the diagnosis and treatment of ADHD in Western Sweden, which supports differences in the diagnosis of ADHD in girls. 100 children with an existing diagnosis were randomly recruited from six Child and Adolescent Psychiatry outpatient care units (CAPs) for this study. Results indicated that girls were more often referred to CAPs for assessment because of emotional symptoms, while boys were referred for neurodevelopmental disorders. In addition, boys were also referred for ADHD assessment at younger ages as compared to girls. However, once the diagnosis was made, both boys and girls were medicated at similar rates. Still, girls were more likely to be treated with other, non-ADHD medications, such as treatment for emotional disorders, prior to the diagnosis. Girls were more likely to have

received counselling prior to their diagnosis, including a combination of individual and family or parental counselling. These findings suggest girls often experience a different diagnostic pathway to a final ADHD diagnosis compared to boys. This can delay a correct diagnosis and treatment plan (Klefsjö et al., 2021).

Hyperactivity in Girls With ADHD

Hyperactivity in girls often manifests as hyper talkativeness or emotional reactivity, rather than the excessive motor activity commonly observed in boys (Quinn, 2005). The differences in presentation of ADHD in girls make their symptoms less apparent in classroom settings, often leading to delayed or missed diagnosis. Girls are generally less disruptive, which allows their struggles to go unnoticed. Symptoms in girls are also frequently accompanied by other conditions such as anxiety, depression, and learning disabilities, which often take priority in diagnosis. Girls are often treated for depression or anxiety before ADHD is properly diagnosed, as their symptoms can mimic similar conditions. Misinterpretation of inattentive symptoms can further lead to misdiagnosis, such as depression or bipolar disorder, instead of ADHD (Quinn, 2005).

Effects of Undiagnosed ADHD in Women

Attoe and Climie (2023) conducted a systematic review of the impacts of undiagnosed ADHD in women and the transformative effects of receiving an adult diagnosis. The authors used thematic analysis and reviewed eight studies to explore the psychological and social challenges faced by women with undiagnosed ADHD. Four key themes emerged from this analysis. Women with undiagnosed ADHD reported low self-esteem, difficulties in peer relationships, and challenges regulating their emotions, which led to them feeling isolated, socially anxious, and self-blaming. Additionally, many women also reported experiencing strained relationships with their partners, peers, or family members. These challenges were often associated with a lack of emotional understanding and self-identity issues. Women also reported feeling powerless and linked their failures to personal flaws instead of being unable to deal with the symptoms of ADHD. Finally, women who received a diagnosis of ADHD in adulthood labelled it as transformative, because it provided them with validation, relief, and increased self-love, allowing them to attribute their challenges and struggles to external causes. This, in turn, improved their self-esteem and coping strategies. In conclusion, this article underlined some challenges in the existing system, such

as gender biases in the diagnostic criteria and the lack of awareness when it comes to the female presentation of ADHD, showing that comorbidities like depression were prioritized over ADHD in clinical assessments (Attoe & Climie, 2023).

Previous research shows women and girls are underserved by the current measures for ADHD. New measures need to be constructed to assess ADHD in girls and women by focusing on the gaps in the current diagnostic practices and recognizing how female experiences, such as social-emotional difficulties and relationship struggles caused by ADHD, are often disregarded. Therefore, these studies support the need for a refined measure for ADHD that assesses the internalized symptoms in girls, which could be beneficial for developing a more comprehensive, gender sensitive scale.

The Present Study

The present study aimed to develop a new subscale for girls with ADHD because girls are often underdiagnosed or untreated due to the lack of awareness and research conducted on girls ADHD symptomology. In the past, ADHD was commonly considered predominantly a male disorder. Qualitative research and diagnostic criteria mainly focused on hyperactivity symptoms typical of boys. Due to this, rating scales are biased toward boys and are not generalizable to girls. The purpose of developing a new scale was to prioritize identifying the symptoms commonly exhibited by girls and to ensure that girls receive an accurate diagnosis. This new ADHD scale includes items that will focus on internalized symptoms, the severity of the symptoms, signs of hyperactivity/inattention, and social-emotional difficulties experienced by girls. In addition, the purpose of this adapted measure is to help girls with inattentive subtypes of ADHD obtain proper diagnosis and treatment by tailoring questions according to their gendered symptoms to reduce the gender differences in ADHD diagnosis.

Method

Participants

Due to the constraints of the study, which was conducted for an undergrad psychology course, sampling children was not possible. Instead, this study surveyed a sample of 53 undergraduate students from a Canadian university. The sample consisted predominantly of male participants, with 43 identifying as male (81%), nine as female (17%), and one as another gender identity (2%). Participants ranged in age from 18 to 33

years, with a mean age of approximately 23.2 years. 25 participants identified as Indian (46.3%), nine as White (16.7%), eight as East Asian (14.8%), seven as Other (13.0%), three as Hispanic (5.6%), and two as African American (3.7%).

Sampling Procedure

Participants were recruited through a convenience sampling method using the university's SONA research participation system. The study was advertised through the SONA portal, and interested students were able to voluntarily sign up for the study at their convenience. Eligibility was limited to current undergraduate students, and no additional exclusion criteria were applied. Data collection took place entirely online, allowing participants to complete the questionnaire remotely and anonymously. Prior to beginning the survey, informed consent was obtained from all participants.

Original Scale Items

A total of 28 items were developed based on existing ADHD literature, specifically targeting symptoms often observed in girls, such as inattentiveness, internalizing behaviours, and difficulties with emotional regulation. According to the existing qualitative research, these symptoms are not adequately targeted in current testing measures as diagnostic criteria are biased toward the symptoms presented by boys (Klefsjö et al., 2021).

Participants rated each item using a six-point Likert scale (see Appendix).

Results

It was hypothesized there would be six factors within this measure as the researchers attempted to create questions that targeted the six main symptoms found more commonly in girls and women with ADHD. These symptoms were inattention, hyperactivity, social difficulties, difficulties with task-oriented coping, distraction and emotional and psychological symptoms. Eigenvalues were used as a cutoff to determine how many factors the survey structure contained as outlined in Cohen et al. (2013).

On analysis, the scree plot (see Figure 1) and eigenvalues indicated eight factors within the data analyzed. The Tucker Lewis Index for an eight-factor measure was 0.862 and the RMSEA Index was 0.051. Both are close to the acceptable cut TLI > 0.90 and RMSEA <= 0.08.

On further analysis of one factor above and one below, it was found that using a nine-factor analysis gave better reliability as evidenced by the TLI of 0.93 and RMSEA index of

0.033 (see Table 1). It was also noted that the ninth eigenvalue was very close to 1.00 at 0.99333245. For these reasons, the researchers chose to use nine factors for the analysis of the measure of ADHD in women and girls.

Variance is very similar between the two models with the nine-factor model accounting for slightly more total variation at 0.67 versus 0.64 on the eight-factor model. This supports the researcher decision to use the nine-factor model.

On examination of the factor loading table (see Table 2), it was determined items two, three and nine should be discarded. In all three cases, these items had low loadings (< 0.30) with numerous cross loadings (< 0.30).

Nine factors are included in the analysis. Factor one measures distraction which is a measure of distractibility. This factor included questions such as “I frequently lose track of what I am doing because my mind wanders” and “I often find myself daydreaming when I should be paying attention” (Young et al., 2020). Emotional and psychological symptoms in factor two measured content, such as the habit of negative self-talk and emotional dysregulation, an ADHD trait common in women as girls (Young et al., 2020).

Factor three measures emotionality which includes feelings of exclusion, shame and failure (Attoe & Climie, 2023). Factor four measures time management skills which are a factor in overall disorganization, a common symptom for women and girls with ADHD (Young et al., 2020). Factor five measures social difficulties, as research by Attoe and Climie (2023) indicated women with undiagnosed ADHD report difficulties in their peer relationships. In factor six, we measure indicators of inattention which includes difficulty concentrating. Factor 7 measures a lack of focus, those with ADHD struggle with larger tasks and report that breaking them into smaller pieces helps with this lack of focus (Attoe & Climie, 2023). Hyperactive symptoms are measured in factor eight, which often manifests as hyper talkativeness in women and girls (Quinn, 2005). Finally factor nine addresses difficulties with task-oriented coping. Women and girls reported struggling to develop coping skills to address the challenges faced due to the myriad of ADHD symptoms (Attoe & Climie, 2023).

Factors

The nine factors are as follows:

Factor 1 (distraction): Items 17, 18, 21,

Factor 2 (emotional and psychological symptoms): Items 23, 24

Factor 3 (emotionality): Items 6, 25, 28

Factor 4 (time management): Items 11, 14

Factor 5 (social difficulties): Items 7, 8, 27

Factor 6 (inattention): Items 1, 19

Factor 7 (lack of focus): Items 16, 20, 22

Factor 8 (hyperactivity): Items 4, 5, 10

Factor 9 (difficulties with task-oriented coping): Items: 12, 13, 15, 26

Figure 1

Scree plot

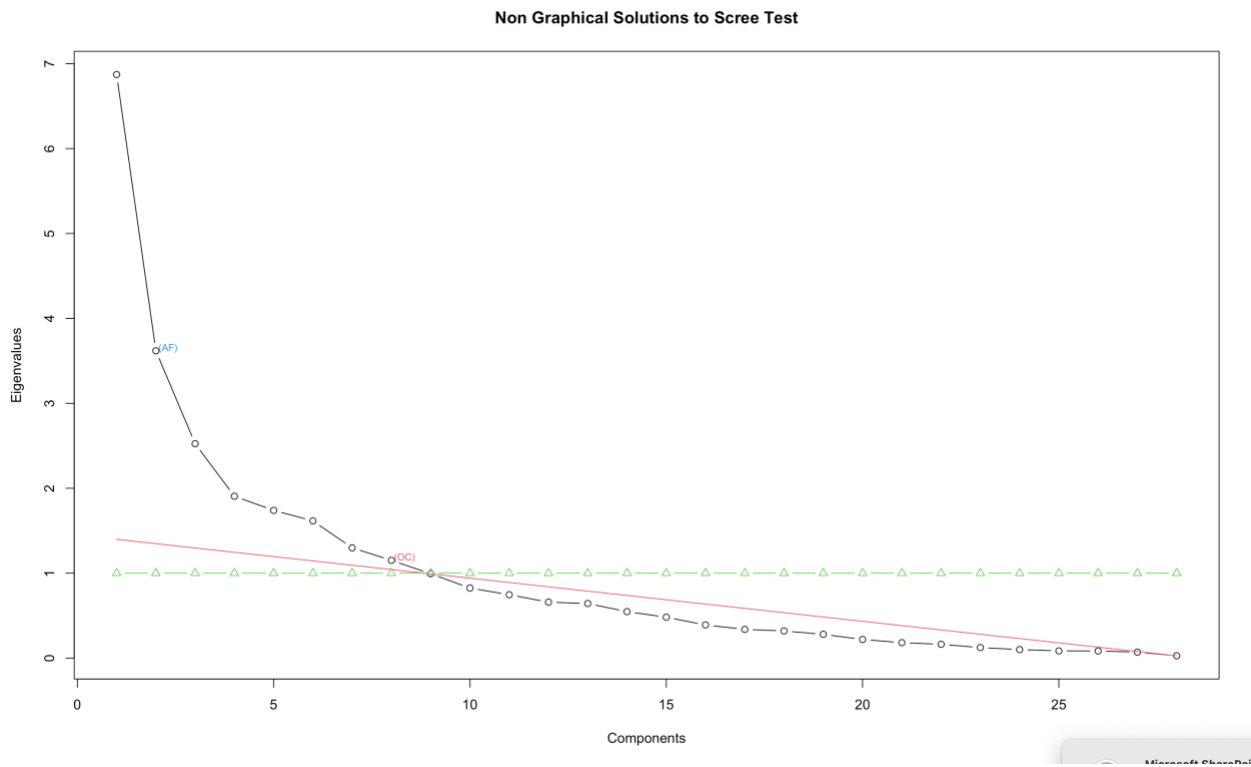


Table 1

Eigenvalues, Percentage of Variance and Cumulative Percentage for Factors for 28 ADHD Measures

Factor	Eigenvalue	% Variance	Cumulative %
Factor 1 - Distraction	6.87	10%	10%

Factor 3 - Emotionality	3.62	9%	19%
Factor 9 - Difficulties with task-oriented coping	2.52	8%	27%
Factor 4 - Time management	1.91	7%	34%
Factor	Eigenvalue	% Variance	Cumulative %
Factor 2 - Emotional and psychological symptoms	1.74	7%	41%
Factor 7 - Lack of focus	1.62	7%	48%
Factor 6 - Inattention	1.3	6%	54%
Factor 8 - Hyperactivity	1.15	6%	60%
Factor 5 - Social difficulties	0.99	6%	66%

Table 2

Factor Loading Table for a Nine Factor Analysis of 28 ADHD measures

Survey question	factor loading								
	1	2	3	4	5	6	7	8	9
1	0.13	-0.22	-0.21	-0.27	0.04	0.52	0.11	0.2	0.01
2	-0.21	0.08	-0.07	0.18	-0.08	0.25	0.23	-0.29	0.02
3	-0.13	0.12	0.05	-0.03	-0.21	0.04	0.26	0.21	0.08
4	0.14	0.02	0	-0.04	0.15	-0.03	-0.13	-0.84	-0.01
5	0.03	0.17	-0.08	0.27	0.26	0.22	-0.28	0.42	-0.38
6	-0.12	-0.02	0.45	0.04	0.37	0.16	0.11	-0.29	-0.13
7	-0.02	0.16	0.03	-0.11	0.74	0.09	-0.07	-0.24	0.21
8	0.18	-0.05	0.06	-0.05	0.47	-0.3	0.23	0.17	-0.02
9	0.13	-0.12	0.28	0.26	0.26	0.26	-0.17	0.24	-0.21
10	0.15	0.35	0.06	0.09	0.01	-0.31	-0.14	0.4	0.22
11	0.26	-0.06	0.1	0.53	-0.19	0.22	-0.13	-0.24	0.17

12	0.17	0.03	0.04	0.27	-0.11	0.23	0.05	-0.14	0.59
13	0.07	-0.07	0.08	-0.04	0.23	0	0.03	0.05	0.75
14	0.1	0.11	-0.01	0.87	-0.04	-0.1	0.16	0.1	-0.02
15	0.22	-0.01	0.11	0.12	0.11	0.27	-0.08	0.2	0.44
16	-0.06	0.05	-0.28	0.31	0.3	-0.19	0.45	-0.02	0.27
17	0.97	-0.08	0.05	0.1	0.03	-0.1	0.06	-0.03	-0.01
18	0.55	-0.04	0.02	0.12	-0.04	0.16	-0.05	-0.05	0.24
19	0.26	0.07	0.22	0.03	0.08	0.61	0.15	0.01	0.18
20	0.11	0.33	0.05	0.14	-0.19	0.12	0.57	-0.09	-0.06
21	0.69	0.1	0.13	-0.1	-0.05	0.33	0.04	-0.06	0.04
22	0.13	0.15	0.1	0.1	0.03	0.08	0.78	0.14	0.02
23	0.01	0.54	0.3	0.01	0.07	-0.09	-0.3	-0.01	0.36
24	-0.07	0.93	-0.01	0.05	0.05	0.02	0.17	0	-0.09
25	0.14	0.05	0.59	-0.05	-0.27	0.17	-0.15	0.27	0.12
26	-0.01	0.22	-0.2	0.11	-0.27	0.15	0.08	0.18	-0.34
27	-0.22	-0.21	0.35	0.33	0.38	0.13	-0.05	0.07	0.15
28	0.13	0.05	0.92	0.02	0.04	-0.07	0.09	-0.04	0.04

Scale Reliability

The reliability analysis of the nine factors showed different levels of consistency among the items. Factor 1 (distraction) had a high alpha of 0.88, showing excellent internal consistency. The items in this group are highly related and appear to measure the same concept very well. This factor is very reliable and does not need any changes.

Factor 2 (emotional and psychological symptoms) had a low raw alpha of 0.55, suggesting that the items in these factors do not strongly correlate with each other. Removing one or more items could improve these factors' reliability.

Factor 3 (emotionality) showed better reliability with a raw alpha of 0.69, indicating that the four items in this factor are measuring a similar concept. The inter-item correlations are generally strong, particularly for item 28, which had a high correlation with the other items. However, item six and item 25 show weaker relationships with the rest. A minor revision to these two items could help improve overall reliability.

Factor 4 (time management) had a raw alpha of 0.68, which is moderate to good, suggesting that the two items are measuring the same concept. The correlation between these items was strong, and this factor seems to be reliable.

Factor 5 (social difficulties) had a poor raw alpha of 0.44, meaning that the items do not fit together well. The low inter-item consistency suggests that these items may be tapping into different experiences or aspects of social difficulties. It might help to revise or remove one of the items to make the factor more reliable.

Factor 6 (inattention) had a low raw alpha of 0.45, suggesting that the two items in this factor do not go together well and may not be measuring the same concept. The inter-item correlations are moderate, but item one had a low correlation with the rest, suggesting that it may not fit well within the factor. It might be helpful to consider removing or revising item(s) to improve reliability.

Factor 7 (lack of focus) had a moderate reliability with a raw alpha of 0.69 suggesting that the three items in this factor are reliably measuring the same construct. The correlations between the items are moderate to strong, making this factor relatively reliable.

Factor 8 (hyperactivity) had a low raw alpha of -0.56. This negative value and poor correlations with each other suggest that the items are not related to each other and might be measuring different things. Item four may be reversed to better match the other items.

Factor 9 (difficulties with task-oriented coping) had a low raw alpha of 0.49, suggesting that the items do not align. Item 26 was negatively correlated with the first principal component and probably should be reversed.

Overall, only Factor 1 (distraction) shows excellent reliability and does not require any changes. Factors 3 (emotionality), 4 (time management), and 7 (lack of focus) have moderate reliability and are consistent, though small improvements could help. On the other hand, Factors 2 (emotional and psychological symptoms), 5 (social difficulties), 6 (inattention), 8 (hyperactivity), and 9 (difficulties with task-oriented coping) show low reliability and may benefit from revising or reversing certain items.

Discussion

The primary rationale within this study was to address the gap in diagnostics when it comes to identifying ADHD in girls, which is a population that is often overlooked due to the gendered presentation of common symptoms of this disorder. While boys are more

frequently diagnosed due to externalizing behaviours such as hyperactivity and impulsivity, girls are more likely to exhibit more internalizing symptoms such as inattention, emotional sensitivity and social withdrawal. These symptoms are much less disruptive than the ones seen in boys and therefore are often missed or overlooked by teachers, parents and even clinicians. The main goal of this study was to develop a scale which was gender sensitive, that would better capture the symptoms experienced by girls and, in turn, lead to more accurate diagnoses.

It was initially hypothesized that the scale would reveal six underlying factors which were: inattention, hyperactivity, social difficulties, task-oriented coping difficulties, distraction and emotional and psychological symptoms. The results of the factor analysis did not support this prediction and instead a nine-factor solution was found to be a better fit for the data, based on the strong model fit indices with the TLI of 0.93 and RMSEA of 0.033. The final factors were identified as distraction, emotional and psychological symptoms, emotionality, time management, social difficulties, inattention, lack of focus, hyperactivity and difficulties with task-oriented coping. This much more detailed factor structure reveals that the experiences that girls with ADHD have, are much more multifaceted and cannot be fully captured by broader or even fewer categories.

Limitations

There were several limitations with this study. The sample was not limited to women and girls. Due to the constraints of the study (upper-level psychology course with a limited time frame) it was not possible to sample children as this would have required a much more in-depth REB application. Additionally, surveying the population of interest—young girls—would have required more time. Further, limiting the sample to only women through SONA would have resulted in a very small sample size as noted in the demographics (43 identifying as male, nine as female, and one as another gender identity). Another limitation that was seen in this study, was the limited generalizability of the findings due to the homogenous sample. Since the participants were all university students, which excludes younger individuals and those from varied cultural, educational and socioeconomic backgrounds, this creates a sample size from a very narrow demographic. This, in turn, could limit the applicability of the scale to much more broader populations.

Future research in this area should focus on validating this scale across much more diverse groups, including clinical populations and even adolescents. Additionally, longitudinal research could help examine whether early identification using this gender sensitive scale could improve long term outcomes for girls with ADHD in areas such as academic achievement, mental health and even interpersonal relationships. Expanding this scale's use in school and clinical settings could also help bring down the gender disparities in ADHD diagnosis and treatment which could, in turn, allow for much more accurate and even earlier diagnoses.

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Appendix

ADHD Measure for Girls

This scale uses a 6-point agreement scale where:

- 1 = Not at all like me
- 2 = A little like me
- 3 = Somewhat like me
- 4 = Moderately like me
- 5 = Mostly like me
- 6 = Exactly like me

Items 2, 3, 5, 8, 10, 14, 16, 20, 22 and 24 are reverse coded

Item 1: I often prefer to do my schoolwork in a quiet room.

Item 2: I find noise-canceling headphones unhelpful for concentrating in class.

Item 3: My emotional reactions are much milder than most of my peers.

Item 4: I am often called out in class due to talking too much.

Item 5: I find it easy to make new friends.

Item 6: I often feel left out or excluded by my peers.

Item 7: I have trouble understanding how others are feeling.

Item 8: I do not have trouble understanding non-verbal social cues, such as body language, facial expressions, or tone of voice.

Item 9: I feel anxious or nervous in social situations.

Item 10: I do not have difficulty knowing what to say in social situations.

Item 11: I often put off starting tasks even when they are important.

Item 12: I struggle to finish tasks that require ongoing effort.

Item 13: I often engage multiple projects but rarely complete them.

Item 14: I do not have trouble managing my time effectively.

Item 15: I frequently underestimate how long a task will take me.

Item 16: I find it easy to break big tasks into smaller, manageable steps.

Item 17: I frequently lose track of what I am doing because my mind wanders.

Item 18: I often find myself daydreaming when I should be paying attention.

Item 19: I get easily distracted by sounds, movement, or other external stimuli.

Item 20: I find it easy to stay focused on one thing at a time.

Item 21: I struggle to complete tasks because I keep shifting my attention to different things.

Item 22: I can easily tune out distractions and stay focused when needed.

Item 23: I often tend to indulge in negative self-talk.

Item 24: I have control over my emotions.

Item 25: Whenever I make a mistake, I feel ashamed of myself.

Item 26: I never blame myself for my failures.

Item 27: I often face difficulty initiating conversation with others which affects my social relationships.

Item 28: My mind is full of 'negative/positive' thoughts that make it harder to stay focused as I fixate on the intrusive thoughts.